The Development and Testing of an Instrument for Measuring Awareness of Coronary Heart Disease Risk Factors Reduction in a Hong Kong Chinese Population

Submitted by
CHAN CHOI WAN
RN, B App. Sc. Nursing, PG Dip App. Psychology, MNS

A Thesis Submitted in Total Fulfillment

of the Requirements of the Degree of

Doctor of Philosophy

School of Nursing (NSW & ACT)

Faculty of Health Sciences

Australian Catholic University
Research Services
Locked Bag 4115,
Fitzroy, Victoria 3065
Australia

December 2008

STATEMENT OF SOURCES

This thesis contains no material published elsewhere or extracted in whole or in part from a thesis by which I have qualified for or been awarded another degree or diploma.

No other person's work has been used without due acknowledgment in the main text of the thesis.

This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution.

All research procedures reported in the thesis received the approval of the relevant Ethics/Safety Committees (where required).

Name: CHAN Choi Wan

Signature: ____________________

Date: December 2008

Abstract

Coronary heart disease (CHD) claims millions of lives every year worldwide. In the developed countries, a clear connection has been documented between a decline in CHD mortality and modifiable risk factor reductions. While raising awareness of CHD risk factors reduction is imperative, no valid instrument backed by robust psychometric data is available to measure people's awareness in this regard. In addition, especially among the Chinese population, despite many studies already conducted concerning awareness of CHD-related issues, inconsistency in how people define and measure this concept remains.

This study aimed to develop a valid instrument that measures Hong Kong Chinese people's awareness of CHD risk factors reduction. The study involved two phases. Phase I involved qualitative data collection through 18 focus group interviews (n=100). Participants in this phase included members from three groups: (1) the low risk general public, (2) people having multiple CHD risk factors either with or without CHD, and (3) people who have been diagnosed of myocardial infarction. The objective of this phase was to identify key elements and to clarify the concept inherent in awareness, from which served as a basis to generate items to form the awareness instrument. Upon completion of this phase, three main categories were generated including: CHD knowledge, perceptions of CHD, and risk control efficacy. Under these main categories, twelve subcategories emerged. Under the category of CHD knowledge, the subcategories were: pathological causes of CHD, external forces in causing CHD, modifiable and non-modifiable risk factors, CHD trends, symptoms of CHD, and knowledge of CHD prevention. Under the category of perceptions of CHD, the subcategories were: perceived seriousness of CHD and perceived risk. Under the category of risk control efficacy, the subcategories were: planning of health actions, control over risk reducing behaviour, perceived opportunities to understand CHD, and chest pain appraisal/perceptions.

A total of 70 items were generated to form the Awareness of Coronary heart disease Risk Factors Reduction (ACRFR) scale.

The second phase of this study focused on the evaluation of the psychometric properties of ACRFR scale. The objective of this phase was to establish the validity and reliability of the instrument. It commenced with determining the content validity by expert review, followed by identifying the factor structure, construct validity and reliability. A good content validity index (CVI) of 0.84 was achieved. The factor structure of ACRFR was identified through exploratory factor analysis (EFA) data collected from a sample (n=232) of the three groups as described in phase one. The final results revealed a seven-factor model with 43 items accounting 49.5% of the total explained variance. The seven factors were: (1) CHD knowledge, (2) planning of health actions, (3) perceived ability to monitor health-related behaviour, (4) perception of risk, (5) perceived opportunities to understand CHD, (6) perceived seriousness of CHD, and (7) chest pain appraisal/perceptions.

The factor structure of ACRFR was further cross-validated by confirmatory factor analysis (CFA) in another independent sample (n=225) of the three groups. Goodness of fit statistics fell within acceptable ranges: χ^2 / df = 1.6, RMSEA = 0.053, NNFI = 0.92, IFI = 0.93, CFI = 0.93. The factor model was further supported by hypothesis testing and known-groups comparisons. The results of hypothesis testing demonstrated significant correlations between ACRFR and other measures. Known-groups comparisons among subjects with MI, those with CHD and without CHD provided satisfactory evidence for construct validity. Reliability of this developed instrument, as estimated by the internal consistency Cronbach's alphas, ranged from 0.60 to 0.90 for each sub-scale and for the total scale was 0.82, and the test-retest reliability was 0.89, suggesting good instrument reliability.

While current literature reveals no objectively devised conceptual definition of ACRFR and that no published instrument was made available for healthcare professions to enhance

people's awareness of reducing CHD, this study fills these gaps. It is envisaged that this developed instrument could assist healthcare professional in accurately estimating people's awareness of risk factors reduction that could provide valid and reliable data that could inform future directions in CHD prevention and cardiac health promotion.

Acknowledgments

I thank my supervisor, Professor Violeta Lopez, for her knowledge, advice, sustained support and encouragement throughout the course of this study. She has revived my enthusiasm to continue this study when I met difficulties.

I would like to thank Professor Joanne W. Y. Chung, Professor of Nursing at the Hong Kong Polytechnic University, who acted as my associate supervisor during the conduct of this study in Hong Kong, and for her invaluable support and advice in dealing with various problems related to the study.

I would like to acknowledge Dr. Matthew Ng, Dr. Stephen Lee and Dr. Dawna Chiu for their support to conduct this study.

I would like to express my gratitude to Ms. K. B. Lam, Ms. Y. Y. Ho, Ms. W. C. Chan, Mr. Peter Chan, Mr. K. S. Chan, and Mr. Peter Chuk for their assistance in the recruitment of participants.

I am grateful to the participants who consented to participate in this study. Their involvement in the study encouraged and supported me.

Special thanks are given to Ms. Caroline Chan, Ms. S. F. Leung, Ms. Claudia Chan, Dr. Sze and Dr. C. F. Wong. They have been my valuable friends whose understanding and words of encouragement help me to go through difficulties.

I am deeply indebted to my mother, my sister and brother, for their love and unfailing support. Their care and encouragement enabled me to continue and complete this project. I would like to express my love and thankfulness to them.

TABLE OF CONTENTS

CHAPTER 7. RESULTS OF PHASE II STUDY

CHAPTER 8. DISCUSSION: PHASE TWO RESULTS

CHAPTER 9. CONCLUSION

APPENDICES

List of Tables

List of Figures

List of Abbreviations

Statistical Abbreviations	
CI	Confidence interval
CFI	Comparative fit index
EFA	Exploratory factor analysis
CFA	Confirmatory factor analysis
HR	Hazard ratio
LISREL	Linear Structural RELation software
IFI	Incremental fit index
KMO	Kasier-Meyer-Olkin
NNFI	Non-normed fit index
OR	Odds ratio
RMSEA	Root mean square error of approximation
RR	Relative risk
rho	Spearman rank correlation
SMC	Standard multiple correlation
SPSS	Statistical Package for Social Sciences
X^2	Chi-square
dƒ	Degree of freedom

Other abbreviations	
ACRFR	Awareness of CHD risk factors reduction
BMI	Body mass index
CABG	Coronary bypass surgery
CHD	Coronary heart disease

CVD	Cardiovascular disease
FP	Female participant
HBM	Health Belief Model
LRP	Low risk public
MI	Myocardial infarction
MP	Male participant
MRF	Multiple risk factors group
PAPM	Precaution Adoption Process Model
PTCA	Coronary angioplasty
PMT	Protective Motivation Theory
SARS	Severe acute respiratory syndrome
SCT	Social Cognitive Theory
SL	Source language
TL	Target language
TPB	Theory of Planned Behavior
TTM	The Transtheoretical Model

CHAPTER 1

INTRODUCTION

This chapter provides the current research in context. The epidemiology of coronary heart disease (CHD) and the importance of the awareness of CHD in terms of risk factors reduction will be highlighted. The justification for this study focusing on the awareness of CHD risk factors reduction will be presented followed by the aim and objectives of the study.

The Epidemiology of CHD in the Local and Worldwide Contexts

In Hong Kong, heart disease is the second major cause of death. It accounts for about 15.2% of all causes of deaths in 2005 (Hospital Authority, 2005/2006). More than 68% of all deaths from heart disease were from CHD in 2005 (Hospital Authority, 2005/2006). Deaths from CHD has increased over the years between 1981 to 2005, rising from 2103 deaths in 1981 to 3719 deaths in 2003 and 4003 deaths in 2005 (Hospital Authority, 2003/2004, 2005/2006). Worldwide, CHD as a disease is one of the most common causes of death and kills more than 7 million people each year (Beaglehole, 2001; Mackay & Mensah, 2004). In the United Kingdom, around one in five men and one in six women died from CHD and caused over 105,000 deaths in 2004 (Allender, Peto, Scarborough, Boxer, Rayner, 2006). In 2007, according to the American Heart Association (2007), one in every five deaths in the USA was caused by CHD. The mortality, including CHD and myocardial infarction (MI), accounted to 609,886 (American Heart Association, 2007). In Australia, CHD is the largest single cause of death, accounting for 24,576 deaths and it accounted for 19% of all deaths and 51% of cardiovascular deaths in 2004 (Australian Institute of Health and Welfare, 2006). Based on 2004-2005 National Health Survey, about 334,500 Australians were affected by CHD (Australian Institute of Health and Welfare, 2006). Apart from the developed countries, the world is witnessing the ever increasing incidence of CHD in the developing countries; deaths and disability caused by the disease have been prevailing (Beaglehole, 2001; Khor, 2001). It was projected that CHD will continue to be a serious health problem and will remain as a major disease until 2020 (Beaglehole, 2001). As such, if preventive medicine is to make a difference in human well-being, then CHD must be urgently addressed.

The Importance of Awareness of CHD Risk Factor Reduction

Years of clinical research provided evidences to demonstrate a positive relationship between morbidity and mortality of CHD, and the prevalence of the major modifiable risk factors such as cigarette smoking, physical inactivity, elevated cholesterol level and elevated blood pressure (Beaglehole, 2001; Byers, Anda, McQueen, Williamson, Mokdad, Casper et al., 1998; Critchley, Liu, Zhao, Wei, Capewell, 2004; Unal, Critchley, Capewell, 2004). This has brought about tremendous efforts towards alteration of the CHD modifiable risk factors. In some developed countries, efforts have been launched successfully resulting in the decline of CHD-related mortality (Capewell, Beaglehole, Seddon, McMurray, 2000; Critchley & Capewell, 2003; Hunink, Goldman, Tosteson, Mittleman, Goldman, Williams et al., 1997).

It is believed that if the prevalence, morbidity and mortality rates of CHD were to be effectively curtailed, all communities worldwide could not do without the awareness of reducing modifiable risk factors. Parallel to World Health Organization's conviction (2002) to the importance of individual efforts in reducing the modifiable CHD risk factors, raising individual awareness of CHD risk factors reduction is highlighted. Unless an individual is aware of how health promotion and prevention constitute an effective outcome to CHD risk reduction, change in health behaviours is unlikely. Therefore, individual awareness in this regard is fundamental to bring about personal judgment which guides health changes (Bandura, 1997).

The Problem: A Lack of Valid Instrument Measuring 'Awareness of CHD Risk Factors Reduction'

Understanding, identifying and enhancing people's awareness of reducing CHD risk factors present great challenges to the healthcare professions. Other than calling for health professionals' sensitivity to individual's awareness, it also highly calls for a valid instrument to evaluate the awareness of CHD risk factors reduction amongst the population. To date and to the researcher's knowledge, the literature has not revealed any published instrument of this type supported by robust psychometric data. Even though previous studies have examined individual awareness of CHD-related issues for the purpose of reducing CHD risks, there is no clear agreement and comprehensive information about what constitutes 'awareness' when the term is used in the health context, and about what the key conceptual elements are, and in particular regarding the concept 'awareness of CHD risk factors reduction'. These gaps in the literature are waiting for clarifications.

The Aim and Objectives of the Study

The current lack of a clear and comprehensive research-based instrument to define and measure the concept of 'awareness of CHD risk factors reduction' could lead to incomplete assessment of individual awareness that could be useful in identifying needs and informing strategies for CHD prevention. Therefore, the aim of this research was to develop an instrument that can be a sensitive measure for this concept. The objectives were to firstly, generate items for the instrument and secondly, to evaluate the psychometric properties of the developed instrument.

The study involved two phases. The purpose of the first phase was to identify and clarify the key elements of this concept through a qualitative data gathering process. As the risk factors of CHD affects the general and diseased populations including those diagnosed with

CHD and MI, the study involved data collection from three target groups of participants: (1) members of general public, (2) people with multiple CHD risk factors with or without a history of CHD, and (3) those with a diagnosis of MI. Based on the findings generated from the qualitative data, instrument items assessing individual awareness of CHD risk factors reduction were initially generated. The second phase of this study involved the psychometric analysis of the generated instrument. Included in this phase was a methodological research conducted that supported the establishment of the content validity, the factor structure, reliability and validity of the generated instrument. The developed instrument is referred to as Awareness of Coronary Heart Disease Risk Factors Reduction (ACRFR).

Structure of the Thesis

Chapter 1 presents a brief overview of the epidemiology of coronary heart disease worldwide and in Hong Kong. This chapter also presents the study aim and objectives and some gaps in the literature.

Chapter 2 presents the literature review focusing on the associations between incidence, morbidity and / or mortality of CHD and the prevalence of modifiable risk factors among the general and diseased populations, as well the positive effects of improvement of these risk factors on CHD prevention. The importance of understanding people's awareness of CHD risk factors reduction is also discussed.

Chapter 3 expands the literature review to clarify the concept of awarenss and in particular, awareness to CHD risk factors reduction. The literature pertaining to the conceptual meanings of 'awareness' and previous studies describing the attributes that are associated or conceptually relevant in defining the 'awareness of CHD risk factors reduction' are reviewed and discussed. The theoretical framework, Precaution Adoption Process Model (PAPM) used to guide this study is also presented.

Chapter 4 describes the methodology of this Phase one study. This chapter commences with an introduction of the study design, along with the rationale for using the qualitative descriptive method to explore the awareness regarding CHD risk factors reduction. Details of the sample and sampling method, data collection procedures, together with the purpose of using focus groups for data collection are discussed. This chapter concludes with a description of the analytic procedures employed in this study. The trustworthiness of qualitative data within the qualitative research paradigm is also discussed.

Chapter 5 presents the findings of Phase one of the study. The three main categories that emerged from the data: (1) CHD knowledge; (2) perceptions of CHD; and (3) risk control efficacy are described and discussed. This chapter also discusses the similarities and differences in the information obtained from the three target populations of the Hong Kong Chinese people. In the second part of this chapter, the process of item generation is described and an initial pool of instrument items is presented.

Chapter 6 describes the method to establish content validity of the instrument items using a panel of experts. The translation of instrument, the establishment of semantic equivalence and the pilot study of the instrument are addressed. Sampling for evaluating the psychometric properties of the instrument regarding the identification of the factor structure, reliability and construct validity of the ACRFR are presented. The data collection and data analysis are described and the ethical considerations of the research study are addressed.

Chapter 7 presents the results of Phase II study including content validity, identification of the internal structure of ACRFR using the statistical technique of exploratory factor analysis (EFA), internal consistency reliability and test-retest reliability, construct validations of ACRFR using confirmatory factor analysis (CFA), known-groups method, and hypothesis testing.

Chapter 8 presents the discussion of Phase 2 study in light of the literature and the theoretical framework used in this study. The discussion highlights that awareness to CHD risk factors reduction follows a continuous process of acquiring knowledge about CHD, having attention to CHD-related issues, personalisation of CHD risk, having the ability to detect error in the course of risk reduction, planning of compensatory action to reduce risk, and having the ability to monitor performance in risk reduction

Chapter 9 presents the summary of the main findings and addresses the strengths and limitations of the study. Recommendations for future research to further improve the ACRFR scale and implications for nursing practice in respect of the awareness of CHD risk factors reduction are discussed.

CHAPTER 2

LITERATURE REVIEW

Introduction

CHD has been responsible for more than 7 million deaths each year (Beaglehole, 2001; Mackay & Mensah, 2004). It has been projected that CHD as a major killer probably will remain unchanged even up to year 2020 (Beagehole, 2001). As the occurrence of this disease is closely related to the lifestyle risk factors that are modifiable, there is a pressing need to be aware of, and to reduce them.

This chapter presents a review of the current literature of the major risk factors predisposing CHD, and in particular, the modifiable risk factors. A review of the literature pertaining to the impact of CHD modifiable risk factors and the positive effects of eliminating these modifiable risk factors on CHD prevention will also be discussed. All these reviews provided a clear picture to elucidate the CHD risks faced by the population. In the latter part of this chapter, the importance of understanding people's awareness of reducing CHD risk factors will be highlighted.

Literature Search

A literature search using the databases including Medline (1966-2008), CINAHL (1982-2008) and PsycINFO (1966-2008) was performed. The key words used in the literature search for the present study include: 'coronary heart disease', 'cardiovascular diseases', 'heart disease', 'myocardial ischemia', 'awareness', 'consciousness', 'attention', 'knowledge', 'belief', 'perception', 'attitude', 'behaviour', 'risk', 'perceived risk', 'risk factors', 'health beliefs model', 'social cognitive theory', 'theory of planned behavior', 'protection motivation theory', 'transtheoretical theory', 'precaution adoption process model', 'scale', 'instrument', ‘questionnaire’, and ‘Chinese’. The literature search resulted with numerous articles, in which each abstract identified from the search was carefully securitised. Many important studies related to CHD and risk factors were found in the earlier reports dated as far as 1980’s, and therefore, included in the literature review. Lastly, further selection of relevant articles and identification of key references from the articles selected formed the basis for the literature review in this chapter and the following chapter. The following chapter related to the theoretical framework and why the framework was chosen and used to guide this study are also covered in the literature review.

Risk Factors of Coronary Heart Disease

CHD is an ischemic condition adversely affecting health outcomes and refers to the inability of the coronary artery to deliver oxygen and nutrients to meet myocardial metabolic demands (Baxendale, 1992; Black, Hawks, Keene, 2001). Atherosclerosis is the most prevalent syndrome leading to coronary ischemia (Baxendale, 1992; Black et al., 2001; Cunningham, 1992). Atherosclerosis develops as a result of alterations in the integrity of the vasculature. Such alterations trigger the repair processes that initiate deposition and adherence of monocytes and platelets, stimulate proliferation of smooth muscles, and results in focal thickening of the inner layer of arterial wall. The early evidence (Baxendale, 1992) of atherosclerosis is the presence of small fatty streaks along the inner endothelial layer of the arterial wall. These fatty streaks can also be observed in association with smooth muscle fibers and other fibrous proteins. Streaks accumulate, progress, and form fibromuscular plaques in the inner layer of vessel wall(s) with age. Plaque formation can also be initiated through lipid deposition and endothelial injury as a result of hypertension, infection or trauma. Atherosclerosis, streaks and plaque formation increase the wall-to-lumen ratio. If these occur in the coronary arteries, the myocardial metabolic need for oxygen and nutrients will be insufficient (Baxendale, 1992; Black et al., 2001).

The above phenomena are closely related to the risk factors attributed by an individual. The spectrum of CHD risk factors can be divided into two major categories: the non-modifiable and modifiable risk factors. Family history of CHD, gender and age are regarded as non-modifiable risk factors. Individual lifestyle factors are regarded as the modifiable risk factors.

Non-modifiable risk factors of CHD

Family history of CHD

The role of family history of CHD as a risk factor of CHD has been explored in previous studies (Murabito et al., 2005; Nasir et al., 2007). In a population-based multiethnic cohort, Nasir et al. (2007) reports that a family history of CHD was associated with a higher prevalence and magnitude of coronary calcification, suggesting an increased susceptibility to atherosclerosis, plaque formation and the development of subsequent coronary events. Murabito et al. (2005) examining family history of cardiovascular diseases (CVD) including CHD in families report that subjects with sibling having CVD was associated with a significantly increased risk for CVD (adjusted odds ratio [OR]: 1.45, 95% confidence interval [CI]: 1.10-1.91).

Furthermore, previous studies had reported an interaction of family history of CHD with the presence of modifiable risk factors (Juonala et al., 2006; Yeung et al., 2007). Juonala et al. (2006) report that subjects with positive family history of CHD had greater arterial vulnerability, which associated strongly with the number of metabolic risk factors. Similarly, Yeung et al. (2007) highlight that family history of CHD had a positive effect on type 2 diabetic risk. As such, evidences so far had highlighted that the role of family history have an effect to accentuate CHD risks.

Gender

The difference in CHD risk between men and women has been presented in the literature, with men manifesting CHD about 10 to 15 years before women (Cunningham, 1992; Grundy et al., 1998). Apart from this, risk factors of CHD may have differential effects for males and females, as well as gender-specific differences in the prevalence of risk factors for mortality, were examined in previous studies (Lee, Cheung, Cape, Zinman, 2000; Van Jaarsved et al., 2006). For instance, Lee and colleagues (2000) in a meta-analysis of prospective studies report that the impact of diabetes on CHD mortality was greater for females when compared with males. Gender-specific risk factors for mortality were examined in a prospective community-based study by Van Jaarsved et al. (2006), and found that diabetes as a risk factor increase long-term mortality among females with AMI but not among males with AMI.

Age

Aging is asscoiated with structural changes within the arterial wall and arterial endothelial dysfunction, which mediate atherosclerotic process (Lakatta & Levy, 2003; Kozakova et al., 2007). Age increases risk and mortality for CHD as the result of progressive accumulation of coronary atherosclerosis with aging. Furthermore, age as reported by Zureik et al. (1999) is also related to the incidence of high blood pressure. A longitudinal study of a large population of relatively aged subjects (n=957, 59-71 years) showed that elevated levels of pulse pressure are associated with progression of arterial wall thickening (Zureik et al., 1999). A number of studies also concurred that elevated pulse pressure is an independent risk factor for future cardiovascular events (Franklin, Khan, Wong, Larson, Levy, 1999; Franklin et al., 2001; Izzo, Levy, Black, 2000; Sesso et al., 2000).

In summary, family history of CHD, gender and age as non-modifiable risk factors cannot be modified, but they have been commonly reported to influence other potential modifiable risk factors of CHD, in which these risk factors can be modified through health changes in lifestyles to reduce CHD risk. In the following sections, indepth discussion on modifiable risk factors of CHD will be discussed as these risk factors are major issues as far as a person's efforts in CHD risk factors reduction is concerned.

Modifiable risk factors of CHD

Modifiable risk factors include smoking, physical inactivity, obesity, high intake of dietary fat and cholesterol (high triglyceride, total cholesterol and non-high-density lipoprotein cholesterol level), high blood pressure, diabetes, high consumption of alcohol, and stress (Black et al., 2001; Cunningham, 1992). These modifiable risk factors predisposing and / or demonstrating synergistic effects on CHD have been reported in the literature (Black et al., 2001; Barrett-Connor & Khaw, 1989; Baxendale, 1992; Craig, Palomaki, Haddow, 1989; Eckel, Barouch, Ershow, 2002; Eliasson, 2003; Grundy et al., 1998; Hagberg, Montain, Martin, Ehsani, 1989; Hammar, Johansson, Hu, Pleltonen, Qiao, Tuomilehto, 2004; Hubert, Eaker, Garrison, Castelli, 1987; Krauss, Winston, Fletcher, Grundy, 1998; Laufs et al., 2005; Visscher & Seidell, 2001; Wagenknecht, Zaccaro, Espeland, Karter, O'Leary, Haffner, 2003; Yusuf et al., 2004).

Smoking

Cigarette smoking is one modifiable risk factor of CHD with adverse impacts on CHD. Cigarette smoking contains a number of constituents that lead to the initiation and progression of atherosclerosis, that triggers clinical events. Cigarette contains nicotine, which has been suggested to precipitate vasospasm and hence acute ischemia. Smoking-related vasospasm may precipitate manifestation of CHD such as angina and sudden cardiac death (Baxendale, 1992; Black et al., 2001). Smokers were found with increased platelet aggregation and thrombosis that lead to the thickening of the arterial wall causing myocardial ischemia

(Baxendale, 1992; Black et al., 2001; Haskell, 2003). The Framingham's early findings found that smoking is a powerful risk factor for MI, even stronger than for angina pectoris (Hubert, Holford, Kannel, 1982). An earlier study also found that smoking cessation could rapidly and markedly reduce risk for MI (Rosenberg, Kaufman, Helmrich, Shapiro, 1985). Grundy et al. (1998) highlight that smoking is especially dangerous in patients with advanced coronary atherosclerosis, as it destabilises coronary plaques and promotes plaque rupture and coronary thrombois.

Diabetes, hypertension, dyslipidemia, obesity and a systemic proinflammatory state are features of metabolic syndrome, which is a well-known predictor of CHD events (Girman et al., 2004). A number of research studies reported that smoking is associated with the major components of metabolic syndrome including increased insulin resistance (Eliasson, 2003), abdominal obesity (Barrett-Connor & Khaw, 1989), and low high-density lipoprotein (HDL-C) cholesterol concentrations (Craig et al., 1989). Tonstad and Svendsen (2005) further elucidate the relation between smoking and the metabolic syndrome by examining 705 men aged <55 years and 296 women <65 years within 6 to 12 months of a major CHD events and found in that metabolic syndrome doubled in men who smoked cigarettes daily (OR: 2.2, 95% CI: 1.3-3.7) and who were ex-smokers (OR: 2.3, 95% CI: 1.4-3.9) when compared with nonsmokers, after adjustment for age, educational background and alcohol consumption. For females, both current smokers (OR: 1.8, 95% CI: 0.9-3.5) and ex-smokers (2.0, 95% CI: 1.0-3.9) had an increased risk for metabolic syndrome when compared with nonsmokers (Tonstad and Svendsen, 2005).

Adding to cigarette smoking itself as one modifiable risk factor with adverse impact on CHD, Hammar et al. (2004) and Yusuf et al. (2004) report that cigarette smoking and the components of metabolic syndrome have an additive effect on the incidence of CHD and may have a syngergistic effect on CHD.

Physical inactivity

Physical activity improves coronary artery vasodilation and blood flow (Gielen & Hambrecht, 2001). Empirical studies have identified that the relative risk of CHD mortality for the more physically active groups ranged from 20% to 40% less than the least active groups (Manson et al., 2002; Myers et al., 2002; Tanasescu et al., 2002). Furthermore, physical activity is associated with improvements in endothelial function (Walther, Gielen, Hambrecht, 2004). This was further echoed by Laufs and colleagues (2005) who speculated that inactive lifestyle propagates vascular endothelial dysfunction increases cardiovascular event rates.

The role of physical activity in buffering psychobiological responses to psychosocial stress (one of the CHD modifiable risk factors), particularly in relation to sympatho-inhibitory effects, the inflammatory, neuroendocrine and haemostatic pathways, neural activation, and the positive effect of psychological well-being, which are directly relevant for reducing CHD risk (Hamer, 2006). It has been suggested that the post-exercise attenuation in blood pressure reactivity is a function of regional vascular resistance mediated by sympathetic nervous system inbibition (Halliwill, 2001). Brownley et al. (2003) also report that physical exercise reduces noradrenaline response and increases vasodilatation mediated-receptor to attenuate blood pressure responses. These two studies highlighted that a reduction in blood pressure reactivity could be an important stress-buffering mechanism of physical exercise in relation to CHD risk. Physical exercise has been shown to increase tissue sensitivity to glucocorticoids, which acts as a mechanism to prevent an excessive muscle inflammatory reaction (Duclos, Gouarne, Bonnemaison, 2003). In a randomised controlled study in healthy men, Wang and colleagues (2005a) report that platelet aggregation induced by stress was suppressed after 8 weeks of physical exercise training. Post-exercise changes in regional brain blood flow have been related to post-exercise hypotension (Williamson, McColl, Mathews, 2004), which leads to the possibility that the stress-buffering effects of physical exercise may result from changes in regional brain activity (Hamer, 2006). Physical exercise has been associated with positive mood and vitality (Biddle, 2000), which could promote emotional flexibility as the modality to cope with stressor.

Finally, physical inactivity as a modifiable risk factor of CHD contributes importantly to the development of metabolic syndrome to accentuate CHD risks. Studies have shown that physical activity is associated with other CHD risk factors including blood pressure, lipid levels, body weight and control of blood glucose (Hagberg et al., 1989; Hubert et al., 1987).

Obesity

Obesity as a condition has been associated with insulin resistance, type II diabetes, dyslipidemia, inflammation, thrombosis, hypertension, and atherosclerosis (Krauss et al., 1998; Visscher & Seidell, 2001; Eckel et al., 2002). Therefore, clustering of multiple metabolic risk factors as a result of obesity poses a synergistic effect on CHD.

Furhtermore, obesity has been associated with further risk of coronay thrombosis, as a risk factor for unstable angina and MI, in patients with a history of advanced atherosclerosis (Wolk, Berger, Lennon, Brilakis, Somers, 2003). According to the report by Wolk and colleagues (2003), CHD patients with even mildly elevated BMI (25.6 to 27.6) had a significantly great risk of an unstable coronary syndrome (either unstable angina or MI) than patients with normal BMI (<25.6).

High lipid and cholesterol levels

High lipid levels are referred as a total cholesterol of >200mg/dL and a low-density lipoprotein (LDL) cholesterol of >130mg/dL according to National Cholesterol Education Program (Grundy et al., 1998). Physiological investigations on cell protein proved that LDL receptors add in transferring the body's atherogenic LDL particles to the liver for excretion, and note that a diet rich in cholesterol and saturated fatty acids apparently signals the body to manufacture fewer LDL receptors (Brown, Kovanen, Goldstein, 1981). Brown and colleagues (1981) found that individuals with a lifestyle-induced deficiency of LDL receptors are prone to atherosclerosis and in greater risk of CHD. In addition, LDL has been shown to be a significant co-factor for the plaque formation and the progression of the plaque results in thickening of coronary vessel wall (Baxendale, 1992; Black et al., 2001) and hence, increases coronary risk.

Furthermore, a large body of epidemiologic, clinical, genetic and laboratory animal studies have been reviewed and summarised in reports, indicating that high serum levels of cholesterol are related to coronary atherosclerosis and increased risk of CHD (LaRosa et al., 1990). In summary, the epidemiologic evidence comparing various populations showed that there is a positive relation between serum cholesterol levels and occurrence of CHD. Clinical trials in humans have also shown that lowering levels of serum cholesterol with diet or drugs reduces the subsequent incidence of fatal or non-fatal CHD. Moreover, premature CHD commonly occurs in individuals with genetic forms of hypercholesterolemia even in the absence of other risk factors. In animal studies, atherosclerosis is developed when animals are fed with high cholesterol diet to raise serum cholesterol levels, and a substantial regression of atherosclerotic lesions has been reported when the high serum cholesterol levels are lowered by diet or drugs.

High blood pressure

According to the National Cholesterol Education Program, hypertension is defined as a consistent blood pressure greater than 140/90 mmHg (Grundy et al., 1998). Hypertension is a syndrome leading to CHD manifestations (Baxendale, 1992; Black et al., 2001). The mechanisms report that hypertension increases perfusion pressure as a result in hypertrophy of vascular smooth muscle and increased collagen concentration in vessel walls. With the alterations in vasculature, the initiations of repair processes and plaque formation take place. The increased in wall-to-lumen ratio of the vessels results in a greater resistance of the vessels and thus, increases pressure pulsatility. Eventually, this cyclic stress on the vessel walls and the proliferating substances in the inner vascular walls continue thus, predisposing a person to CHD (Baxendale, 1992; Black et al., 2001).

Diabetes

Diabetes associated with other metabolic disorders such as hypertension, hyperlipidemia, hyperinsulinemia, and obesity act in synchrony that increase CHD risk (Black et al., 2001; Grundy et al., 1998; Wagenknectht et al., 2003). Earlier studies has indicated that the increased level of circulating glucose, advanced glycation end products and oxidation of lipoproteins are unique diabetic metabolic disturbances that might increase the risk and rate of atherosclerosis (O'Brien & Timmins, 1994; Vlassara, 1994).

Furthermore, it has been suggested that atherosclerosis progresses most rapidly in the earliest stages of diabetes, and glucose and insulin levels are elevated in the prodromal stage (Wagenknecht et al., 2003). High level of glucose can damage or alter the endothelial barrier, allowing insulin to interact with the underlying smooth muscle cells. As insulin is known to have atherogenic properties (Stout, 1991), insulin in physiological concentrations triggers the proliferation of smooth muscle cells and increases lipid activity and synthesis.

High consumption of alcohol

A beneficial effect of a light to moderate consumption of alcohol on CHD has been reported by extensive epidemiologic evidences (Ajani et al., 2000; Baraona & Lieber, 1998; Mukamal & Rimm, 2001; Nanchahal, Ashton, Wood, 2000; Rankin, 1994; Renaud, Criqui, Farchi, Veenstra, 1993; Rimm, Williams, Fosher, Criqui, Stampfer, 1999; Single, Robson, Rehm, Xie, 1999). However, the relation of alcohol to CHD is complex. Evidences have shown that heavy drinking occasions, even when coupled with average light or moderate consumption, have been related to an increase in CHD risk (McKee & Britton 1998; Murray et al. 2002; Puddey, Rakic, Dimmitt, Beilin, 1999; Rehm, Sempos, Trevisan, 2003a). Reviews on patterns of drinking and CHD (McKee & Britton 1998; Puddey et al. 1999; Rehm et al., 2003a) have also shown that irregular heavy drinking occasions may have detrimental effects on CHD. For instance, in the review conducted by McKee and Britton (1998), the authors hightlighted that the detrimental effects of heavy drinking occasions on CHD were consistent with the physiological mechanisms of increased clotting and a reduced threshold for ventricular fibrillation after heavy drinking occasions, which are factors that accentuate CHD risk.

Furthermore, other patterns of alcohol drinking relevant to CHD have been examined (Dorn et al., 2003; Trevisan, Schisterman, Mennotti, Farchi, Conti, 2001a; Trevisan, et al., 2001b). Dorn et al. (2003) report that alcohol drinking patterns affect central adiposity in women and men. Increased central adiposity as a risk factor of CHD was measured by the increase in supine height of the abdomen. The study found that drinking frequency was inversely associated, but drinking intensity was positively associated with central adiposity in women and men (Dorn et al., 2003). For the association between drinking frequency and the abdomen height measure, daily drinkers had significantly lower measures than participants who drank less frequently (Dorn et al., 2003). When frequency and intensity were considered together, daily drinkers of less than 1drink/drinking day had the smallest mean supine height of the abdomen and less than weekly drinkers (drink <1 time/week) who consumed 4 or more drinks/drinking day had the largest supine height of the abdomen (Dorn et al., 2003). Trevisan et al. (2001a, b) also found consistently higher CHD risks in people drinking outside of meals compared with those who drank mainly with meals and snacks, after adjustment for age, education and volume of alcohol consumed.

Hypertension is a well-known risk factor for CHD. Alcohol consumption increases risk for hypertension (Nanchahal, Ashton, Wood, 2000; Rehm, Room, Graham, Monteiro, Gmel, Sempos, 2003b). In the review conducted by Rehm et al. (2003b), the average volume of alcohol consumption was found to increase risk for hypertensive diseases. Nanchahal, Ashton, Wood (2000), examining the relationships between alcohol consumption and hypertension among women (aged 30-94 years) in a study (n=14,077), reported that there was an increased prevalence of hypertension among women who consumed alcohol >15 units/week (OR: 1.68, 95% CI: 1.14–2.46).

As such, the increased risk of coronary heart disease (CHD) was found to depend on the volume and patterns of alcohol consumption. It is implicated that the influences of patterns of alcohol drinking on CHD risk may be underestimated because pattern measures may have not been included in many epidemiologic studies (Rehm et al., 2003b).

Stress

Stress has been implicated by a number of possible biological mechanisms in which stress induces greater reduction in cardiac parasympathetic activity leading to coronary artery calcification (Gianaros et al., 2005) as well as increases inflammatory process and pro-coagulant changes (Brydon, Magid, Steptoe, 2006; Steptoe & Brydon, 2005; Von Känel, Mills, Fainman, Dimsdale, 2001), and triggers detrimental processes to accelerate coronary risk such as platelet activation (Steptoe et al., 2003) and transient vascular enodothelial dysfunction (Ghiadoni et al., 2000). Regarding stress and CHD mortality, Sheps et al (2002) in a psychophysiological investigation report that the development of ischemia in response to mental stress in the laboratory predicted an increased in mortality rate among patients with CHD. Bunker and colleagues (2003), undertaking a review relating to the psychosocial stress for the development and progression of coronary events, reported that there is strong and consistent evidence indicating that social isolation and lack of quality social support as psychosocial stress are independent risk factors for CHD onset and prognosis. The association between psychosocial stress and CHD revealed that work stress is associated with an increased risk of CHD in prospective epidemiological studies (Kivimäki et al., 2002; Kuper & Marmot, 2003) and a higher prevalence of subclinical atherosclerosis and accelerated progression over time was reported in women with marital dissatisfaction (Gallo et al., 2003).

So far at this point, the modifiable risk factors predisposing CHD had been reviewed. To provide a clear picture to elucidate risk faced by the populations, the impact of CHD modifiable risk factors on the general public and diseased populations will be explored in the next section.

The Impact of CHD Modifiable Risk Factors

Impact on CHD Incidence and Risk among the General Public

Modifiable risk factors affecting the incidence of CHD in general populations have been investigated. In a study examining trends in the incidence of coronary disease among women (aged 34-59) who had not been previously diagnosed of cardiovascular disease (n=85,941), factors including reduction in cigarette smoking, improvement in diet, postmenopausal hormone use and the prevalence of overweight (body mass index $\geq$25 kg/m^2) were found to statistically account for a 68% of the overall decline in the incidence of coronary disease from 1980-1982 to 1992-1994 (Hu et al., 2000). When the factors were examined individually, a reduction in smoking and an improvement in diet statistically explained a 13% and 16% decline in the age-adjusted incidence of coronary disease. The increase in body mass index explained an 8% increase in the incidence of coronary disease.

Hypercholesterolemia increasing the incidence of CHD had been reported in some studies. The positive effects between serum total cholesterol with CHD incidence and mortality were reported in a meta-analysis study (n=33) (Anum & Adera, 2004). The relative risk (RR) for

CHD incidence in men, due to a cholesterol level ≥240 mg/dL versus <200 mg/dL, ranged from 1.1-1.7. In men aged 65 and above, who were longitudinally followed from middle age, the RR for CHD incidence associated with 38.7 mg/dL (or 1.0 mmol/L) increase in total cholesterol was 1.28 (95% confidence interval [CI] 1.17-1.39), whereas in elderly men (followed from age 65 and above), the RR was 1.24 for CHD incidence (95% CI 1.1-1.37). Regarding total cholesterol and CHD incidence in women, there was no detailed information provided in the meta-analysis. Similar findings regarding hypercholesterolemia affecting the coronary incidence were reported in two other studies (Downs et al., 1998; Lemaitre et al., 2002). Downs and the colleagues (1998), investigating the primary prevention of acute coronary events with Lovastatin (a cholesterol lowering drug) in persons (mean age of 58 years), reported a significant risk reduction of 40% for fatal and non-fatal myocardial infarction, and a 32% risk reduction for unstable angina. Lemaitre et al. (2002) examined the association of statin (a cholesterol lowering drug) use with the occurrence of cardiovascular disease. The authors reported a 56% lower risk of cardiovascular events after the use of statin.

In an 18-year prospective study examining the relationship between risk factors and cardiovascular disease of a large cohort (n=7092, aged 20-50), the effects of modifiable risk factors including hypertension, smoking, high total blood cholesterol (≥5.8mmol/l) and overweight (body-mass index ≥27 kg/m^2) in increasing the possibility of cardiovascular disease were reported. A significant relationship between risk factors and cardiovascular disease was, in particular among men. The relative risk (RR) associated with hypertension was 1.8 (95% CI: 1.2-2.3), smoking and high total cholesterol were 1.8 (95% CI: 1.2-2.4) and 2.5 (95% CI: 1.9-2.9) respectively. The relative risk associated with overweight was 1.6 (95% CI: 1.2-2.0). Among women, the risk factors of the high total cholesterol (RR: 1.9, 95% CI: 1.1-3.4) and overweight (RR: 1.9, 95% CI: 1.1-2.8) demonstrated a significant relationship with cardiovascular disease (Bakx, Van den Hoogen, Van den Bosch, Thien, Van Wheel, 2002).

Impact on Patients Diagnosed with CHD and MI

Modifiable risk factors also play a major role in the health outcomes of the diseased populations including those with CHD and MI. These health outcomes include the occurrence of metabolic disorders, cardiac events and deaths. Metabolic disorders include high blood pressure, diabetes, dyslipidemia and obesity, which together are regarded as metabolic syndrome (Tonstad and Svendsen, 2005). The recurrences of cardiac events include angina pectoris, unstable angina, fatal and non-fatal myocardial infarction.

Of the modifiable risk factors, the extent to which cigarette smoking affects the health outcomes of patients with CHD in terms of metabolic syndrome (that is, high blood pressure, diabetes, dyslipidemia and obesity) has been examined. Tonstad and Svendsen (2005) reported the association between cigarette smoking and the metabolic syndrome among people (n=1001) with a recent premature major coronary event (within 1 year). Men who smoked cigarettes daily had increased risk for the metabolic syndrome when compared with nonsmokers (odds ratio [OR]: 2.2, 95% CI: 1.3-3.7). Both male (OR: 2.3, 95% CI: 1.4-3.9) and female (OR: 2.0, 95% CI: 1.0-3.9) ex-smokers had higher risk for the metabolic syndrome than the nonsmokers. As smoking increases risk of the metabolic disorders, with each of the metabolic disorders and their combinations could eventually increase the risk of a recurrent event in patients with premature CHD.

Steffen-Batey et al. (2000), examining the role of physical activity in reducing reinfarction among men and women who survived after a first myocardial infarction (MI) (n=337), concluded that physical activity plays a beneficial role in reducing risk of reinfarction. In this study, at baseline and at follow-up, a change in level of physical activity was determined for each participant on the basis of his / her categorisation as (1) sedentary, no change from baseline (the referent group), (2) decreased activity, (3) increased activity, or (4) remained active, no change. Over a period of 7-year follow-up, patients who remained active after a first MI had a 60% lower risk of fatal or nonfatal reinfarction than those who remained sedentary (adjusted RR: 0.40, 95% CI: 0.24-0.66), after adjusting for age, sex, ethnicity, severity of MI, family history of CHD, hypertension, diabetes, high serum cholesterol, and smoking. Patients who increased their activity after their first MI had a 78% lower risk of reinfarction (adjusted RR: 0.22, 95% CI: 0.09-0.50), whereas patients who decreased their physical activity had a nonsignificant 7% lower risk of reinfarction (adjusted RR: 0.93, 95% CI: 0.59-1.42) compared with patients who remained sedentary.

Cholesterol and triglyceride have long been associated with cardiovascular disease mortality and morbidity (Cunningham, 1992). Bittner and colleagues (2002) investigated the impact of lipid values on 5-year outcome in patients enrolled in the bypass angioplasty revascularization investigation. Using multivariate analyses, they found that non-high-density lipoprotein cholesterol (non-HDL-C) was predictive of nonfatal myocardial infarction and angina pectoris at 5 years, with a 4.9% increase in risk of nonfatal infarction for each 0.26 mmol/L increase in non-HDL-C (multivariate RR: 1.049, 95% CI: 1.006-1.093, $p<0.05$) and also a 4.9 % increase in risk of angina pectoris for each 0.26 mmol/L increment of non-HDL-C (multivariate RR: 1.049, 95% CI: 1.004-1.096, $p<0.05$). Even after adjustment for a multitude of other demographic and clinical characteristics that are known to influence the outcomes, this study delineated non-HDL-C as a strong and independent predictor of nonfatal myocardial infarction and angina pectoris.

There are consistent findings regarding hypercholesteroleamia affecting patients' health outcomes. Sacks and colleagues (2000) reported a highly significant relative risk reduction of 27% ($p<0.001$) for CHD deaths or nonfatal myocardial infarction after the use of cholesterol lowering drug among older patients aged 65-75 years during 5-6 years follow-up. In addition, a substantial rise in total cholesterol level (from a mean of 4.30 to 5.33 mmol/L) explaining the dramatic increase of CHD mortality was reported in a longitudinal 15-year study conducted in Beijing, China, between 1984 and 1999 (Critchley et al., 2004). CHD mortality rates had increased by nearly 50% in men and 27% in women, resulting in 1608 more deaths in 1999. A rise in total cholesterol attributed to most of the CHD deaths (1379 deaths) (Critchley et al., 2004).

Obesity is associated with many metabolic and cardiovascular diseases, thereby contributing to increased morbidity and mortality. Body-mass index (BMI) had been reported as a significant factor connected with an acute coronary syndrome (such as unstable angina or myocardial infarction) in a study of patients (n=504) undergoing angiography (Wolk et al., 2003). It was reported that for every 5.18 kg/m^2 increase in BMI, a 49% increase in odds of unstable angina or myocardial infarction (p=0.014) was found after adjusting for other risk factors (including age, gender, blood pressure, lipid levels, insulin resistance, leptin, fibrinogen, C-reactive protein, coronary artery disease severity on angiography, smoking status, and a history of myocardial infarction or hypertension) (Wolk et al., 2003). This study also indicated that even with a mild elevated BMI (25.6 to 27.6), the risk of an unstable coronary syndrome increased significantly (Wolk et al., 2003).

Consistent findings regarding modifiable risk factors affecting the health outcomes of patients with acute MI were demonstrated in a large-scale standardised case-control study in 52 countries (Yusuf et al., 2004). The study involved an empirical sample of 12,461 and a controlled sample of 14,637. Nine modifiable risk factors including smoking, lipids, self-reported hypertension and diabetes, obesity, psychosocial factors, diet, physical activity, as well as alcohol consumption were examined for the association with the risk for acute myocardial infarction. The study found that all the modifiable risk factors were significantly related to acute myocardial infarction (p<0.0001), except alcohol, which had a weaker association (p=0.03). The odds ratio (OR) and 99% CI were: smoking (OR: 2.87 for current smoke versus never smoke, 99% CI: 2.58-3.19), raised lipid ratio (OR: 3.25, 99% CI: 2.81-3.76), history of hypertension (OR: 1.91, 99% CI: 1.74-2.10), history of diabetes (OR: 2.37, 99% CI: 2.07-2.71), obesity (OR: 1.12, 99% CI: 1.01-1.25), and psychosocial factors (OR: 2.67, 99% CI: 2.21-3.22), daily consumption of fruits and vegetables (OR: 0.70, 99% CI: 0.62-0.79), regular physical activity (OR: 0.86, 99% CI: 0.76-0.97), and regular alcohol consumption (OR: 0.91, 99% CI: 0.82-1.02). The authors further reported the effects of multiple risk factors and healthy lifestyles on the risk of myocardial infarction. Participants who had multiple risks factors including current smoking, hypertension, and diabetes together increased the risk for acute myocardial infarction (OR: 13.01, 99% CI: 10.69-15.83) when compared with those without these risk factors. On the other hand, participants with healthy lifestyles in terms of daily consumption of fruit and vegetables and regular physical activity conferred an OR of 0.06 (99% CI: 0.51-0.71), indicating a reduced risk of myocardial infarction. Further, if an individual avoided smoking, the OR would be 0.21 (99% CI: 0.17-0.25), resulting in a further reduced risk for myocardial infarction.

Elimination of Modifiable Risk Factors:
Positive Effects on CHD Prevention

In a systematic review of 20 studies estimating the magnitude of risk reduction when a patient with CHD stopped smoking, it was found that there was a 36% reduction in crude relative risk (RR) of mortality for those who quit smoking when compared with those who continued to smoke (RR: 0.64, 95% CI: 0.58-0.71). There was also a reduction in non-fatal myocardial infarctions (crude RR: 0.68, 95% CI: 0.57-0.82). Furthermore, the risk reduction associated with quitting smoking was consistent regardless of differences between the studies in terms of index cardiac events, age, sex, country and time period (Critchley & Capewell, 2003a).

Similar findings regarding the positive effects of giving up smoking on the risk of CHD were reported from the data analysis of 40 cohort studies, involving 463,674 Asians and 98,664 Australasians (Woodward et al., 2005). From the study, it was shown that the ex-smokers had a lower risk for CHD when compared with current smokers (hazard ratio [HR]: 0.71, 95% CI: 0.64-0.78), whereas current smokers were found with a much higher risk for CHD when compared with non-smokers (HR: 1.60, CI: 1.49-1.72).

Hsieh, Yoshinaga, Muto and Sakurai (1998) in a study (n=3,331) stated that male participants selected from the general public who were engaged in continuous physical activity of 30 minutes for ≥ 3 days/week demonstrated a significantly higher high-density lipoprotein (HDL) cholesterol values ($p<0.0001$) and lower triglyceride values ($p<0.001$) when compared with those who were sedentary, indicating that engaging in regular physical activity resulted in fewer coronary risks. Furthermore, among the participants who were sedentary and those who exercised 1, 2, and ≥ 3 days/week, participants with sedentary lifestyle had the highest risk for CHD risk factors and participants with a regular exercise of ≥ 3 days/week had the lowest risk for CHD risk factors. Hsieh and colleagues (1998) further confirmed that even participants who engaged in regular physical activity once a week had a lower CHD risk (a high serum HDL cholesterol level) than the sedentary participants and therefore, concluded the message that doing some physical activity is better than doing none at all.

Physical activity lowering the risk of CHD was further evident in a cohort study of healthy female (n=37,169) (Conroy, Cook, Manson, Buring, Lee, 2005). Physically active women (≥1500 kcal / week of physical activity energy expenditure) had a 39% lower risk of CHD than less active women (<200 kcal/week of physical activity energy expenditure) (multivariate-adjusted RR: 0.61, 95% CI: 0.46-0.81). Stampfer, Hu, Manson, Rimm and Willett (2000) assessed the effect of a combination of lifestyle practices on the risk of coronary heart disease in a cohort of 84,129 women who had no diagnosis of cardiovascular disease at baseline of the study. Over the 14 years follow-up, women who (i) did not smoke cigarettes, (ii) were not overweight (body mass index >25), (iii) maintained a healthy diet, (iv) exercised moderately or vigorously for half an hour a day, and (v) consumed alcohol moderately (≥5 g / day) had a relative risk of 0.17 (95% CI: 0.07-0.41) when compared with other women without the above lifestyle practices. The population attributable risk was 82% (95% CI: 58-93), suggesting that 82% of coronary events in this cohort might have been prevented if all women had been following the above-mentioned lifestyle practices.

Similar findings were reported in a cohort of 2,339 healthy elderly people (aged 70-90 years) in 11 European countries (Knoops et al., 2004). By adhering to a Mediterranean diet, moderate alcohol consumption, moderate to high physical activity levels and nonsmoking, a lower mortality rate from CHD was reported (HR: 0.27, 95% CI: 0.14-0.53). The population attributable risk was 64%, suggesting that 64 % of CHD mortality was associated with non-adherence to the healthy lifestyle factors.

Two studies reported consistent findings indicating that efforts in risk factors reduction would decline by over 50% in CHD mortality rate. In Auckland, New Zealand from 1982-1993, CHD mortality rates fell by 23.6%, with 671 fewer deaths than expected from baseline mortality rates in 1982 (Capewell et al., 2000). Fifty-four percent of this mortality fall was attributed to 30% of the population quitting smoking, 12% registering a drop in cholesterol levels and 8% showing reductions in blood pressure. In the United Kingdom between 1981 to 2000, CHD mortality rates decreased by 62% in men and 45% in women (Unal et al., 2004). Fifty-eight percent of the decline in mortality rates was attributed to risk factors reduction in terms of smoking, blood pressure, and cholesterol by 48%, 9.5% and 9.5%, respectively.

Another study used secondary analysis of published data aiming to examine the potential for cardiovascular risk factor changes to reduce CHD deaths in Scotland (Critchley & Capewell, 2003). It was estimated that 2169 fewer coronary deaths in 2010 would result with 937 prevented deaths attributable to falling trends in smoking (from a population prevalence of 30%

to 21%), 774 attributable to a reduction in cholesterol (from 6.3 mmol/l to 5.8 mmol/l among those under aged 65), and 459 attributable to falls in population diastolic blood pressure (from 76 mmHg to 73 mmHg among those under aged 65). By further estimation, a total of about 4749 deaths could be prevented or postponed in 2010 by additional and feasible reductions in: (i) prevalence of smoking (from 30% to 18% contributing about 1668 fewer deaths), (ii) population mean cholesterol level (from 6.2 to 5.2 mmol/l contributing about 2167 fewer deaths), and (iii) mean diastolic blood pressure (a 3.7 mmHg fall in diastolic pressure contributing about 914 fewer deaths).

The Importance of Understanding People's Awareness of

CHD Risk Factors Reduction

Research evidence so far consistently indicates that an elimination of CHD modifiable risk factors lead to great improvements on CHD prevention that could be related to an individual awareness of lifestyle health changes to reduce these risk factors. Theoretically, individual awareness is fundamental to bring about personal judgment which guides health changes (Bandura, 1997). Likewise, at a given point, the importance of awareness is to start emphasising to decide on initiating healthy behaviour in the stage theories of behaviour change (Glanz, Rimer, Lewis, 2002; Pender, Murdaugh, Parsons, 2002). Furthermore, empirical CHD prevention studies have shown that the notion of awareness regarding CHD and lifestyle risk factors is positively related to individual healthy lifestyle and healthcare behaviours (Gombeski et al., 2005; Hsia et al., 2002; Merz, Felando, Klein, 1996; Morbidity and Mortality Weekly Report, 2001; Mosca et al., 2006).

Hsia et al. (2000) demonstrated the notion that an awareness of and / or a high level of awareness of lifestyle risk factors is positively paralleled to healthy lifestyle and behaviours. Hsia et al's (2002) study examining elder women's compliance with dietary and lifestyle guidelines (n=91267), found that women who were aware of own hypercholesterolemic condition were more likely to report compliance with National Cholesterol Education Program (NCEP) step I (48% versus 38%, p<0.0001) and step II (20% versus 13%, p<0.0001) dietary goals. The authors (2002) also found that women who exercised four or more times weekly and with a body mass index (BMI) of <25kg/m^2 were most likely to comply with NCEP diet goals (26%), whereas those who exercised less and with a BMI of >30kg/m^2 were least likely (7%) to follow the dietary goals. Furthermore, older women who smoked, followed a sedentary lifestyle, had a higher BMI and suffered from diabetes were those who generally failed to follow dietary goals.

In a national study (n=1008) that examined women's awareness, preventive actions and barriers to cardiovascular health, Mosca et al (2006) found that an increased awareness of cardiovascular disease had a positive impact on health promoting behaviour. The results of the study indicated that women who had seen, heard, or read information about heart disease were significantly more likely to increase their physical activity, decrease their intake of unhealthy food, and lose weight. Women, who were aware of heart disease being the leading cause of death for women, were more likely to increase physical activity and control weight. Mosca and colleagues (2006) also found that people's awareness of healthy blood pressure levels was significantly correlated with improvements in diet. Furthermore, the presence of personal risk factors was also found to be associated with several positive lifestyle changes such as better diet, weight management, and smoking cessation.

Mosca et al's (2006) study also demonstrated that women who were aware of themselves as being in the high risk group for heart disease were significantly more likely to seek health care when compared with those who perceived themselves to be at moderate or low risk groups (93% vs 89.5% vs 85.5%, respectively). High percentages of respondents who perceived themselves at high risk (88.4%) had cholesterol screening checked within the last 5 years (time of reporting being baseline) when compared with those who perceived themselves at moderate (80.8%) or low risk (75.5%).

In a survey study (n=379) of cholesterol management practices among patients with CHD, Merz et al. (1996) reported a greater cholesterol awareness was found in patients who took lipid-lowering medication than those who did not (86% vs 55%, $p<0.05$). Empirical data collected by the Centers for Disease Control and Prevention in the United States further supported the relationship between awareness and behavioural changes. Data collected for Behavioral Risk Factor Surveillance System from 1991 to 1999 reported that public health programs that increased awareness of cholesterol levels had a positive effect on public cholesterol screening behaviour. This was evidenced by the increase in cholesterol screening among adults aged $\geq$ 20 years in the United States from 67.3% in 1991 to 70.8% in 1999 (Morbidity and Mortality Weekly Report, 2001).

Increased awareness of heart health also facilitates health care seeking behaviour. A study conducted after a 3-year national heart educational program to motivate and educate women's early and appropriate act on heart problems found that increased awareness was associated to prompt actions (Gombeski et al., 2005). Women with increased awareness of heart problems were more likely to call 9-1-1 or attend the emergency department. There was a statistically significant increase in percentages of callers from 63% in 2002, 72% in 2003 to 83% in 2004 ($p<0.05$). Furthermore, Gombeski et al (2005) also found that more women were engaged in extensive discussions with their physicians regarding heart-risk factors. Based on these findings, it was believed that the impact of the 3-year campaign had successfully raised women's awareness of heart health and had promoted the respondents' appropriate health care behaviour (Gombeski et al., 2005).

To this end, understanding individual awareness of CHD risk factors reduction is therefore, significant in the context of CHD prevention. As such, parenthetically, what ‘awareness’ and ‘awareness of CHD risk factors reduction’ actually meant become central, in particular in the development of an instrument for the purpose of understanding individual awareness in this area. The conceptual meanings concerning these terms and the theoretical frame of reference used by the researcher to guide this study for instrument development will be addressed and discussed in the following chapter.

CHAPTER 3

THEORETICAL FRAMEWORK

Introduction

Current literature reveals confusing definition of the concept ‘awareness’ and in particular, ‘awareness of CHD risk factors reduction’. The purpose of this part of the literature review is to critically analyse the existing literature so as to clearly explicate the meaning of the concept used to guide the present study that aimed at developing an instrument measuring Hong Kong Chinese people’s awareness of CHD risk factors reduction. In this chapter, the literature pertaining to the conceptual meanings of ‘awareness’ and previous studies describing the attributes that were associated or conceptually relevant in defining the ‘awareness of CHD risk factors reduction’ were reviewed and discussed.

The conceptual definitions regarding ‘awareness’, which have been used by different disciplines are firstly reviewed. For the conceptual meaning of ‘awareness of CHD risk factors reduction’, a review of previous studies examining awareness of CHD-relevant issues under the research areas of coronary prevention and health promotion were explored in order to acquire the broadest insight about what has already been done relevant to the concept being studied, which associated attributes best “fit” the concept, how those relevant issues or characteristics have been researched, and what the key issues are that enabled the researcher to guide this study. Then, discussion of the key issues or gaps for assessing the concept, including the lack of (1) validated measuring instrument, (2) the perspectives of CHD patients, and (3) the Chinese people’s views of awareness in this area follows. In the latter part of this chapter, the theories of health behaviour are reviewed, and the theoretical frame of reference, the Precaution Adoption Process Model (PAPM) that was used to guide this study is discussed.

Conceptual Meaning of 'Awareness' Used By Different Disciplines

The Oxford English Dictionary (1989) defines 'awareness' as the quality or state of being aware; to be 'aware' is to be cognizant, conscious, sensible, to know and be informed. These definitions, however, do not provide much information about the explicit features or characteristics that are required to attain a state of awareness. They only indicate that 'awareness' is synonymous with 'consciousness'. Likewise, in the literature, the term 'awareness' has been used synonymously with the term 'consciousness' (Block, 1995; Lynn, 1996). Furthermore, Lynn (1996) refers to human information-processing system as 'awareness', whereas Newman (1994) and Umilta (1992) refer to this as 'consciousness'. Therefore, the conceptual information related to 'awareness' and 'consciousness' were reviewed and where appropriate, these terms were used interchangeably in this study.

Lynn (1996) describes the term 'awareness' by adopting Freud's definition of consciousness, which is defined into three levels in the field of psychology: the preconscious level, the conscious level and the unconscious level. The preconscious level contains memories about information that are not readily available but this information can be recalled with some effort. The conscious level of awareness describes memories of information and knowledge over which an individual has conscious control. The unconscious level includes memories of infant states, which are very difficult and even impossible to recall. These memories of the unconscious level could be expressed and manifested through the individual's dreams and behaviours. This approach of defining awareness is in terms of knowledge and information at different levels of consciousness. This highlights that 'awareness' could appear in different levels, and 'knowledge' as an element pertaining to 'awareness'.

In cognitive sciences, LaBerge (1998) suggests that awareness is an operation involving the activity of attention to and the individual's own participation in the action of attending to a subject matter. As such, only the activity of attention is not sufficient enough to define awareness. Despite attention activity as necessary to bring the 'awareness', it does not represent the whole issue of an awareness event (LaBerge, 1998). This approach could suggest that 'awareness' is an event involving aspects from neurological and behavioural sciences. Sensory stimulation of attentional mechanisms represents the neurological approach. One's personalisation to, and participation in attending to action over a subject matter instead of solely holding impersonal perceptive ideas on event represent the behavioural aspect. Therefore, LaBerge's (1998) ideas of 'awareness' highlights the elements of 'attention', 'personalisation' and 'participating action' in relation to a subject matter.

Umilta (1992) suggests that the mechanism of consciousness has the power of controlling, and of deploying the mechanisms of attention for the purpose of enhancing or inhibiting the processing of certain information. Consciousness is therefore, in charge of allocating attentional mechanisms to some events and not to others. For instance, consciousness can purely use attention as a short-term information-processing; or consciousness can intentionally direct attention to certain locations in the external world or in our long-term memory. As such, 'consciousness' constitutes different levels of attentional activities, and it controls the lower level as a short-term of, and the higher level as a sustaining long-term of the attentional mechanisms or activities. Parenthetically, Cimprich (1992) gives more descriptions about the 'attention' mechanisms and suggests that when attention is intentionally directed, effective human functioning is facilitated. Effective human functioning, which are termed 'executive functions' includes four components: goal formulation, planning, carrying out activities, and self-monitoring of performance (Lezak, 1982). As such, it may be plausible to describe that 'consciousness' controls 'direct attention' to regulate performance for effective human functioning. That is, 'consciousness' constitutes the mental capacity to 'direct attention' and a 'regulatory function' on human performance if one desires.

In the discipline of occupational therapy, therapists working with individuals having disabilities highlight a model of awareness that emphasises individuals' cognitive skills and occupational performance. Barco, Crosson, Bolesta, Werts, Stout (1991) as well as Katz and Hartman-Maeir (1997) address a model of awareness, which includes intellectual awareness, emergent and anticipatory awareness. Intellectual awareness relates to the basic knowledge pertaining to deficits and the recognition of the deficits. Emergent and anticipatory awareness relate to the ability to detect errors in performance, and to anticipate problems and plan strategies for compensation or regulating performance. The use of the term 'awareness' by the authors combines aspects of 'knowledge base' and 'executing control for performance'. The execution of control for performance further constitutes 'the ability to identify error', 'to plan action to eliminate error' and 'to monitor performance' for a subject matter.

Based on the above reviews, 'awareness' denoted by different disciplines is conceptually associated with the key attributes or elements of 'knowledge', 'attention' to, and 'personalisation' to a subject matter, as well as 'executing control' over a subject matter with participating actions that entail the 'ability to detect error', 'plan actions' and 'monitor performance' for the particular subject matter. Although these attributes gleaned from the reviews appear in discrete components, they are quite congruent and interrelated in particular, when 'awareness' is viewed as a process of information processing. Thus, in the following section, 'awareness' as a process of information processing connoting with those identified attributes will be addressed.

Awareness: A Process of Information Processing

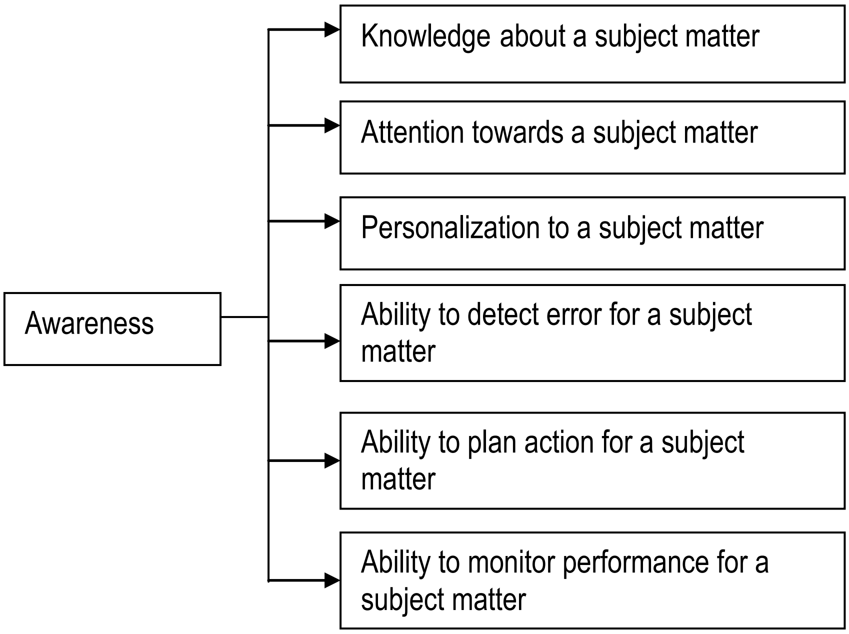
Lynn (1996) suggests the notion of awareness as information processing system. Awareness includes consciously knowing of facts and processing the constant flow of information coming in through the senses (Lynn, 1996). Lynn (1996) elaborates the recognition of the pattern of information flow of a person in the notion of health. She believes that people learn to be aware of changes in the knowledge about what hurts and what helps. A person comes to recognise the disharmony, discomfort and / or harmonious pattern that exist in health. This recognition leads to understanding the meaning of awareness in relation to health and disease, in which learning of knowledge in respect to health and illness takes place in the process of being aware. According to the learning theory (Duffy & Cunningham, 1996), learning involves knowledge constructions, in which the learner actively constructs knowledge and transfers knowledge into action within a particular context. Likewise, knowledge may be viewed as a modifying factor relating to individual perceptions of, and hence, the attitudes and behaviours to a health problem according to health behaviour models (Pender et al., 2002). Knowledge may empower and enable the individual to make decisions and execute actions for health.

Rather than using the term of 'awareness', 'consciousness' as a term has been used in the literature while linking with health and disease. Newman (1994) suggests that consciousness is regarded as the information system of a person, which constantly interacts with the environment. She views disease as the manifestation of health and also as a kind of information, which can be a catalyst for consciousness expansion. The process of expanding consciousness involves one's pattern of harmony being thrown off balance and then discovering how to attain a new state of balance, perhaps temporarily, and then moving on to another phase of disharmony (Newman, 1994). This process of evolving to a higher level of consciousness (awareness) connotes one's adaptive behaviour for attaining a phase of equilibrium from the phase of disequilibrium. In other words, the process entails a representation of say 'disease', as pieces of information alerts the person to become aware of initiating and sustaining healthy behaviour to restore health from illness. In this way, consciousness is expanded and the process of consciousness reflects the process of execution of control in order to achieve health by exchanging and gaining of information, as well as initiating and sustaining healthy behaviour.

Taking the early mentioned perspectives of LaBerge (1998) and Umilta (1992) that awareness or consciousness contains the attribute of 'attention', Cimprich (1992) highlights that 'attention' is crucial for effective human functioning, which is a process involving four components: goal formulation, planning, carrying out activities, and self-monitoring of performance. Of these four components according to Lezak (1982), goal formulation requires self-awareness on aspects involving internal states, experience and relation to the environment, and the ability to conceptualise the purposes before acting. Planning requires the ability to think of alternatives, to make choices, and to construct a conceptual structure to guide action. Carrying out purposeful activity (or behaviour) involves attentional capacity in initiating and maintaining intended activity (or behaviour). As for self-monitoring, attention is crucial to keep track of what one is doing, in perceiving mistakes, and for adapting behaviour to meet the intended goals. The role of attention is essential not only on processing information but also for carrying out therapeutic self-care behaviour or actions and making necessary adjustments in daily life. As such, 'awareness' entailing processes of attention and personalisation that lead to a stage of self-care (health) behaviours is demonstrated with the presence of a continual processing of health-related information, despite clear steps of the exact mechanisms involving the cortical (or cognitive) activities and behaviour are not properly illustrated until now.

In summary, as human beings grow, they interact with the environment. They take in information and become cognizant of the direct and subtle cues from the persons and objects around them. Awareness generally increases. When they develop into more mature beings, they expand their awareness or consciousness of the outer world of things and events. Simultaneously, they increase in personal experience and knowledge. 'Awareness' has been delineated as a process of information processing, in which people gain in knowledge, come to attend to the gained information, to personalise to issues, and to construct their personal judgments that motivate and regulate their behaviour for their everyday life functioning (Cimprich, 1992; Duffy & Cunningham, 1996; Lynn, 1996; Newman, 1994). Figure 3.1 summarises the key conceptual elements regarding awareness.

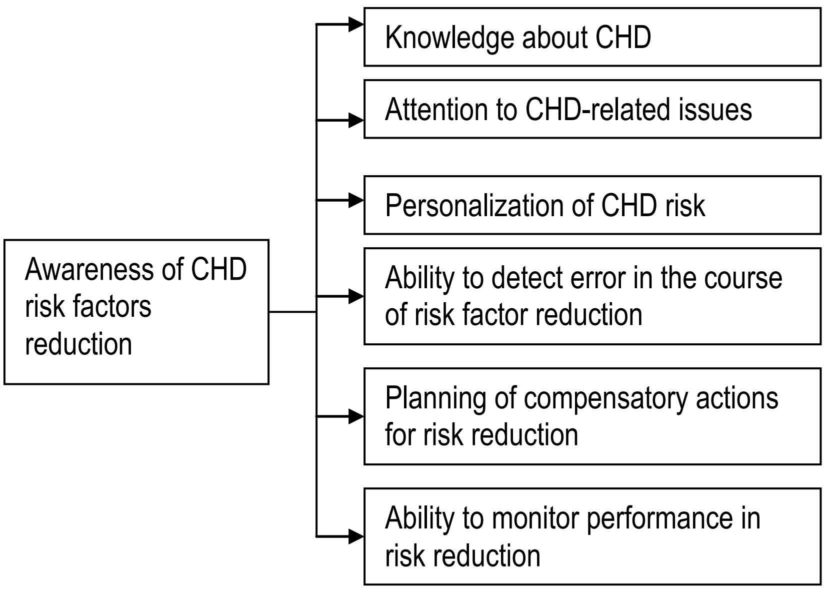
Figure 3.1 Conceptual elements of 'awareness'



While identifying the domains, 'awareness (or consciousness)' itself appears as a spectrum of information-processing mechanisms which includes simple to complex information processing; low to higher level of mental attention; or simple perceptive ideas on events to exercise control over events (Barco et al., 1991; Cimprich, 1992; Katz & Hartman-Maeir, 1997; LaBerge, 1998; Lynn, 1996; Umilta, 1992). Newman (1994) views 'disease' as a pattern of information that expands consciousness, and achieving 'health' as the expansion of consciousness. Persons are different in their consciousness level because it depends on where they fall within their spectra of consciousness (Newman, 1994) in terms of knowledge about, attention to, personalisation of, and control over the health matter.

As such, the application of awareness - information processing – may apply to the concept of ‘awareness of CHD risk factors reduction’. An individual could have no initial idea or simply hold ideas about CHD risk without any intention to control the risks. The other individual may personalise to the risk and attends to heart issues with planned actions. It could be suggested that if people are fully aware of lifestyle risk factors affecting heart health, health behaviour is likely to work towards reducing or controlling their health risk. The concept may appear as a state that a person cognitively attends to, and personalises to CHD risk, possesses CHD knowledge, and executes control to reduce risk factors with participating actions. The key conceptual domains may be viewed as knowledge about CHD, attention to CHD-related issues, personalisation to CHD risk, ability to detect CHD error in the course of risk factor reduction, planning of compensatory action for risk reduction, and the ability to monitor performance in risk reduction (as shown in Figure 3.2). In juxtaposing the conceptual elements of awareness as shown in Figure 3.1 with the key conceptual domains for awareness of CHD risk factors reduction in Figure 3.2, the identified domains provided a possible basis to assess the extent of awareness between individuals.

Figure 3.2 Key conceptual domains for ‘awareness of CHD risk factors reduction’



Review of Studies Examining Awareness of CHD-related Issues

As mentioned earlier, the literature search using databases including Medline (1966-2008), CINAHL (1982-2008) and PsycINFO (1966-2008), revealed no objectively devised conceptual definition in particular, for 'awareness of CHD risk factors reduction' and no valid instrument has been published to measure Chinese people's awareness of CHD risk factors reduction. In addition, there is a paucity of information about the Chinese people's awareness in this area. However, the literature search identified studies examining and exploring awareness of CHD-related issues, namely, awareness of hypertension/diabetes/hyperlipidaemia, awareness of fat intake, awareness of weight gain, awareness of maintaining heart health, heart disease awareness or awareness of heart disease, health awareness of CHD, and public awareness and attitudes towards CHD risk factor reduction. In this section, these aforesaid studies were reviewed and discussed for the purpose of acquiring a better understanding of the concept 'awareness of CHD risk factors reduction', of what has already been done relating to it, what associated and relevant attributes are in defining the concept, how those relevant attributes have been researched, and what the key issues are that enabled the researcher to guide this study to develop an instrument measuring the concept. In addition, these reviewed studies often used self-developed or standardised questionnaires to measure 'awareness' of some issue(s) but did not provide psychometric data nor clear conceptual operational definitions of awareness. Therefore, the instrument items, methods and results of these studies were reviewed, explored and analysed also in this section.

Gnasso et al. (1997) examined the awareness, treatment and control of hypertension, diabetes mellitus and hyperlipidaemia in an Italian sample. The authors defined awareness of hypertension/diabetes mellitus/hyperlipideaemia as a positive answer to either one of the two questions they posed, which were: (1) “have you ever been told that your blood pressure/gluocose/lipid was high?” and (2) “have you ever visited a doctor because of high blood pressure/glucose/lipid?” From the questions, ‘awareness of hypertension/diabetesmellitus/hyperlipideaemia’ seemed appertaining to individuals’ knowledge of their disease conditions and their readiness to attend to their health problems by seeking medical advice.

Glanz, Brug, Van Assema (1997) conducted a study to compare dietary fat intake, the accuracy of individuals’ awareness about their fat intake, and sociodemographic and psychosocial correlates of awareness, in Dutch and American samples. Respondents’ awareness of fat intake was measured in terms of objective dietary intake and subjective dietary intake. Objectively assessed dietary intake was obtained by asking respondents to complete a validated food frequency questionnaire containing items that yields a fat consumption score. Subjective self-rated fat intake was measured by asking respondents to rate the fat content of their diets on a five-point scale from ‘very low in fat’ to ‘very high in fat’. By comparing the difference between the objective dietary intake data and subjective self-rating of dietary fat consumption, the authors referred this difference as respondents’ awareness of fat intake and classified respondents as ‘good estimators’, ‘underestimators’ and ‘overestimators’. From this study, ‘awareness of fat intake’ might incorporate information of one’s attention to, personalization of, and evaluation to his/her own dietary issue.

Wammes, Breedveld, Looman, and Brug (2005) conducted a study evaluating a national campaign, which aimed primarily at increasing awareness to weight gain. The measuring domains for ‘increase awareness to weight gain’ included: (1) perceived body weight by self-rated weight on a bipolar 5-point scale ranging from ‘far too light’ to ‘far too heavy’, (2) risk perceptions of overweight in terms of perceived susceptibility of weight gain when compared with others of the same age and height, and perceived serious consequences of gained weight (that is, how negatively weight gain would be viewed), (3) attitudes towards the prevention of weight gain, and (4) motivation to prevent weight gain by choosing options pertaining to various prevention strategies ranging from 'never thought about trying', 'thought about actively trying', 'have decided not to actively try', 'have decided to actively try', 'already actively trying/tried'. In summary, 'increasing awareness of weight gain' in this study might also encompass the domains of one's attention to body weight, personalisation and evaluation of risk about being overweight and one's planned actions to reduce weight.

A focused national heart campaign to educate and motivate women to act quickly while experiencing possible symptoms of heart attack demonstrated increase in awareness, knowledge, and hence behavioural change towards maintaining heart health (Gombeski et al., 2005). Specific objectives of the program were to: (1) increase knowledge of heart disease as a major clinical issue for women, (2) increase possibility of early recognition of heart attack symptoms, (3) increase knowledge of appropriate-care practices, and (4) decrease time lapse from onset of symptoms to receiving rapid and appropriate care. In this study, there was no information about the survey questions for each of the following aspects: 'awareness', 'knowledge' and 'behaviour'.

In the program evaluation (Gombeski et al., 2005), the study reported results on three categories, namely: growth in awareness, behavior changes and campaign impact. The results showed that in growth in awareness category, the number of women reported an increased recognition of classic and nonclassic heart symptoms and that heart disease as a major cause of death. In the behaviour change category, there was an increased number of women who attended emergency department, and more women reported and discussed heart-risk factors with their physicians. In the category of campaign impact, there was an increased percentages of women who remembered the heart program.

In this campaign, the term 'awareness' to some extent seemed to be equivalent to women's knowledge about heart disease as reported by authors in the category: 'growth in awareness'. Furthermore, the other categorical results or evaluation categories might be seen as under the theme of 'awareness'. 'More women who reported and discussed risk factors with their physicians' as reported in the category: "behaviour change" could be regarded as increasing attention to (thus awareness of) heart-risk factors leading to discussions with physicians. Women remembered the heart program as reported in the category: "campaign impact" could be viewed as increasing awareness of the heart issues as a result of the program. The term 'awareness' seemed diverse and ambiguously identified with the terms 'knowledge' and 'behaviour'.

Collins, Dantico, Shearer and Mossman (2004) explored heart disease awareness among college students (n = 1481) using a survey instrument consisting of areas related to: (1) knowledge of heart disease risk factors and preventive methods, (2) perceptions about their own health risks among choices of diseases / life threatening choices (including cancer, heart disease, accidents or homicides, AIDs and tuberculosis), and (3) opinions about various forms of public health information. The survey questions, however, were not included in this publication. The authors reported that the college students perceived health risk from and perceived health knowledge of a number of disease/life threatening choices such as cancer, heart disease, accidents or homicides, AIDs or tuberculosis. The students were also asked to report their knowledge regarding heart disease as the most common cause of death and whether they had access to heart health information. In this study, the study results to some extent differed form the survey measuring areas as initially proposed. The meaning of 'heart disease awareness' was diffuse and unclear. However, three constituting categories at least might be possibly identified regarding 'heart disease awareness'. These were (1) personalisation of heart disease risk, (2) knowledge about heart disease, and (3) attention to heart health issues as respondents had access to heart information.

Kavanagh, Shephard, Hamm, Mertens, and Thacker (2000) examined health awareness in male offspring of parents with premature coronary heart disease (n=571). The study consisted of an initial assessment and a follow-up questionnaire sent two years after the initial assessment. The authors did not define health awareness. The study objectives were to (1) assess the prevalence of each modifiable risk factor among the respondents, (2) assess the extent of personal health initiatives being taken by the respondents, and (3) estimate, from the perspectives of the respondents, the degree of physicians' contacts to promote a healthy lifestyle and to carry out risk-reduction counseling. Apart from the percentages of modifiable risk factor prevalence, the study showed that respondents were aware of their own risk factors, tried lifestyle health practices or behaviours such as not smoking, adopting a low-fat diet and starting a regular exercise regimen, continued/discontinued the healthy lifestyle practices or behaviour after two years, were highly concerned about their heart health, and had interactions with physicians on a regular basis to receive risk-reduction counseling and to have blood lipids checked.

Regarding 'health awareness', collectively, this study might also seem to cover the domains (1) respondents' personalisation of disease risk, (2) initiating planned practices for CHD, (3) ability to monitor health actions, and (4) paying attention to health problem including reporting high level of concern about the disease and attending to risk-reduction advice through counseling.

An international survey assessed public awareness and attitudes towards CHD risk factors reduction in five European countries (Shepherd et al., 1997). The sample included general public, people with high risk for CHD and those with a history of myocardial infarction. The study did not indicate the operational definitions for 'awareness' and 'attitude' towards CHD risk factor reduction. Data were collected using predetermined sequence of questions covering respondents' perceptions and actual knowledge of heart disease, attitudes to their current lifestyle, actual lifestyle practices and contact with the medical profession. The results reported respondents' knowledge about the leading causes of death in their country, their self perceived health concerns, and their degree of worry about having or suffering a further a heart. The sources of information about reduction in cholesterol intake came from their doctors, friends and magazines. Their current lifestyles on smoking, exercise frequency and care in monitoring dietary component, and whether the respondents were informed of the presence of CHD risk factors and had received advice on risk reduction from the general practitioners were reported. Furthermore, significant changes of health-related lifestyle over past three years since respondents' heart attack and their adherence to risk reduction advices were also reported in this study.

Regarding the aspects of 'awareness' and 'attitude' in this study, the survey questions were not provided. In addition, the study results whether the concept of 'awareness' was related to 'attitude', or vice versa was not clearly discussed. These were gaps that needed further clarifications concerning the concept of awareness. Despite the fact that the study did not explicitly indicate the awareness towards coronary risk factor reduction, the issue of 'awareness' in this research might also be interpreted as relating to respondents' knowledge about CHD as a leading cause of death, personalisation of risk in relation to their health concerns such as CHD and heart attack, attending behaviour in relation to their health problems including locating sources for heart information, refraining from lifestyle risk behaviour and attending to professional advice on risk factor reduction, and ability to monitor their lifestyle behaviour for risk reduction.

Four national surveys were conducted using a standardised questionnaire in 1997, 2003, 2005 and 2006 assessing women's awareness, perception, knowledge, preventive action, and/or barriers to heart disease (Mosca, Jones, King, Ouyang, Redberg, & Hill, 2000; Mosca, Ferris, Fabunmi and Robertson, 2004a, Mosca et al., 2006; Christian, Rosamond, White, Mosca, 2007). The survey questionnaire consisted of four sections namely: (1) general awareness of women's health issues, (2) communications and behaviour related to heart disease prevention, (3) specific understanding of heart disease and behaviour associated with prevention, and (4) the demographic characteristics. Regarding general awareness of women's health issues, respondents were asked what were the greatest health problems and leading cause of death in women today. The respondents were also prompted for subjective ratings of their degree of concern about the common diseases (e.g. cancer, breast cancer, heart disease, diabetes, stroke, osteoporosis) on a 3-point Likert-scale of "worry a lot", "worry a little", "do not worry at all". Responses to these questions might be represented as respondents' knowledge about, and attention to heart disease issues, and their perceived risk for different kinds of diseases.

Regarding communications and behaviour related to heart disease prevention, the women were asked how well respondents saw themselves as being informed of heart disease by physicians; whether they had seen, heard, or read information about heart disease within the past years; and respondents' sources of obtaining heart disease information. The information about whether participants saw themselves as being informed of heart disease by physicians in this section might be seen as self-perception or participants' personalisation of heart risk. Responses to the other questions might be perceived as respondents' awareness of heart disease by paying attention to heart-related issues. For the specific understanding of heart disease and behaviour associated with prevention, knowledge of risk factors, lifestyle choices that might reduce risk factors and the early warning signs of heart attack were assessed. This could then indicate their knowledge of heart disease and knowledge to detect heart risk. As such, these questions might appertain to one's awareness in relation to heart disease (or CHD).

In summary, knowledge about, attending to, personalisation of risk for, the ability to detect health risk, planning of risk reduction actions and ability to monitor risk reduction for CHD were related to studies regarding the awareness of CHD-related issues for the purpose of reducing coronary risks, despite the facts that these aspects differed and to some extent were ambiguous in terms of the measuring items of awareness aspects (domains), and that neither operational definitions nor psychometric data were reported in these studies. In the next section, these gaps and key issues are addressed.

Key Issues for Assessing Awareness of CHD Risk Factors Reduction

This section highlights key issues as gaps in assessing awareness of CHD risk factors reduction, which include the lack of a definition of awareness, a comprehensive measuring domains surrounding the 'awareness of CHD risk factors reduction', a validated instrument measuring awareness, information of patients' perspectives, and information about the Chinese people in assessing awareness.

Lack of an 'Awareness' Definition, Measuring Domains and a Validated Instrument in Assessing the Concept

Among the reviewed studies, elements including knowledge about, attention to, and personalisation of risk for a health issue, the ability to detect health risk, planning of risk-reduction actions, and ability to monitor risk reduction were found as surrounding issues appertaining to awareness of coronary health, and they appeared in various diversity and in different coverage. This, in one hand, sheds light on the feasibility of using the conceptual domains as discussed in the literature review (as shown in Figure 3.2), but on the other hand, highlights the incomprehensiveness of defining awareness surrounding coronary risk reduction. Likewise, the various diversity and incomprehensiveness of definition(s) in the literature reveal the problem that if CHD remains a major health problem causing deaths and disability and ‘awareness of CHD risk factors reduction’ has to be deliberately undertaken, there has been a lack of a definition of ‘awareness’ in healthcare context, a comprehensive coverage of conceptual domains surrounding ‘awareness of CHD risk factors reduction’, and a validated instrument to measure awareness of CHD in this regard.

Despite a wide scope of coronary health promotion and prevention research and the term ‘awareness’ commonly mentioned, there remains a lack of consensus in its definition. The measuring scale items of some reviewed studies to a certain extent seem less clear in defining awareness surrounding coronary health-related issues. The consequences of this might lead to an incomplete assessment of people’s awareness, where identifying needs and informing strategies for coronary health promotion and prevention could be affected. As such, the definition of ‘awareness’ as a background information is central in providing a clear point of reference that could shed insights to the comprehensive coverage of domains assessing awareness in CHD risk factors reduction.

Furthermore, there were many studies using standardised or self-developed questionnaires with no psychometric details provided. In instrument development, scales with robust psychometric evaluations ensure reliability and validity of measuring items and domains underpinning the concepts being measured. Currently, no instrument with a clear indication of psychometric findings has been published specifically for measuring ‘awareness of CHD risk factors reduction’. To date, the underlying structure of the concept ‘awareness of CHD risk factors reduction’ is poorly understood.

Lack of CHD or MI Patients’ Perspectives in Assessing the Concept

Among the reviewed studies, except one study conducted by Shepherd et al. (1997), all of them examined awareness regarding coronary health-related issues from the general public who did not have CHD. Instead of assessing awareness, patients with CHD or MI were studied very often under the scope of their lived experiences with CHD or MI, their adaptations or coping with the lifestyle modifications. It seems that the issue about awareness of CHD risk factors reduction is primarily for the general public who do not have the disease, but excluding those with CHD or MI. As a matter of fact, CHD and MI patients remain unaware of coronary health issues and knowledge even after being diagnosed. Gulanick, Bliley, Perino, Keough (1998) examined patients' recovery patterns and lifestyle changes after coronary angioplasty in a qualitative study (n=45). Unclear of heart health information, and not being aware of the role of regular physical exercise on coronary health (e.g. fear of overexertion) were reported among the patients. Similarly, in another qualitative study (n=10), women after being diagnosed of MI reported lack of knowledge about MI, about lifestyle changes and how to manage chest pain (Jackson et al., 2000). Participants often did not recognise MI symptoms and were not aware of the need to change their lifestyles. Jackson and colleagues (2000) also highlighted that the patients' unmet needs for reliable information to reduce future coronary risk continued throughout the study period of 7, 14, 21 days post-MI hospital discharge. Newman (1994) views disease as a kind of information to expand individuals' health consciousness. It may appear that patients with CHD or MI are expanding their information-processing spectra of awareness in particular for CHD risk reduction in the course of regaining health.

In fact, general public, people with CHD and those with MI should all be included in exploring awareness of CHD risk factors reduction. Ashaye and Giles (2003) in a study (n=35677) reported that only 6.3% of patients with CHD and 6.8% among persons without CHD engaged in healthy lifestyle behaviours. The healthy lifestyle behaviour includes: eating five or more portions of fruits and vegetables daily; performing at least 30 minutes of leisure time physical activity at least five times a week; quitting smoking; and keeping body mass index <25 kg/m^2. The results showed that CHD patients were equally as likely to engage in the healthy lifestyle behaviour as persons without CHD (OR: 1.0, 95% CI: 0.7-1.3), after adjusting for sociodemographics (age, gender, ethnicity and employment status). It appears that both CHD patients and persons without CHD are required to be aware of the lifestyle factors for risk reduction.

Patients with CHD or MI as members of the society are in fact at high risk for recurrent cardiac events (Benjamin, Smith, Cooper, Hill, Luepker, 2002; National Institutes of Health [NIH], 2002; Mosca et al., 2004b). In addition, the American Heart Asscioation Task Force (2002) outlines the initiative of CHD risk factors reduction involving primordial, primary and secondary preventive sectors (Benjamin et al., 2002). Moreover, as mentioned earlier in Chapter Two, CHD modifiable risk factors have a continued impact on both the general public and patients with CHD and MI in terms of the disease incidence and health outcomes. Therefore, it is essential to enquire patients' perspective together with public's views regarding awareness of CHD risk factors reduction.

Mooney, Shaw, Potu, Sawicki, Kilber, Mooney (1992) examined the differences in psychosocial status and medical outcome of patients after coronary angioplasty (PTCA) (n=63) and coronary bypass surgery (CABG) (n=59). Mooney and colleagues (1992) reported that PTCA patients were more likely to be hospitalised for MI. CABG patients were more likely than PTCA patients to perceive a need to make favorable changes in their behaviour at home, at work, during recreation, and in social activities. As such, patients may have differences in terms of 'awareness of CHD risk factors reduction' according to their disease severity or modalities, for example, in terms of being diagnosed with a CHD and a MI. Then, collecting data from the perspectives of these populations should never be undermined.

Lack of Information about the Chinese People in Assessing the Concept

Most of the reviewed studies were conducted in the Western populations. In most developing countries (including China), the mortality and morbidity of CHD is rising to date (Beaglehole, 2001). While performing the literature search of databases, there reveals little information regarding, for examples disease knowledge, attending behaviour for CHD-related issues, perception of CHD risk, and perception of control to reduce CHD risk among the Chinese populations. In this regard, there is a lack of cultural information when considering to develop an instrument for the Hong Kong Chinese people's awareness in this area. It has been argued that prevention models and efforts developed in Western countries have little relevance for most of the world's population (Beaglehole, 2001), and that generalisation of study findings regarding perceptions of diseases, say CHD in this case, based on one ethnic group may obscure cultural differences of the other (Landrine & Klonoff, 1994). Even though some instruments measure some aspects of people's perceptions and/or knowledge regarding CHD and may have adequate translations, item validity could be challenged because of sociological and anthropological differences.

In addition, population information regarding CHD could be different in another cultural context. For instance, Lee and Cubbin (2002) reported that Hispanics had healthier diets and higher smoking rate than Blacks. Girois, Kumanyika, Morabia and Mauger (2001) found that knowledge and attitudes about diet reflected cultural differences or national policies, and thus, in the United States and Switzerland, guidance messages relating to health were different. In Switzerland, more emphasis on diet and obesity were provided to the people, and less to reduction in serum cholesterol level, whilst attention in the United States was focused on the latter. In Beijing, China, between 1984 and 1999, most of the increased CHD mortality was attributed to substantial increases of population mean in total cholesterol levels, diabetes and obesity. In addition, the smoking prevalence increased in men but decreased substantially in women (Critchley et al., 2004). As such, cultural information regarding 'awareness of CHD risk factors reduction' is important when developing a cultural relevant instrument for the Chinese people.

It could then be said that awareness to a health risk is important to change health behaviour to prevent illness and promote health. Several models or theories on health behaviour have been advocated in the literature which could have significant relevance in guiding this study. These models are discussed in the following section.

Models / Theories of Health Behaviour

"A theory - or a conceptual framework – can be, and is, useful because it enriches, informs, and complements the practical technologies of health promotion and education" (Glanz et al., 2002 p.35). "Theories are interpreted in different ways depending on the stage of development of the field of study. In advanced disciplines, theories integrate laws; in less advanced fields, theories specify the determinants and mechanisms governing the phenomena of interest." (Bandura, 1986 p.xii). Glanz et al. (2002) suggest that the term 'theory' used in the field of health behaviour and health education specifies the determinants explaining the phenomena of interest as the field is relatively young. As such, the goal of using a reference theoretical frame in the present study is to guide the development of the research, to enable the researcher to link the relevant attributes that were gleaned from the literature, and to make sense of the concept being studied, which has been previously under-explored. As individuals' motives of knowing, adopting and maintaining health behaviour as key issues that relate to the awareness of CHD risk factors reduction, in which requires health behavioural change in achieving its goals, reviewing the theories and / or models of health behaviour in explaining the process of behavioural change can be used to identify an appropriate model to guide the present research. The health behaviour models: Health Belief Model, Social Cognitive Theory, Theory of Planned Behavior, Protection Motivation Theory, The Transtheoretical Model, and Precaution Adoption Process Model will be reviewed in the following sections. These theories were reviewed for they were used more frequently in research on health behavior.

Health Belief Model

The Health Belief Model (HBM) was delineated by Rosenstock (1974) and further developed by Rosenstock, Strecher, and Becker (1988). The key concepts of HBM as predictive variables for health acts includes perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy (Janz, Champion, Strecher, 2002). The HBM is a value-expectancy theory. Within the theoretical context of the HBM, the individuals will take a health action to prevent, to screen for, or to control ill-health condition if they perceive themselves as susceptible to the risk condition, if they believe the risk condition would have potentially serious consequences, if they believe that the health action would be beneficial in reducing either their susceptibility to, or the severity of the condition, if they believe that the barriers of that health action to be anticipated are outweighed by its benefits, and if they believe themselves competent (self-efficacious) to overcome perceived barriers to taking action. Furthermore, readiness to take health action could be potentiated by cues to instigate action.

The HBM has been used widely to determine relationships between constructs and behaviours of public concerns including breast cancer or mammorgraphy screening (Farmer, Reddick, D'Agostino, Jackson, 2007; Garza et al., 2005), cervical cancer screening (Boonpongmanee & Jittanoon, 2007), and AIDS-related behaviours (Maguen, Armistead, Kalichman, 2000). Studies had been conducted using HBM to predict CHD preventive behaviours (Ali, 2002; Mirotznik, Feldman, Stein, 1995), in which variations of study findings were reported. In a study (n=178) aiming to examine the predictors of CHD preventive behaviours, the results showed that the predictor variables were perceptions of susceptibility to CHD, perceptions of seriousness of CHD, general health motivation, social support, and knowledge of risk factors of CHD (Ali, 2002). Regression results revealed that susceptibility to CHD, seriousness of CHD, knowledge of risk factors of CHD, and general health motivation together explained 76% of the variance of CHD behaviours. While Mirotznik et al. (1995) conducted a study to explore the possible utility of the HBM for explaining attendance at a supervised CHD exercise program, the study results showed that the model as a whole accounted for 29% of the variance in explaining the exercise adherence, and that only two components: peceived severity of CHD and general health motivation were associated with exercise attendance.

Social Cognitive Theory

Bandura's (1986) Social Cognitive Theory (SCT) focus on a central construct of personal self-efficacy in respect to performing a specific health behaviour to produce a desirable outcome. Modeling, verbal persuasion, emotional arousal and mastery experiences determine self-efficacy and outcome expectancies, which enforce health behaviour (Bandura, 1997). Self-efficacy is positively related to motivation and extensively regulated by behavioural intention and planning (Bandura, 1982). Individuals who are confident about their ability to achieve a specific health behaviour have optimal motivation for maintaining the behaviour.

Self-efficacy has been used as a predictor to people's motive in adopting and maintaining health-promoting behaviors in diverse health areas including maintenance of diabetic self-care, adoption and long-term adherence to a regular physical exercise, weight reduction, reduction of cholesterol through dietary means, control of addictive habits such as alcohol abuse, smoking and use of opiate drugs (Bandura, 1997).

It is noted that a person's self-efficacy is a complex phenomenon receiving much critiques. For instance, people with high efficacy may not necessarily improve health practices but rather hold optimistic thoughts about the least probability of contracting a disease.

Furthermore, people could simply have high efficacy to master the preventive skills and techniques, but they do not carry out the health-promoting behaviors if they possess low efficacy to maintain the desired outcomes. This was evident in the control of alcohol addiction. Alcoholics could have high efficacy in relaxation training to abstain from alcohol, but they remained unconvinced that in no way this affected their desire for alcohol or resisted the social pressure to drink (Bandura, 1997). Likewise, low efficacy people are more stressed, and perceived their susceptibility and severity of physical disorders. Then, their motives drive them to take the preventive health practices. As such, a person's self-efficacy to some extent may not be a stable predictor of health behavioral outcomes since multi-faceted behavioural factors could have been involved. Instead, self-efficacy could be possibly one of the explaining factors regarding the process of behavioral change. It varies in predicting behavioral outcome, which is affected by different contexts and time frames.

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is an extension of the Theory of Resoned Action (Ajzen, 1988). The TPB asserts that the most important determinant of behaviour is an individual's intention. The theory suggests that attitude, subjective norm, and perceived behavioural control are the three conceptually independent determinants of intention (Montano & Kasprzyk, 2002). Attitude is the individual's perceived positive or negative evaluation of performing the behaviour. Subjective norm refers to the perceived social pressure as to whether to perform the behaviour. Perceived behavioural control considers the facilitators and barriers to behavioural performance. The TPB is a value-expectancy theory (Weinstein, 1993).

The TPB explaining and predicting health behaviours has been used in a number of settings including the uptake of cervical screening (Sheeran & Orbell, 2000), the uptake of breast screening (Rutter, 2000), illicit drug use (Orbell, Blair, Sherlock, Conner, 2001), the use of condom among women with different ethnicity (Montano & Kasprzyk, 2002), and exercise research (Armitage, 2005; Hagger, Chatzisarantis, Biddle, 2002). Apart from exercise behaviour, limited recent studies using the model in relation to other CHD risk reduction behaviours were found.

Protection Motivation Theory

Protection Motivation Theory (PMT) explains the cognitive mediation process of behavioural change in terms of threat and coping appraisal (Rogers, 1983). Within the theoretical context of PMT, the intention to perform the recommended or desired behaviour is associated with the cognitive mediation process of behavioural change. The threat appraisal of the PMT model depends on: (1) the person's perceived severity of the threat of the disease, and (2) his or her perceived vulnerability of the disease. The component of coping appraisal depends on: (1) response efficacy, which is the individual's expectancy that carrying out recommendations can remove the threat, and (2) self-efficacy, which is the belief of the individual's capability to execute the recommended behaviour successfully to remove the threat.

PMT is a value-expectancy theory (Rogers, 1975). PMT assumes that the motivation to protect a person from risk is a positive linear function of the four cognitive beliefs where the individual perceives: (1) the threat is severe; (2) one is personally vulnerable to the threat; (3) the coping response is effective to reduce the threat; and (4) one has the ability to perform the coping response. Theoretically, the emotional state of fear has played a role to influence attitudes and behaviour change indirectly through the appraisal of the severity of the threat.

PMT has been used in several areas including cancer prevention, AIDS prevention, medical treatment compliance, environmental protection, emergency assistance, and bicycle and transportation safety (Floyd, Prentice-Dunn, Rogers, 2000). For CHD-related behaviours, PMT has been used for smoking, alcohol consumption, exercise and low-fat diet behaviour (Floyd, et al., 2000; Plontnikoff & Higginbotham, 1998; Plontnikoff & Higginbotham, 2002). Floyd et al. (2000) noted that usually studies using PMT involved motivating people to adopt the health or safety recommendations, which focused on the most immdediate measure of people's intention to accept the recommendations instead of intentions to sustaining behaviour over time. The authors pointed out that the stage of change in behaviour (initiation, cessation, maintenance) seemed to be a greater factor when addressing the impact of coping variables (Floyd, et al., 2000). This was further reflected in the study conducted by Plotnikoff and Higginbotham (2002) who examined exercise behaviour for the CHD prevention using PMT along with a behavioural theory of stage change reporting that the PMT's coping appraisal component of response efficacy and self-efficacy produced stronger positive significant associations with concurrent and subsequent exercise outcome measures than the theory's threat components. The PMT model could be enhanced by combining it with a stage change of behavioural model regarding health-related behaviours over different stages (Bolck & Keller, 1998).

The Transtheoretical Model

The Transtheoretical Model (TTM) contends that individuals behavioural change go through five stages (Prochaska, Redding, Evers, 2002). The five behavioural stages are precontemplation, contemplation, preparation, action and maintenance. In precomtemplation stage, people may fail to see they have a problem and have no intention of changing any behaviors, usually measured over the next six months. The contemplation stage implies that people are aware of the problems and think of behavior changes within the next six months. The preparation stage includes people's thoughts and actions in making specific plans about behaviour changes, usually measured in the next month. In action stage, people make changes in behaviors or modify behaviors within the past six months. In the maintenance stage people try to sustain their behavior changes and avoid relapses for more than six months. The model elucidates that the behavioral change is a dynamic process reflecting the transition from one stage to another in one's readiness to adopt health related behaviors. During the process, relapses could happen and people would go back to the previous stage from which they again progress through stages until their behavioral changes are completed. People move from one stage to another in a spiral pattern instead of a linear fashion.

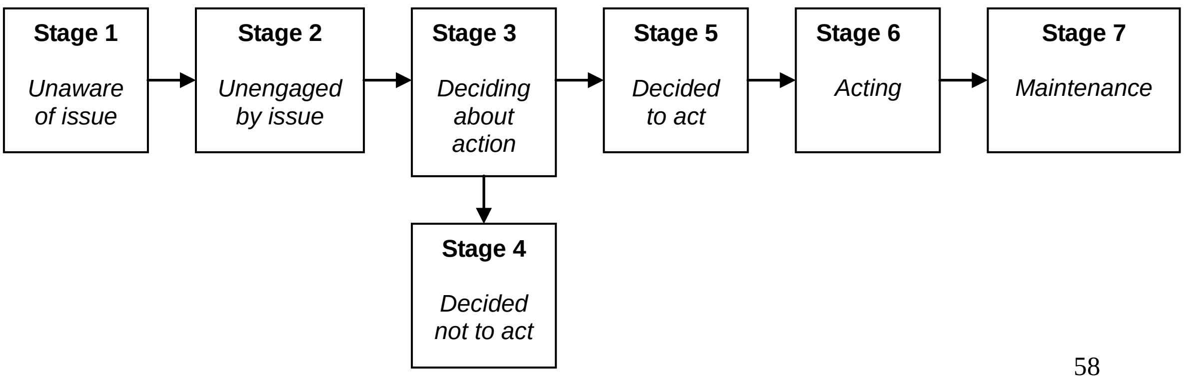
There was a large and diverse studies that have applied TTM model. From the initial studies of smoking, the model has expanded in scope to include investigations and applications to health behaviours regarding alcohol and substance abuse, anxiety and panic disorders, delinquency, eating disorders and obesity, high-fat diets, HIV / AID prevention, mammography screening, medication compliance, unplanned pregnancy prevention, pregnancy and smoking, sedentary lifestyles, and sun exposure (Prochaska, et al., 2002).

However, the first criticism of this model was that it has to draw arbitrary dividing lines (time frames) in order to differentiate between the stages (West, 2005). For example, individuals' thoughts and actions in making specific plans about behaviour changes within 31 days' time is in the preparation stage. This has to mean that these are not genuine stages. Moreover, this approach assumes that individuals typically make coherent and stable plans for health behavioural changes; and thus they willl generally try to choose an answer set by the response options, but it does not mean that they think about things in their own actual situations. Parenthetically, instability in intentions to stop smoking over short periods or a high level of instability in stages in other domains of the model were reported in past studies (Hughes, Keeley, Fagerstrom, Callas, 2005; De Nooijer, Van Assema, De Vet, Brug, 2005). Second, it has been pointed out by others that the stage definitions represent a mixture of different types of construct (Weinstein & Sandman, 2002; West, 2005). The model did not recognise differences among individuals, for example, people not acting and not even thinking about acting (failing to act) in the precomtemplation stage. Furthermore, the model overlooks the issue of unawareness or lacking of awareness of a hazard as a unique and well-defined construct (Weinstein & Sandman, 2002). Reasearch deals with well-known hazards such as smoking making reseasonable stand to ask individuals about their beliefs and plans as whom might think about the relevance of those threats to their own lives. But if people have never heard of a hazard, they may not have opinions about it. More importantly, "no opinion" response may indicate something substantive – knowledge and/or exposure of knowledge of the hazard becomes central in relation to health behavioural change.

Precaution Adoption Process Model

The PAPM as a stage theory of health behaviour was discussed and published in 1988 (Weinstein, 1988), 1992 (Weinstein and Sandman, 1992), 1998 (Weinstein, Rothman, Sutton, 1998), 2002 (Glan et al., 2002; DiClemente, Crosby, Kegler, 2002). The PAPM applies to the adoption of a precaution or the cessation of a risky behaviour. The goal of the PAPM focusing on psychological processes is to explain how an individual comes to the decision to take action, and how he or she translates that decision into action. The model identifies seven stages along a path from lack of awareness to awareness to action. Weinstein's PAPM is depicted in Glan et al. (2002) as shown in Figure 3.3

Figure 3.3 Stages of the Precaution Adoption Process Model



In stage one, people are unaware of the health issue. Stage two is the time when they become aware of the issue but are not necessarily engaged by it. Stage three is when they become engaged, they come to the decision-making process. The decision-making process could result in two outcomes. If the decision is not to take action, the precaution adoption process ends in stage four for the time being. Stage five is the time when people decide to adopt the precaution and in stage six, they initiate the behavior and, where appropriate, in stage seven, they come to continue the behaviour over time. The model asserts that people usually pass through the stages in sequence. Backward movement to an earlier stage can occur, without necessarily going back through all the intermediate stages, and obviously it is not possible to go from later stages to stage one and stage two.

Applications of the PAPM regarding preventive health behaviours included radon home testing (Weinstein & Sandman, 2002), osteoporosis prevention (Blalock, et al., 1996), mammography screening (Clemow, et al., 2000), fruit intake (De Vet, De Nooijer, Oenema, De Vries, Brug, 2008), osteoprotective behaviour (Elliott, Seals, Jacobson, 2007), and calcium intake patterns (Blalock, 2007).

Using the Precaution Adoption Process Model as a Theoretical Frame of Reference

In the following section, the Precaution Adoption Process Model (PAPM) will be further explored in its basic principles and concepts as to justify why and how this theoretical frame above all other theoretical models discussed earlier was chosen to be utilised in this study.

Justification for the PAPM Stages

The stages in the PAPM are justified in detailed with explanations according to Weintein and Sandman (2002):

Stage 1 (unaware).

The PAPM acknowledges people who have never heard of a hazard may not have opinions about and plans to deal with it. Much health research deals with well-known hazards, such as smoking and high-fat diets. It could be quite reasonable to ask someone about his or her perceptions and plans about the hazards. With the PAPM, it is justified that participants in some health behaviour research are not given the opportunity to say that they ‘don’t know’ or have ‘no opinion’, in which these responses could indicate something substantive.

Stage 2 (unengaged) versus Stage 3 (deciding about acting).

Once people have heard about a hazard, they are no longer in Stage 1. However, so many issues compete for their limited time and attention that people can know some amount about a hazard without ever having considered whether they need to do anything about it. The PAPM acknowledges the condition of awareness without personal engagement. The PAPM further suggests that it is important to distinguish between the people who have never thought about an action (Stage 2) and those who have given the action some consideration but are undecided to act (Stage 3). There are several premises to make such important distinction. Firstly, getting people to think about an issue may require different sorts of communications and dealing with different sorts of barriers from the state of being unenaged. Secondly, people who have thought about acting are likely to be more knowledgeable. Thirdly, attitudes based on experience with an issue are more predictive of future behaviour than attitudes generated only on the spot.

Stage 3 (deciding about acting) versus Stage 4 (decided not to act) and Stage 5 (decided to act)

The PAPM holds that there are differences between people who have not yet formed decisions and those who have made decisions; and between people who say that they have decided to act and those who have decided not to act. The PAPM believes that people who have come to a definite decision on an issue have different responses to information and are more resistant to persuasion than people who have not formed a decision (Glanz et al., 2002). Then, issues including overconfidence in one's beliefs, searches for new evidence that are biased to favor one's beliefs, biased interpretations of new data, and insufficient adjustment of one's beliefs in light of new evidence have significant implications for the difference between people to decide to act and not to act, based on the literature (Klayman, 1995 cited in Glanz et al., 2002). In addition, factors, for example perceived susceptibility, that govern how people who get to Stage 3 decide what to do are believed as barriers relating to one portion of the precaution adoption process.

Stage 5 (decided to act) versus Stage 6 (acting)

PAPM asserts the distinction between decision and action. People in motivation phase develop an intention to act based on beliefs about risk, outcomes, and self-efficacy. People after the motivation phase enter the volition phase in which detailed plan of action, initiating the action, and dealing with difficulties in carrying out that action successfully are thought of. Important gaps between intending to act and carrying out the intention are believed to reach a suggestion of their differences.

Stage 6 (acting) versus Stage 7 (maintenance)

The PAPM asserts that the process of adopting the behaviour for the first time is different from that involved in repeating the behavior at intervals or continuing a habitual behaviour over time. A person who gets in a behavior for the first time will have more information, and positive and negative past experiences play a part in the decision to repeat the behavior at intervals. Furthermore, addressing different challenges is believed in the maintenance stage.

Stages of inaction

One value of the PAPM is its recognition of important differences among people who are not thinking about acting and those who are not acting. They are the people in Stage 1 (unaware), Stage 2 (unengaged) and Stage 4 (decided not to act). People in Stage 1 obviously need basic information about the hazard and the recommended precaution. People in Stage 2 require personally relevant issues that make the the threat and action whereas those in Stage 4 have thought about and rejected the action. Evidence shows that people can either be quite well informed of information about the hazard and precaution (Weinstein & Sandman, 1992) or they can dispute the information that challenges their decision to not act and to ignore information that action is unnecessary in their case.

Desipte the delineation in stages of PAPM, the actual boundaries between stages may not be as clear that few people may match these ideal stages perfectly (Weinstein et al., 1998). The authors of the PAPM assert the feastibility that the PAPM stages could be applied to a wide range of health behaviours as a framework depending on an analysis of how each stage transition occurs. The model emphasizes on the development over time of the beliefs and intentions that lead to action. Individuals at different points in the precaution adoption process behave in qualitatively and quantitatively different ways, which is different from other value-expectancy theories that base on a single prediction equation of health behaviour

(Weinstein, 1988).

Justifications on the Application of PAPM to the Study: The Appropriateness and Feasibility of PAPM to Present Study

The concept 'awareness of CHD risk factors reduction' could be primarily viewed as the awareness of lifestyle health behaviour in respect to CHD risk factors reduction, in which requires health behaviour changes in achieving its goal. The PAPM is relevant to this study as it correlates to a stage of health behaviour change in which people may go from a state of unawareness to awareness and action. Furthermore, some elements of the PAPM had relevance to the present study as follows:

1. PAPM provides an intrapersonal theory with a dynamic of psychological processes in the framework of health behaviour change. Based on the literature, "awareness of CHD risk factors reduction' denotes and reflects mental processes and cognitive activities entailing human decisions on lifestyle behavioural changes for coronary health promotion and prevention. Therefore, the model is relevant to the present study.
2. The possible cessation of a risky behaviour in different stages might correspond to the awareness of health behaviour in CHD risk factors reduction that appears in different levels of awareness along a continuum. For instances, an individual could have no idea or simply hold ideas about CHD risk without any intention to control the risks. This might correspond to the fact that PAPM acknowledges the condition of awareness without personal engagement. The other person may personalise to the risk and attends to heart issues with planned actions. If people are fully aware of lifestyle risk factors affecting heart health, health behaviour is likely to work towards reducing and controlling their health risk despite few people might match this ideal perfectly.
3. PAPM explicitly recognises a state in which one is unaware of a risk. Awareness (or

consciousness) itself appears as a spectrum of cognitive information-processing mechanisms which includes simple to complex information processing; low to higher level of mental attention; or starting from none to simple perceptive ideas on events to exercise control over events (Barco et al., 1991; Cimprich, 1992; Katz & Hartman-Maeir, 1997; LaBerge, 1998; Lynn, 1996; Umilta, 1992). This implies the representation of a state linking from 'unawareness' to 'awareness to act' in relation to CHD risk factors reduction.

4. It emphasises risk perception in the framework. It includes how people process risks and communications related to risk. 'Personalisation of CHD risk' as one identified aspect of being aware that is relevant in this study.
5. PAPM includes the mediating issues or variables, such as knowledge that is gained as a result of media messages and communications and recommendations from other people, as well as the perceptions and barriers for health behaviours. Weinstein (1988) indicates some examples of mediating issues that could be important at different stages as shown in Table 3.1. Some of these mediating issues are considered as important aspects obviously relating to the concept being examined as indicated in the literature reviews for this study.
6. It explicitly includes maintenance of behaviour. This is relevant to the present study as ability to monitor performance in risk reduction, planning of compensatory actions for risk reduction, and ability to detect error in the course of risk factor reduction were identified as important aspects for the awareness of CHD risk factors reduction.

PAPM as the theoretical frame of reference provided a framework representing the researcher's interpretation of awareness of CHD risk factors reduction. The framework guided the present study is shown in Figure 3.4

Table 3.1 Issues likely to be involve between stages

Stage transition	Issues
Stage 1 (unaware) to stage 2 (unengaged)	Media messages about the hazard and precaution
Stage 2 (unengaged) to stage 3 (deciding about acting)	Communications from significant others Personal experience with hazard
Stage 3 (deciding about acting) to stage 4 (decided not to act) or stage 5 (decided to act)	Beliefs about hazard likelihood and severity Beliefs about personal susceptibility Beliefs about precaution effectiveness and difficulty Behaviours and recommendations of others Perceived social norms Fear and worry
Stage 5 (decided to act) to stage 6 (acting)	Time, effort and resources needed to act Detailed 'how – to' information Reminders and other cues to action Assistance in carrying out action

Figure 3.4. A framework for 'awareness of CHD risk factors reduction'

Awareness of risk factors reduction

Stage transition	Issues likely to be involved between stages	A spectrum of domains gleaned from the literature
Stage 1 (unaware) to stage 2 (unengaged)	Knowledge gained from Media messages about the hazard and precaution	***Knowledge about CHD***
	Attention to hazard severity	***Attention to CHD-related issue***
Stage 2 (unengaged) to stage 3 (deciding about acting)	Knowledge gained on hazard severity	***Personalisation of CHD risk***
	Communications from significant others Personal experience with hazard	
Stage 3 (deciding about acting) to stage 4 (decided not to act) or stage 5 (decided to act)	Perceptions of hazard severity	
	Perceptions of personal risk Other cues of 'how – to' information in perceptions of personal risk	
Stage 5 (decided to act) to stage 6 (acting) to stage 7 (maintenance)	Time, effort and resources needed and planed to act	***planning of action to reduce CHD risk***
	Perceptions of precaution effectiveness and difficulty	***Ability to monitor performance in risk reduction***
	Other cues in carrying out action	***Ability to detect error in the course of risk reduction***

Reduction of CHD risk

Justifications on the Application of PAPM to the Study: The Differences of PAPM from Other Models

The differences of PAPM from other models of health behaviour will be compared in this section in order to further indicate the suitability of using PAPM for the present study. The current study highlights that the concept of awareness of CHD risk factors reduction is a dynamic cognitive information process from the initial state of unawareness (or lack of awareness) of hazards to becoming aware of hazards, then to making behavioural change to alleviate personal risk. During the course, individuals are engaged in different stages of readiness for behavioural change. When choosing a theoretical frame of reference to guide the present study, the inclusions of the 'state of unawareness (or lack of awareness)' and the 'behavioural change over time' as the major features were obviously taken into considerations.

PAPM and TTM propose health behaviour in a dynamic process that people at different stages of readiness to health acts behave in qualitatively and quantitatively different levels over time which are distinct from other value-expectancy theories such as HBM, TPB, SCT and PMT. The value-expectancy theories presume that individuals behave and act equally across the entire precaution adoption process from the moment when the individual first learns of the health threats to the time he or she starts actions (Block & Keller, 1998; Weinstein, 1988). Another difference between the stage of change models - PAPM and TTM, and the value-expectancy models is that PAPM and TTM explicitly include the maintenance stage of the health behaviour which is an important aspect that the value-expectancy theories do not cover. For the stage of change models, PAPM explicitly highlights the importance of individuals' perception of risk (threat) and recognises the state of unawareness in health behaviour, where TTM does not. As a matter of fact, these constructs are substantial in the course of health behaviour change. Therefore, taking the aforementioned accounts, PAPM was used in the present study. A summary of the differences among the health behaviour models is shown in Table 3.2

Table 3.2 A summary of the differences among the health behaviour models

	PAPM	TTM	HBM	TPB	PMT	SCT
Theory reflects intrapersonal cognitive process of health behaviour	√	√	√	√	√	√
Theory explicitly reflects the barriers that inhibit behavioural change	√	√	√			
Theory explicitly reflects the importance of perceived risk	√	Not explicit	√		√	
Theory reflects the stages of health behaviour in a dynamic process	√	√				
Theory deals with awareness of risks in different ways	√	√				
Theory explicitly includes maintenance of health behaviour	√	√				
Theory explicitly recognises the state that one is unaware of a risk	√	Not explicit				

PAPM=Precaution Adoption Process Model; TTM=The Transtheoretical Model; HBM=Health Belief Model; TPB=Theory of Planned Behavior; PMT=Protection Motivation Theory; SCT=Social Cognitive Theory

Summary of Literature Reviews

Numerous studies have indicated that modifiable risk factors triggering endothelial repair cascade and plague evolution predispose CHD. Many epidemiologic studies have demonstrated that increasing CHD modifiable risk factor increases the incidence of CHD among the general population, and affects the health outcomes of patients with CHD and MI detrimentally. It is a fact that elimination of lifestyle risk factors results in great reductions in disease morbidity and mortality. Furthermore, both theoretical and empirical information support the notion that an awareness of healthy lifestyle has a positive impact on health promoting behaviour for the purpose of coronary risk reduction. Therefore, it is of paramount importance to understand people's awareness in respect to CHD risk factors reduction in order to facilitate effective coronary health strategies to reduce the adverse disease-related outcomes.

To understand people's awareness of CHD risk factors reduction, a valid instrument is required. However, there is a lack of consensus on how to define and measure 'awareness of CHD risk factor reduction'. Chapter Three attempted to define and identify possible measuring domains for the concept through in-depth literature reviews and the adoption of the PAPM as theoretical frame of reference. For the present study, the measuring domains of awareness include: (1) knowledge about CHD, (2) attention to CHD-related issues, (3) personalisation of CHD risk, (4) ability to detect error in the course of risk reduction, (5) planning of compensatory action to reduce risk, and (6) ability to monitor performance in risk reduction were identified.

Due to the limited information gleaned from the literature review, it was then necessary to firstly conduct a qualitative research study among the Hong Kong Chinese people using the conceptual framework, and the adoption of PAPM as a basis to further explore and clarify information for subsequent instrument development. Moreover, the study involved data collection from the general public and disease populations including those diagnosed with CHD and MI. According to the literature reviewed, measuring public awareness should include not only those without CHD or MI as these groups of people, although with a diagnosis of cardiac illness may not necessarily have an awareness of CHD risk factors reduction.

Aim and Objectives of the Study

The main aim of this research was to develop an instrument to measure 'awareness of

CHD risk factors reduction' in a Hong Kong Chinese population. The objectives were to:

1. identify and clarify the conceptual dimensions surrounding 'awareness of CHD risk factors reduction' through a qualitative data collection to generate instrument items (Phase One), and
2. use a methodological research to establish the factor structure, reliability and validity of the developed instrument (Phase Two).

Operational Definition

The operational definition of 'awareness of CHD risk factors reduction' used in this study was the state that a person cognitively attends to, and personalises to CHD risk, possesses CHD knowledge, and executes control to reduce risk factors with participating actions.

In this current study, the descriptions together with the methodologies used in the qualitative study and the psychometric evaluations of the developed instrument are further elucidated in detail in Chapters Four and Six.

CHAPTER 4

METHOD OF PHASE I STUDY

Introduction

The objective of the Phase I of the study was to identify and clarify the conceptual dimensions surrounding 'awareness of CHD risk factors reduction' through a qualitative data collection in order to generate instrument items for subsequent psychometric evaluations. The purpose of this chapter is to describe the methodology of this Phase one study. This chapter commences with an introduction of the study design, along with the rationale for using the qualitative descriptive method to explore the awareness regarding CHD risk factors reduction. Second, details of the sample and sampling method are provided. Data collection procedures, together with the purpose of using focus group to collect qualitative data follow. This chapter concludes with a description of analytic procedures employed in this study. The trustworthiness of qualitative data within the qualitative research paradigm is also discussed.

Research Design

This phase of the study was designed using a qualitative research approach to identify and clarify the categories of information about the awareness of CHD risk factors reduction. This approach is used to explore the phenomena and to generate concepts emerging from the data based on interviews and observations for the purpose of developing measurement items (Mishel, 1998). Because of its nature, a number of the authors have asserted that the qualitative research method serves as a basis from which items for psychometric instruments are derived (Brink & Wood, 1998; Morse & Field, 1995; Polit & Hungler, 1995). Of the vast spectrum of methods in the qualitative research approach, qualitative descriptive method was chosen for this phase of the study. The next section explains and describes the appropriateness and the use of qualitative descriptive method to achieve the aim of the study.

Qualitative Descriptive Method

Qualitative descriptive method serves to provide descriptions of facts about a phenomenon, when a concept is loose ranging, or when a problem has been identified but few or no literature exists on the topic (Brink & Wood, 1998). This is echoed by Sandelowski (2000a) that knowing 'facts' about the phenomenon requires descriptions of a particular context that gives those facts meaning, as 'facts' are not outside the particular context. Sandolowski (2000a) elucidates that qualitative descriptive research method lends itself close to the data to produce comprehensively and accurately detailed summaries of different participants' versions of the same event. Therefore, such summaries of data are valuable primarily end-products of the analysed categories and subcategories; or these analysed categories and subcategories may yield the working concepts as entry points for further studies; or may themselves contain early versions of such exploration (Sandolowski, 2000a).

Therefore, qualitative descriptive method fulfills the purpose of the present study for instrumentation development. Firstly, while the concept about 'awareness of CHD risk factors reduction' is loose ranging with a dearth of literature that exists to reach at a clear description of its meaning, the qualitative descriptive method serves to provide descriptions of facts about the concept. Secondly, summaries of information regarding awareness of CHD in risk factors reduction serve as end-products of analysed categories and subcategories in Phase One of this study, serving as entry points for instrument item development and these data summaries were deemed essential for yielding the early versions of an instrument for subsequent psychometric testing in Phase Two of this research. Thirdly, the research design is typically a basic and fundamental method of providing a full description of factual information collected from the participants in this current study. This factual information is close to the data and thus, is able to directly represent the topic under study as suggested by Sandolowski (2000a). A full description of factual information is particularly valuable when little information about the Hong Kong Chinese people's awareness of CHD risk factors reduction is known. Therefore, this method had assisted the researcher in understanding people's awareness in this area from a Chinese community. In addition, Sandelowski (2000a) states that qualitative descriptive method suits a data collection using focus group interviews and the qualitative content analysis as an analytic strategy. Therefore, these methodological strategies were employed in the present study.

Sample

Target Populations

The present study sample contained three target populations: (1) low risk public for CHD, (2) population having multiple CHD risk factors with or without a history of CHD, and (3) the population diagnosed of myocardial infarction (MI). This was based on a number of premises. First, the American Heart Asscioation Task Force (2002) outlines primordial, primary and secondary prevention as important approaches for cardiovascular prevention including CHD prevention (Benjamin et al., 2002). This indicates that all members of the society including individuals in the low risk population, those at high risk and the diseased populations comprising of people diagnosed with CHD and MI, would be included in respect to the awareness for CHD prevention and coronary health promotion. Therefore, the development of an instrument assessing awareness of CHD risk factors reduction was aimed to be used for all those people in the society. Second, while developing an instrument, a heterogeneous sample is considered as appropriate for providing greater variance (Kline, 1997). This is further echoed by Morse (1991) and Denzin and Lincoln (1994) that a heterogeneous sample provides a richness of data. People of different demographical characteristics, health status and/or disease severity could offer various information reflecting different levels of awareness in terms of CHD knowledge, attention to, and personalisation of CHD risk, as well as an execution of control over CHD risk in respect to CHD risk factors reduction. This sampling approach allowed the researcher to explore the common and unique manifestations of a target phenomenon across a broad range of demographically varied cases. The development of an instrument by consulting people of different health status or demographical conditions is expected to have wide applicability among people with variations in demographic attributes.

Selection of Participants

Each target population: the low risk public (LRP), population with multiple risk factors (MRF) and population diagnosed of myocardial infarction (MI) had a set of recruitment criteria. A screening list of eight CHD risk factors adopted with modifications from a study conducted by Shepherd, et al. (1997) was used to classify participants into groups. Shepherd, et al. (1997) developed this list based on separate surveys of 125 general practitioners in France, Germany, Italy, Sweden and the United Kingdom, whom were asked to identify the risk factors they used to determine whether people had a high risk for a CHD or an MI. The screening list was regarded by the experts as valid to some extent, although the authors did not provide information about validity of this screening tool. This screening list consisted of simple and straight forward short questions and statements concerning daily lifestyle factors in lay perspectives and enabling a collection of participants' information regarding CHD risk factors in clinical and nonclinical contexts.

Classifying persons to risk categories by CHD risk factors estimation have varied across heart societies and organisations. For instance, the American Heart Association (AHA) outlines numerous risk factors and classifies asymptomatic patients by obtaining an estimate of absolute risk based on probabilities of developing future coronary events (Smith, Greenland, Grundy, 2000). Framingham risk scoring focuses on the continuous relationship between risk factor intensity and coronary risk (Smith et al., 2000). Global risk assessment according to the guidelines of the National Cholesterol Education Program (NCEP) refers to the estimation of absolute risk based on the summation of risks contributed by each risk factor (Smith et al., 2000). These risk categories highlight moderate score calculations and medical interpretations on CHD risk. Therefore, Shepherd, et al's (1997) screening list of the eight CHD risk factors was finally adopted with modifications as it was more akin to laymen perspectives and fulfilled the present study purpose of recruiting participants involving the clinical and community (nonclinical) settings. The eight risk factors were as follows (the complete wording of the questions and statements about the eight risk factors is attached in Appendix 4.6): -

1. Personal history of CHD, hypertension or diabetes
2. Family history of CHD
3. A history of smoking cigarettes

4. Drink an average of three or more ‘units’ of alcohol per day for every day, most days (4-7 days a week) or 1 to 3 days a week (a unit measured as a glass of wine, half pint of ale).
5. Exercise 30 minutes/day less than once a month
6. Poor eating habit and poor eating attitude - defined as participants do not monitor two or more out of the 4 dietary components: fat, cholesterol, calories or salt in diet, and choose the attitudinal statement indicating not concern about diet and eating with no regard to health or nutrition
7. Poor attitude about healthy lifestyle - defined as participants choose the statement indicating no concern about lifestyle and not willing to make sacrifices to live healthily.
8. Participants with total cholesterol level $\geq$ 5.3 mmol/l, or have no knowledge about cholesterol as a risk factor and do not know their cholesterol level.

Based on the above eight risk factors, the inclusion criteria for each of the three target population groups were as follws:

Inclusion Criteria for the LRP Group

1. Participants aged 18 or over
2. Participants have no history of MI
3. Participants who had no more than three of the listed risk factors as stated

above were regarded as the population for the low-risk public group.

Inclusion Criteria for the MRF Group

1. Participants aged 18 or over
2. Participants have no history of MI
3. Participants who have four or more of the listed eight risk factors as stated above were regarded as population with multiple risk factors group

Inclusion Criteria for MI Group.

1. Participants aged 18 or over
2. Participants with a diagnosis of MI whose conditions are being stabilized. They are not patients in the hospital but are discharged clients who actively participate in a cardiac rehabilitation program and therefore regarded as the population in the MI group.

Sampling Method

Convenience and snowball sampling methods were used to facilitate the recruitment of a sufficient number of readily accessible participants to ensure maximum heterogeneity in terms of health status, age and gender (LoBiondo-Wood & Haber, 1994; Polit & Hungler, 1995). Recruitment strategies to locate the participants included approaching the community centers, asking eligible participants whether they knew of anyone who is willing to participate in the study, and approaching clients in a cardiac rehabilitation and prevention center.

Accessible Population

To recruit participants of the low risk population as stated in the inclusion criteria, approaching the community centers in conjunction with asking eligible participants whether they knew of anyone who is willing to participate in the study served as the main catchment areas. Recruitment was aimed at recruiting sufficient participants with a broader age range at different geographical areas. The method of snowballing was used, especially when some community centers refused to participate in the study. Five community centers among three geographical sites: Hong Kong Island, Kowloon and New Territories were approached to recruit the participants. Three centers provided access for recruiting the participants. They included an integrated social service community center in New Territories and two elderly community centers in New Territories and Kowloon. The in-charge persons of these three community centers carried out the recruitment by identifying clients who are willing to participate in the focus group interviews and provided the lists of clients to the researcher. With lists of clients, the researcher contacted the clients and arranged covenient dates and times for the group interviews. For recruiting low risk participants through snowball method, the participants themselves were able to ask other people in their neighbourhood or community centres to also join the focus group interviews. They were then assessed by the researcher according to their eligibility for the low risk group. Recruitment among the geographical regions of Hong Kong Island, Kowloon and New Territories, the population make-up from these three regions ensured a heterogenous population comprising of people in different age groups and socioeconomic groups (university students, homemakers, people with employments and retired elderly persons).

Participants of MRF and MI groups were recruited in a cardiac rehabilitation and prevention center of a community-based hospital operated by the Hong Kong Hospital Authority. The center in-charge nurses assisted in the recruitment by providing lists of clients, who are willing to participate in the study to the researcher. The researcher screened and contacted the eligible participants, and arranged dates and times for the focus group interviews. With reference to the Hong Kong Hospital Authority web page (http://www.ha.org.hk), this hospital is the second largest community-based hospital in the Hong Kong West Cluster of Hospital, which essentially serves the community of the Central and Western District. It has 633 beds, including 494 in-patients, 93 day patients and 46 rehabilitation day beds. The hospital consists of a cardiac rehabilitation and prevention centre, which has expanded in 1998 since its establishment in 1993 as the first cardiac centre in Hong Kong that provides comprehensive cardiac health services. This cardiac rehabilitation and prevention center ultimately served as an aggregated site for the recruitment of participants with multiple CHD risk factors and MI groups. The sampling method used fulfilled the purpose of the present study, as well as the "appropriateness" of the sample in the qualitative research paradigm (Morse, 1991; Denzin and Lincoln, 1994).

The Number, the Size and the Dynamics of Focus Groups

Single-sex focus group interviews were conducted to facilitate open discussion within group since previous literature indicates that there are gender differences in terms of their knowledge of CHD risk factors, perceptions of disease severity, risk and symptoms (Astin and Jones, 2004; Mosca et al., 2000; Marcuccio, Loving, Bennett, Hayes., 2003; Goldberg, O'Donnell, Yarzebski, Bigelow, Savageau, Gore, 1998), which were the concerning elements of the present study examining the awareness of CHD risk factors reduction. Same sex focus group interviews facilitated open discussions to occur as participants felt at ease during the conversation instead of in a position of being passive and/or dominant, if they are in a group with mixed genders (Grbich, 1999). This also addresses some cultural norms and issues in the Hong Kong Chinese society as the male being more dominant than women (Cheung, 1997) and that the Hong Kong Chinese women have been reported to have higher level of self-esteem and better adjustments in the consequences of their diseases than men (Ng, Tam, Man, Cheng, Chiu, 2003).

The final sample consisted of different target populations and both genders. Morgan (1997) suggests that the difference in attributes of the participants both within and across groups is important in the determination of the number of focus groups. Having one focus group is impossible to tell whether the discussion data reflects either the unusual composition of that group or the dynamics of that unique set of participants; but with many focus groups, additional efforts in recruitment, data collection, coding and analysis efforts with a larger number of transcripts will be required (Morgan, 1997). A flexible alternative should be considered in projects with multiple levels (segments) of attributes. More than one focus group in each level provides a safe ground to conclude the data and to reflect usual and unusual data (Carey, 1995; Morgan, 1997). As such, based on three target populations in this present study, with at least two groups in each gender, a total of at least 12 focus groups were initially planned to ensure that data saturation is achieved. Data saturation is the stage at which no new information emeged from the focus group interview data or the researcher obtained repeated data from the focus group participants (Polit & Hungler, 1999). In this study, data saturation was achieved after conducting 10 focus groups of LRP participants (with 5 male- and 5 female-groups) as this target population covered a broader age range (18-88 years), 4 groups of MRF participants (with 2 male- and 2 female-groups), and 4 groups of MI participants (with 2 male- and 2 female-groups). The sample consisted of 18 focus groups comprising a total of 100 participants. Half of the focus groups comprised of male participants.

Of the LRP focus groups, 4 groups were elderly participants (age 63-88 years), and 6 groups were younger LRP participants (age 18-56 years), in which 2 groups were from the integrated social service community center and 4 groups were recruited using snowball method. For the MRF and MI groups, participants were recruited from a cardiac rehabilitation and prevention center. Details in compositions of the focus groups, in particular the numbers of participants, the age range of each focus group, catchment and geographical areas for recruitments are summarized in Table 4.1.

Regarding the number of participants (size) in each focus group, a range of 3-8 participants per each focus group was ultimately recruited in the present study (as shown in Table 4.1). Morgan (1997) highlights that the constraints of the field situation and the dynamics of the focus group must be taken into account when determining the size of a focus group. Morgan (1997) suggests, "one should not feel imprisoned by either this lower or upper boundary, I have conducted groups of 3 highly involved participants that would have been unmanageable at size 6, and I have led discussions in naturally occurring groups of 15 to 20 participants in which the process was quite orderly. Ultimately, both the purposes of the research and the constraints of the field situation must be taken into account." (p. 43).

In addition, Calder (1977) indicates that the importance of group interaction varied according to study approaches, and for a study with an exploratory approach, the group interaction is not nearly so central despite interaction among the participants is thought to be a major virtue of the focus group technique. It is because, in exploratory study, the group functions as a convenient device for interviewing a number of people compared to a one-to-one interaction (Calder, 1977).

Krueger (1995) further echoes that serious thought should be given to using smaller focus groups, when topics are complex or when participants have expertise on the topic. Twohig and Putnam (2002) reporting focus group across research studies add that the number of participants per group warranted some consideration in some circumstances. Moreover, using a group of 3 participants with no significant reports to the detriment of the quality of data collected have been noted in a number of recent studies (Augustus, 2002; Corlett, 2000; Tiwari, Lam, Yuen, Chan, Fung & Chan, 2005; Wilhelmsson & Foldevi, 2003), which further elucidated the inappropriateness of being imprisoned by a lower or upper limit of participants per group, say 6–10 persons per group.

The present study took accounts of the constraints of both clinical and nonclinical settings, especially unanticipated constraints, and considered the dynamics in each focus group to determine the number of participants in each group during the course of data collection. Unanticipated constraints of the field situations such as participants not turning up because of sickness or medical appointments had occurred. In the present study, although some group interviews were conducted in small groups, the group dynamics were maintained because of a high level of involvement among participants. No dominant participants affecting the group dynamics was observed. The involvement and interaction of participants were achieved at exploring issues pertaining to the awareness of CHD risk factors reduction, even though participants were in smaller groups.

Table 4.1 Compositions of focus groups

Target type (No. of focus group)	Code	No. of participants / Sex	Age range (years)	Catchment areas	Geographical areas
Low risk public (10 focus groups)	LRP1	8 / Female	45-53	Integrated social service community center	NT*
	LRP2	6 / Male	18-23		
	LRP3	5 / Male	23-44	Via the recruitment using snowball method	KLN*
	LRP4	4 / Female	23-56	Via the recruitment using snowball method	HK*
	LRP5	5 / Male	76-88	Elderly community center	KLN
	LRP6	6 / Female	70-88		
	LRP7	5 / Male	66-72	Elderly community center	NT
	LRP8	7 / Female	63-80		
	LRP9	7 / Male	21-23	Via the recruitment using snowball method	KLN
	LRP10	4 / Female	27-28	Via the recruitment using snowball method	KLN
Multiple risk factors (4 focus groups)	MRF1	5 / Male	52-76	Cardiac rehabilitation and prevention center	HK
	MRF2	6 / Female	57-67		
	MRF3	6 / Male	44-68		
	MRF4	5 / Female	54-77		
Myocardial infarction (4 focus groups)	MI1	7 / Male	50-76		
	MI2	3 / Female	65-72		
	MI3	6 / Male	45-70		
	MI4	5 / Female	70-78		

* NT=New Territories; KLN=Kowloon; HK= Hong Kong

Data Collection

In this phase of study, focus group as the method was used in data collection. In the following sections, the purpose of using focus group as a method of data collection and the descriptions of data collection procedure, the focus group interviews, the interview schedule, the role of moderator and the research assistance are presented.

The Purpose of Using Focus Group as a Data Collection Method

The purpose of focus group study can range from exploring topics to gaining understanding, identifying, clarifying content domains, and obtaining natural vocabulary for instrument development (Carey, 1995). The use of focus group for instrument development is further echoed by Morgan (1997) who suggests three basic ways that focus group can contribute to the creation of instrument items by: (1) capturing all possible domains that measure in the instrument, (2) determining the possible dimensions that will cover or make up each domain, and (3) providing item words that effectively represent the measuring items. In addition, with regard to locating the possible domains, focus group can provide and/or clarify a complete picture of participants' opinions rather than simply relying on the researcher's assumptions about what is relevant. As the present research project was concerned with an instrument development to measure the Hong Kong Chinese people's awareness of CHD in risk factor reduction, this was an area where little information was available. Focus group study thus, served to (i) explore the topic, (ii) identify and clarify domains for the study topic, and (iii) collect natural words or phrases (i.e. vocabularies) for developing an instrument.

In addition, the strengths of focus group included: (1) a one time approach to obtain a large amount of data about the phenomenon, say in this case ‘awareness of CHD risk factors reduction’; (2) participants in the focus groups with a broad range of information in terms of similar and diverging views in reflecting facts about the phenomenon under study are collected; (3) the focus group interaction can provide insights into participants’ opinions, experiences and/or expressions regarding the topic under study (Morgan, 1997). Therefore, the unique features of focus group aforementioned fulfilled the purpose of conducting the present study.

Procedures of Data Collection and Focus Group Interview

Before the recruitment of participants, ethics approval was sought from the university and hospital ethics committees (Letters of ethics approval are included in Appendix 4.1 and 4.2). Eligible participants recruited through the snowball method and through the assistance of the centers’ in-charge persons were arranged in groups, and informed of the day, time and venue for conducting the focus group interview. Focus group interviews were mostly arranged in the community centers and the cardiac rehabilitation and prevention center. Participation on a voluntary basis was explained and highlighted. Prior to the focus group interviews, each participant was approached with an explanation of the purpose of the study in order to obtain a written informed consent (English and Chinese versions are attached in Appendix 4.3 & 4.4), demographics and health history data form (shown in Appendix 4.5), and a screening list about the eight risk factors of CHD (shown in Appendix 4.6). The issue of confidentiality was assured and maintained.

The group interview lasted from 60 to 90 minutes. All interviews were conducted in Chinese and were audiotaped with permission from participants. A fourth-year nursing student was invited as an assistant to observe the group interviews, take field notes and monitor the audiotaping process. The researcher served as the moderator in the focus group interview. The interview started up with a question: "Could you tell me what you understand about coronary heart disease?" Follow-up questions were raised to explore participants' initial answers. An interview schedule, which will be described in details in the next section, was used to guide discussions during focus group interviews.

The Interview Schedule

The interview schedule is a guide that contains discussion areas in terms of questions and probes for the group to discuss (as shown in Appendix 4.7). It is used to facilitate discussion towards accomplishing the research objectives. Based on the framework for 'awareness of CHD risk factors reduction' (shown in Figure 3.4) as described in Chapter Three, the interview schedule for this study covered the discussion areas: knowledge about CHD, attention to CHD and perceptions of CHD risk, risk factor reduction methods or strategies, barriers or difficulties in terms of CHD prevention, coronary health promotion and the accessibility of obtaining CHD information. Table 4.2 indicates the questions with possible probes which were formulated in order to collect data based on the domains surrounding 'awareness of CHD risk factors reduction'.

Table 4.2 Domains of 'awareness of CHD risk factors reduction' and the interview questions with possible probes

Domains	Questions and *probes*
Knowledge of CHD Attention to CHD	1. Could you tell me what you understand about CHD? *Probes: causes or risk factors, symptoms of CHD, prevention of CHD*
Personalization of CHD risk	2. In your opinion, do you think CHD posed a threat to you health? If so, why? *Probes: perceived seriousness of CHD, perceived risk factors / symptoms in relation to risk perception*
Planning of actions for risk reduction	3. What do you think can be done to reduce CHD risk? *Probes: any planning for preventive measures*
Ability to monitor performance in risk reduction Ability to monitor detect error in the course of risk factor reduction	4. What do you think are the barriers (difficulties) to reduce CHD risk? *Probes: control over their current health practice to reduce risk or CHD prevention, any difficulties in obtaining CHD information*

The Roles of the Moderator and Research Assistant

The researcher served as the moderator who introduced the study purpose, raised follow-up questions upon participants' initial answers, guided the scheduled topics for discussions and re-focused discussion when participants drifted away from the topic. In addition, the moderator managed group dynamics by encouraging quiet participants to share their views and experiences, ensuring that outspoken participants did not bias the discussion, and encouraging respondents to elaborate their viewpoints that differed from the predominant one. At the same time, the moderator remained neutral and nondirective, as well as being sensible to participants' verbal and nonverbal cues, that might imply participants were focused on certain aspects of a topic. Tracking and gauging the focus group discussion was monitored in order to pursue the phenomenon being discussed in greater depth and ensure the quality of the focus group data.

A female year-four student of a nursing bachelor degree was invited as an assistant in the focus group interviews. She attended all sessions to monitor the audiotaping process and observe the group. She took field notes about the group dynamics during the interviews as well as assisted in identifying voices when it came time to transcribe the recording of the focus group interviews. Field notes served as a kind of inquiry audit during data analysis for the purpose of establishing the trustworthiness of qualitative data (Morse & Field, 1995).

Data Analysis

Sample Demographical Characteristics

The sample characteristics were analysed and compared in terms of descriptive statistics and inferential statistics. The descriptive statistics included the frequency, range, mean and standard deviation of distribution. Inferential statistics included one-way analysis of variance for continuous data, Kruskal-Wallis test and Mann-Whitney test for categorical data. The results of sample demographical characteristics are presented in Chapter 5.

Focus Group Qualitative Data

Focus group data were analysed using content analysis. The interview data were subjected to both manifest and latent content analysis. The manifest level of analysis is the coding of directly observable descriptions, whereas the latent level of analysis is the coding of significant underlying meanings (Berg, 2007; Boyatzis, 1998). Content analysis is a dynamic form of analysis of verbal data, which entails a data-derived process. This analysis characterises categorisation of verbal data into categories and/or subcategories through coding of words, phrases and themes from the interview scripts (Berg, 2007; Sandelowski, 2000a). Codes and categories, generated from the data themselves, were continually revised and systematically applied, while on-going analytic processes are being undertaken. Discussions of the analysed data between two persons, the researcher and the researcher's supervisor, who analysed the data independently were performed in this study in order to ensure that the analysed data were reliable and valid representation of the phenomena under study (Berg, 2007), in this case about the Hong Kong Chinese people's awareness of CHD in risk factors reduction. Detailed discussion on the process undertaken to ensure trustworthiness the qualitative data is presented on page 99. The identified categories and subcategories are commonly used to create items for an instrument (Sandelowski, 2001; Sandelowski, 2000). The content analysis technique of categorising data reflects the magnitudes of participants' specific responses suggesting something about the pattern, typicality, regularity and/or intensity of the responses (Berg, 2007; Sandelowski, 2001). Adding to this analytic approach, the crucial concern of the analysis in the present focus group study were not strictly restricted to focusing on the amount of data but rather in identifying the important and valid aspects of an issue being raised through a continual checking of data within and between groups of participants (Carey, 1995; Morgan, 1995). Therefore, even a piece of datum being collected, had to be checked even if it seemed to be a piece of outlying information because it may give indication of an important issue regarding awareness of CHD risk factors reduction. To ensure that the data set was adequate and reliable in this study, more than one focus group in each level or segment (in terms of gender and target populations) were conducted as a safeguard to reflect the usual and unusual data (Carey, 1995; Krueger, 1988; Morgan, 1995).

Qualitative data analysis was based on familiarity with the data and the analysis required repeated coding, sorting, and comparisons between pieces of qualitative information (Morse & Field, 1996; Strauss & Corbin, 1998). The analysis of data within and across focus group interviews was performed. Similarities and differences, consistencies and contradictions, as well as discarding and retaining of marked pieces of data (codes) were constantly reviewed and checked. Pieces of data were either retained or discarded; in the former case the category holding the data were strengthened and further dimensionalised, while in the latter, the data were either allocated to a different category. When new data were added as data collection continued, re-scrutiny of new codes and categories were formulated or reformulated. Indeed, the analytic process was non-linear and was repeated many times resulting in substantive categories. Concurrent qualitative data analysis and data collection were continued until data saturation, where as a condition no new information emerged from the interviews was achieved. The following sections described the procedural analytic steps of the present study about how codes, categories and subcategories regarding the awareness of CHD risk factors reduction were developed, interconnected, modified, refined and formed. It is important to note that the procedures were non-linear in sequence and were back-and-forth interplayed during the analytic process.

Step 1: Preparing an Accurate Transcript in English

The researcher first prepared an accurate transcript in Chinese and then translated into English. The analysis of data was conducted in English because two independent persons, the researcher and the researcher's supervisor, carried out the data analysis independently, followed with a consensus-based dispute resolution procedure in order to establish the trustworthiness of qualitative data. The researcher's supervisor had no knowledge of Chinese language and had expertise only in English. Twinn, (1997) conducting an exploratory study examining the influence of translation on the validity and reliability of qualitative data indicated that there are no significant differences in the generation of major categories resulting from the analysis between the Chinese and English scripts of qualitative data. However, the possibilities of translation and semantic errors should be anticipated. Further to minimise compromising the quality of data as the undertaking of data analysis was not in the language of the interview, a vigorous procedure of forward-backward translations of scripts by two independent bilingual persons was adopted in the present study. Any errors and discrepancies in semantic meaning, modifications with final consensus were made to achieve a maximum equivalence. When an accurate transcript in English was completed, analysis of data was commenced.

Step 2: Coding

Each English script was first read as a whole to obtain a broad overview of participants' awareness of CHD in risk factors reduction. The questions and probes in the interview schedule set the lens for exploration as analysis starting with interview questions links to, and increases understanding of the aspects of the topic under study as the analysis progresses (Berg, 2007; Carey, 1995). In addition, the questions and probes provided the structure of data and were useful in quickly locating the responses when making comparisons across focus groups (Carey, 1995; Krueger, 1988). Therefore, data collected in each focus group interview were analysed initially by interview questions based on the interview schedule. Analysis began with coding using line by line examination of the transcript. Words, phrases and themes were identified and codes were assigned. Codes, which were found to be conceptually similar in nature or related in meaning, were then grouped to form a category. The categories held all appropriate and similar segments of data (Carney, 1972). During the course of the data analysis, codes and categories arising from different transcripts were constantly and systematically compared to see how they could be clustered or connected, as well as to assure they were mutually exclusive. In some cases, categories have merged to become subcategories of a core category in order to achieve maximum clarity. During the analysis, the researcher kept reminding herself of what was the datum about; which categories should this belong to; how this information was the same or different within the category; is this a new data, and should a new code or category be assigned; and do categories require reformulation in order to make sense of data.

In the course of data analysis, two persons carried out the analysis of data independently following to the analytic procedures:

(1) read the transcripts all the way through,

(2) re-read the script line-by-line,

(3) mark significant keywords, phrases and themes,

(4) assign codes,

(5) sort and group similar codes into categories, and

(6) label categories.

The analysed codes and categories were constantly compared and discussed by the two independent persons. Consensus was sought in each stage of discussion.

Step 3: Interconnecting and Modifying of the Coded Categories and Subcategories

Coding resulted in categories and each category comprised bulks of 'fractured' data. Bulks of data were put back together in new ways to identify the interconnection within the coded category. Each coded category composed of subcategories, which were properties representing multiple dimensions of the category. For instance, in the category of 'CHD knowledge', bulks of relevant data such as 'cigarette smoking increases the chance of having CHD' and 'the incidence of CHD is increasing in the younger population' as informational data for 'CHD knowledge' were put back and revised in a new way to yield two subcategories: 'modifiable risk factor' and 'CHD trends' in respect to the main category of 'CHD knowledge'. Thus, this enabled the researcher to understand the interconnection of data within the category, 'CHD knowledge' and to identify the multiple dimensions of that knowledge category. Then categories and subcategories were continually revised and modified to ensure a category holding the appropriate subcategories of data, as well as subcategories of data accurately representing the dimensions of the category.

If a subcategory was beyond the scope of a category being defined in the analytic process, joint interpretive discussions with repeated textual reference were carried out, and/or allocated to another category. Analysis attempts were oriented towards summarising the informational contents of the data and were made to reflect the actual data representing participants' awareness of CHD in risk factors reduction.

<u>Step 4: Refining Categories and Subcategories</u>

This stage of analysis was to refine those identified categories and subcategories. The procedure was to go back to the data and look for evidence to verify the data analysis. Reframing the identified categories and subcategories in a logical fashion in response to the interview questions representing the phenomena under study were performed, which provided a picture to elucidate participants' subjective information that was gleaned in the focus group interview data. The process involved analytical thinking and the identified subcategories and categories that were collapsed to permit parsimony in representing participants' awareness for the purpose of CHD prevention and reduction.

Trustworthiness of Qualitative Data

Trustworthiness of data includes several dimensions: credibility, applicability, consistency and confirmability (Lincoln and Guba, 1985; Morse & Field, 1995; Polit & Hungler, 1995). Various strategies were used to establish this. Credibility was maintained by ensuring voluntary participation and providing detailed explanation of the study objective and procedures. Voluntary basis of participation and the procedural activities increased the likelihood of true data. The focus interviews were limited to small groups to enable sharing of ideas in an attentive manner with constructive interaction, which facilitated the collection of true data. Analysed data were constantly discussed and checked by two independent persons, which acted as a constant peer review process to ensure the analysed data were true findings and were free from potential bias. All focus group interviews were audio taped and participants' verbatim quotes were provided, where appropriate, to represent categories and subcategories identified, which further rendered evidence to indicate a trustfulness of true data in the present study. Applicability was enhanced by (1) data collection through recruiting different target populations: members of low-risk public, people with multiple risk factors and with a MI in this study, and (2) continuing data collection until data saturation was achieved. Therefore, data collected would be valid to represent and apply to different people in the community. Consistency was maintained by constantly comparing data within and across focus groups to counter check for the consistency of data. Field notes were reviewed as a kind of inquiry audit to prevent potential bias and to ensure the stability of data (Morse & Field, 1995). Confirmability was maintained by involving two persons to analyse data independently, followed by a consensus-based dispute resolution procedure when needed.

Ethical Consideration

The ethical consideration of this study will be further discussed with that of the Phase Two study (in Chapter Six pages 210-211). The findings and discussion for Phase One are presented in the next chapter.

CHAPTER 5

FINDINGS AND DISCUSSIONS OF PHASE I STUDY AND ITEM GENERATION

Introduction

The qualitative study focused on the awareness of CHD risk factors reduction among the Hong Kong Chinese people. The primary aim of this chapter was to explore, identify, describe, discuss and compare the categories and subcategories that contribute to the understanding of the awareness of CHD risk factors reduction. The chapter consists of two parts. The first part is the findings of the qualitative study. The second part is the generation of instrument items.

Of the findings of the qualitative study, the demographical backgrounds of the focus group participants will first be presented. Next, three main categories that emerged from the data: (1) CHD knowledge; (2) perceptions of CHD; and (3) risk control efficacy will be described and discussed. This chapter shows the similarities and differences in the information obtained from the three target populations of the Hong Kong Chinese people. In the latter part, inferences are drawn from which to explain how those identified categories and subcategories were used to reflect the concept of the 'awareness of CHD risk factor reduction' in the Hong Kong Chinese people.

In the second part of this chapter, item generation will be described and an initial pool of instrument items will be presented.

Demographical Backgrounds of the Focus Group Participants

As mentioned in the earlier chapter, data saturation was achieved after conducting 10 focus groups of LRP participants, 4 groups of MRF participants, and 4 groups of MI participants. This qualitative study consisted of 18 focus groups comprising nine groups of male participants and 9 groups of female participants (Table 4.1 indicated the details of the compositions of the focus groups). The sample (n=100) was almost equally divided among men (52%) and women (48%). The LRP, MRF and MI groups contained 57, 22, 21 participants, respectively. Of the LRP groups, 37 participants (65%) were recruited from the three community centers and 20 participants (35%) were recruited via the snowball method. The age range for the whole sample was 18-88 years old (mean [M] =56.5; standard deviation [SD] = 20.1). The LRP groups covered a broader age range (18-88 years) with significant younger ($p<0.001$) mean age (M=49.6, SD=23.5) in comparison with the other two target groups, MRF groups (44-77 years, M=64.5, SD=8.3) and MI groups (45-78 years, M=66.7, SD=8.4). Age was not significantly different between the MRF groups and MI groups ($p=0.390$). Most participants were married (79%). Regarding educational backgrounds using Mann-Whitney test for the pairwise comparisons with Bonferroni adjustment at significant level of 0.017, no significant difference was found between the LRP and MI groups (p=0.03), the LP and MRF groups (p=0.08), as well as the MRF and MI groups (p=0.8). There were no significant differences in employment status across the LRP, MRF and MI populations (p=0.924). Of those participants with employments, their monthly income ranged from $3,000 to $36, 000. Details in demographic background of focus group participants are summarised in Table 5.1.

Table 5.1 Demographic backgrounds of focus group participants

	Low-risk public	Multiple-risk factor group	MI group	p-value
	10 focus groups (n=57)	4 focus groups (n=22)	4 focus groups (n=21)	
Sex *f* (%)				0.592 [a]
Male	28 (49%)	11 (50%)	13 (62%)	
Female	29 (51%)	11 (50%)	8 (38%)	
Mean age ± SD (range)	49.6±23.5 (18-88)	64.5±8.3 (44-77)	66.7±8.4 (45-78)	<0.001*[b]
Education: no. (%)				0.046*[a]
No formal education	9 (15.8)	5 (22.7)	4 (19.0)	
Primary	12 (21.1)	8 (36.4)	10 (47.6)	
Secondary	18 (31.6)	6 (27.3)	4 (19.0)	
Post-secondary	4 (7.0)	0 (0.0)	3 (14.3)	
Degree or above	14 (24.6)	3 (13.6)	0 (0.0)	
Employment status: no. (%)				0.924 [a]
Currently working	16 (28.1)	2 (9.1)	3 (14.3)	
Retired	23 (40.4)	15 (68.2)	14 (66.7)	
Homemaker	10 (17.5)	5 (22.7)	4 (19.0)	
Student	8 (14.0)	0 (0.0)	0 (0.0)	

* Significant at the 0.05 level

a=Kruskal-Wallis test

b=Analysis of Variance

Findings of Categories and Subcategories of the Qualitative Study

Three major categories emerged from the data. They were: (1) CHD knowledge, (2) perceptions of CHD, and (3) risk control efficacy. Twelve subcategories were also obtained. The major categories and subcategories are shown in Table 5.2.

Table 5.2 Categories and subcategories of the qualitative study regarding the awareness of CHD risk factors reduction

Categories	Subcategories
CHD knowledge	Pathological causes of CHD External forces in causing CHD Modifiable and non-modifiable risk factors CHD trends Symptoms of CHD Knowledge of CHD prevention
Perceptions of CHD	Perceived seriousness of CHD Perceived risk
Risk control efficacy	Planning of health actions Control over risk reducing behaviour Perceived opportunities to understand CHD Chest pain appraisal or perceptions

The following sections describe and discuss the categories and subcategories. The verbatim quotes from the interview transcripts are provided to support the findings. Where verbatim quotes were adopted to exemplify the categories and subcategories generated from the data they might contain some grammatically errors because of the verbatim nature of the translated Chinese data. Each verbatim quotes was given a code such as: (LRP), (MRF), and (MI) representing the low risk public, multiple risk factor groups of participants and the group of myocardial infarction participants. (M) and (F) indicate male and female participants. The number(s) after LRP, MRF, or MI indicated the number assigned to the focus group. The number(s) after M or F indicated the line number(s) of the verbatim quote in the transcript(s). For example, LRP1M: 1-3 meant that the extract was taken from the low risk public focus group 1 of male participants located in line number 1 to 3 of the transcript. Also, 'LRP1' as a code of the focus group correspond to Table 4.1 and therefore, if required, information about the composition of a focus group could be referred back to the table.

Category 1: CHD Knowledge

The first major category to emerge from the data was that of CHD knowledge, which ultimately influenced participants' awareness of risk reduction. Coding under this category resulted in six subcategories representing participants' knowledge about CHD. They included (1) pathological causes of CHD, (2) external forces in causing CHD, (3) modifiable and non-modifiable risk factors, (4) CHD trends, (5) symptoms of CHD, and (6) knowledge of CHD prevention. Each of these subcategories will be described and discussed below along with supportive quotes presented accordingly.

Pathological Causes of CHD

Included in the 1st category – CHD knowledge – was the pathological causes of the disease. Consistently, participants commonly stated that CHD as a disease was due to the blood vessel blockage or narrowed vessel because of a deposition of cholesterol or fatty substances as one male participant of a LRP group said:

> *"The blood vessels are blocked. You eat well … Atherosclerosis. You have too much cholesterol. The blood vessels become harden. The blood vessels become narrower. The blood cannot flow well." (LRP7M: 65-71)*

Yet analysing some verbatim excerpts, it was difficult to conceptualise participants' information about CHD and to identify their in-depth knowledge regarding the pathophysiology of coronary blood vessel(s) as one of the LRP female participant expressed:

> *"I know CHD is the blood vessels that are blocked by something, the lumen become narrowed, causing blockage of blood flow and leading to the incidence of stroke. Or the blood vessels could not sustain the pressure and rupture. The consequence is serious. It leads to paralysis, or…hemi-paralysis." (LRP1F: 7-12)*

Similarly, another LPR male participant stated:

> *"I have heard health talk held by nurses that there is a blood vessel to the heart and another one out of the heart. If there is blockage, it is coronary heart disease." (LRP7M: 34-36)*

These findings were consistent with Karner, Goransson and Bergdahl's (2003) findings that most patients with CHD were uncertain about CHD. They were not able to express any major mechanisms of CHD and often revealed vague descriptions of the course of the cardiac events. One possible factor accounting for the current findings could be the lack of comprehension of CHD pathogenesis in coronary health education. The current findings has a great impact on public health education for coronary health, prevention and precaution, since pathogenesis of CHD can begin early in life (Lynch & Smith, 2005) and that the pathological changes in the coronary arteries could go on for years. Thus, people's understanding about the anatomy and physiology of CHD, their awareness of the major risk factors and the effects on initiating and sustaining healthy lifestyle changes become significant in any cardiac health promotion activities or programs.

External Forces in Causing CHD

External force(s) causing CHD was identified as the second subcategory. A number of participants attributed "the nature of the universe or fate", "supernatural force" and "bad luck" as the causes of the CHD, and believed that the occurrence or recurrence of CHD is out of one's ability to control. Having repeated CHD incidences, a feeling that the universe determined the incidence of CHD that could not be controlled by an individual effort was expressed in the words of a male MI participant who described:

> *"…If it [CHD] came, it will come. There is no way to be scared of." (MI1M: 1768-1769)*

Similarly, another young male participant of a LRP group aged 18-23, who also believed that the nature determines the occurrence of the disease and there is nothing to do with disease prevention said:

"… Sometimes, if you were with illness, no matter how, you would have the illness eventually. There is nothing to do with the prevention…" (LRP2M: 181-183)

Supernatural thought or bad luck attributed to CHD emerged from the current data. This was exemplified in the words of a MI female participant, who described her immediate thoughts when she was experiencing a cardiac event:

"… I felt there was pressure in my heart. Then I vomited… I felt numb in hands from here to another hand… I thought of supernatural in origin and believed I was unlucky… I also thought that I might have eaten something wrong…" (MI4F: 83- 90)

This finding concurred with several previous studies in which patients with CHD and the general public held a belief in fate, chance or bad luck for the causes of their disease (Karner, Goransson & Bergdahl, 2002; Perkins-Porras, Whitehead & Steptoe, 2006). Anthropological studies indicate that the concepts of the causes of illness may vary along the dimensions of accidental-punitive, natural-supernatural, human-nonhuman, interpersonal-intrapersonal, and internal-external, which may play a role in disease prevention, help seeking, treatment compliance, rate of recovery from illness, and effective coping with illness (Landrine & Klonoff, 1992). In this study, the universe or fate, bad luck and/or supernatural thoughts being reported as the causes of CHD might be explained as a socio-cultural variable in this target population of the Hong Kong Chinese people. This socio-cultural related finding was consistent with previous studies conducted among Hong Kong Chinese people regarding coping with illness, in which Chan and Twinn (2007) reported that participants believed illness was associated with evil spirits and followed the cultural practices to expel evil spirits for recovery.

Furthermore, previous studies reported that the Chinese participants linked their illness to 'Tien' (heaven), that was, illness was dominated by heaven (Mok, Lai & Zhang, 2004; Chan & Twinn, 2007). This present study finding indicated that people might have their own understanding, motivations and attitudes behind their behaviours; and that people could adopt a fatalistic and passive acceptance attitude that disengaged them from being actively involved in any preventive health measures in responses to their illness. This further highlighted the importance of assessing individual's socio-cultural factor during the course of the illness and disease prevention, as the healthcare professionals are the keys to identify health situations and target resources, such as imparting accurate health message and health counseling, to reduce coronary risk.

Modifiable and Non-Modifiable Risk Factors.

Apart from the causes of CHD, many participants mentioned risk factors of CHD including modifiable and non-modifiable risk factors in relation to their understanding about the disease. Many participants emphasised the modifiable lifestyle factors including poor eating habits, high dietary cholesterol intake, lack of exercise, smoking, alcohol consumption, stress, obesity, hypertension and diabetes. Age, gender and hereditary aspects as non-modifiable risk factors were also reported. The following excerpts provided by the focus group participants supported the aforesaid findings:

“I think sex is a factor, age is a factor, whether having exercise is a factor, whether a person having hypertension and diabetes also are all factor…Smoking and drinking alcohol are as well [added by another participants] ” (LRP2M: 107-110)

“I am a bit worried because my character is nervous. And having recognised that age over 50 with menopause, will increase the chance [of having CHD].” (LRP1F: 240-243)

“I have heard a health talk about heart issues before. I know from the talk that if your parents have heart disease, then you have a high chance to have it. If so, you need to prevent it by doing exercise or eat healthy, for example, eat less fatty food. Although my parents have it, I know earlier and thus I can prevent it by myself.” (LRP4F: 108-113)

The findings of this present study revealed that participants of different target populations, gender and various age groups had a mutual understanding about these CHD risk factors comprising of behavioural-, physiological- and psychological-related risks. However, this finding was not consistent to other findings in the literature.

Five previous studies demonstrated inconsistent and diverse findings regarding individuals’ knowledge of CHD risk factors across socio-geographical populations (Farooqi, Nagra, Edgar, Khunti, 2000; Green, Grant, Hill, Bizzolara, Belmont, 2003; Khalid et al., 1994; Murphy et al., 2005; Potvin, Richard & Edwards, 2000). Participants in the previous studies were more able to identify the behavioural-related risk factors when compared with the physiological risks. Two studies (Green, et al., 2003; Khalid, et al., 1994) reported subjects with least awareness of some physiological risk factors including menopause, diabetes, a family history of heart disease and dyslipidemia. Other studies (Astin, & Jones, 2004; Farooqi, et al., 2000; Gabhainn, Kelleher, Naughton, Flanagan, McGrath, 1999; Karner, et al., 2002;

Khalid, et al., 1994) addressed subjects' awareness of psychological risk factors such as stress, anxiety and/or melancholy. General public and CHD patients with high education level and better socio-economical status were found to be more likely to identify poor dietary intake, a lack of exercise and high alcohol consumption as CHD risk factors (Andersson, & Leppert, 2001; Momtahan, Berkman, Sellick, Kearns, Lauzon, 2004; Murphy et al., 2005; Potvin, et al., 2000). In addition, although there was a gender difference in knowledge on CHD risk factors in the previous studies, the findings were inconclusive (Andersson & Leppert, 2001; Astin & Jones, 2004; Green, et al., 2003; Momtahan, et al., 2004; Murphy et al., 2005; Potvin, et al., 2000).

Possible explanations for the current study participants' consistent and mutual concerns might be the result of convenience sampling. Chance is that the participants recruited in the current sample might actually possess a good knowledge of CHD risk factors. Secondly, in an era when health awareness is emphasised and conducive attitudes towards health-related issues are valued, participants might have gained knowledge about CHD risk factors in the surrounding social contexts. Lastly, as a means of data collection via focus group interviews, sharing and consensus to responding are likely when compared with other data collection methods used in other studies. The finding warrants further research for knowledge about CHD risk factors in order to obtain a generalised result and to facilitate the provision of preventive healthcare measures.

CHD Trends.

One of the subcategories was CHD trends. A number of participants focused on CHD as a leading disease causing deaths and morbidity in Hong Kong, and some discussed about the increased prevalence of this disease among the younger population, when they were asked to describe their understanding about the disease. As one young female of a LRP group aged 27-28 said:

> *"I only heard of coronary heart disease is the first killer or the second…I remember that it is one of the top killers even if it is not in the first slot." (LRP10F: 451-455).*

The excerpt indicating the increased prevalence of CHD among the young population was described by one female participant of a middle-aged LRP group:

> *"In the past at old age we will have heart disease. But now it is not. Many children [young adult] have heart disease, even with sudden death. Newspaper also reports these... Even… that is…in about thirties, and among the young adults do have [heart disease]" (LRP1F: 295-302)*

The vast increase and advance information technology present in Hong Kong might have contributed to the partcipants' increase in the awareness of CHD being a major cause of mortality and morbidity among the Hong Kong population, such as in the younger population and/or among the Asian populations on one hand; but on the other hand, the knowledge of CHD trends was not consistently shared across all of the participants in the present study in particular the participants of MRF and older age groups. In addition, the overwhelming misconception that the occurrence of CHD was attributed to the elderly people was highlighted by some participants. As one male MI participant who was in his forty-five years of age confessed and said:

> *"Heart disease is not … [laughed] I think. It is not of the old people and the young people should also be aware of it. Facing with the rapid changing lifestyles and eating habits, city people may be more at risk to have heart disease… People with heart disease could be across different ages" (MI3M: 1152-1159)*

It is worth noting that a few MI participants in this study felt regret for holding inaccurate information about CHD trends prior to their cardiac illness, indicating that not the entire Hong Kong Chinese population has received accurate information about CHD trends. Although the small sample size of the present study might not offer a conclusive interpretation, the present finding to some extent concurred with previous finding that not all of the study subjects knew about the mortality and morbidity trends of CHD; but instead only about one-third to one-half of subjects of previous studies possessed accurate knowledge about CHD trends (Mosca et al., 2004a; Mosca et al., 2000; Wilcox & Stefanick, 1999). This study implies a need for imparting accurate information about CHD trends more effectively for the entire Hong Kong Chinese population.

Symptoms of CHD.

Symptoms of CHD as one subcategory of CHD knowledge was identified. Based on participants' descriptions, both 'typical' and 'other associated' symptoms of CHD were reported. The typical symptoms included *"chest pain", "shortness of breath", "jaw discomfort",* *"arm and shoulder numbness", "a raised of blood pressure"* and *"high blood cholesterol level"*, which were consistent with previous studies (Mosca et al., 2000; Ryan & Zerwic, 2004; Tullmann & Dracup, 2005; Zerwic, 1998). 'Other associated' symptoms such as "*back pain"*, "*sweating"*, "*vomiting"* and *"dizziness"* reported in this study were also in line with previous studies (Tullmann & Dracup, 2005; Zerwic, 1998). On the contrary, gender differences in CHD symptoms were inconclusive in the present study when compared with the previous study, indicating a gender difference regarding CHD symptoms (Tullmann & Dracup, 2005). One possible account for this might be an effect of the convenience sampling of the current study.

In addition, a number of participants in this study believed that CHD appeared with no symptom as one LRP male participant believed CHD being a disease with unobservable symptom:

> *"I think signs and symptoms cannot be seen. As you can read from the newspaper that an inspector suddenly had the [heart] attack while he was having the physical training… It is acute and you cannot see [any signs and symptoms]. If these [signs and symptoms] could be seen, he would not do the vigorous exercise." (LRP7M: 140)*

While examining the findings of this study, differences in reporting symptoms were found across the target groups: the LRP, MRF, and MI regarding 'typical' and 'other associated' symptoms, with MRF and MI participants who were more likely to state the 'typical' symptoms and some of the 'other associated' symptoms. The differences in symptom knowledge will be further addressed in details in the next section - comparison of data between target populations: LRP, MRF and MI. The plausible reasons for such differences across target groups might be that those participants with or at high risk for CHD might have experienced the typical symptoms; that those participants might search for CHD-related information (including the CHD symptoms) in particular when they were diagnosed with CHD or perceived themselves at risk; and that they also might have gained CHD information while in contact with healthcare professionals. As a result, the MRF and MI participants had better knowledge about CHD symptoms when compared with the LRP participants. In view of the convenience sampling of the present study, it might not be sufficient to give a generalisable result. Therefore, future research is recommended to explore this area.

Knowledge of CHD Prevention.

Most participants recognised that CHD as a disease requires preventive measures. Knowledge of CHD prevention as the sixth subcategory was identified. Preventive measures including a consciousness of lifestyle risk factors, such as healthy eating, regular exercise, avoid smoking, no heavy alcohol consumption and maintain a relaxed life, as well as an awareness of some CHD-related risk conditions, such as high blood pressure, diabetes and high cholesterol level, were consistently reported by the LRP, MRF and MI participants. This was exemplified by the following illustrations:

> *"You need to be cautious about diet and do not eat fatty food. You need to do exercise. You should not smoke. You should be relaxed as well…" (MRF2F: 937-939)*

"This coronary heart disease is caused by complications. Others may affect it… Hypertension, diabetes … Oh that mean other diseases may affect CHD… So we need to be aware of other diseases as well." (LRP4 F: 89-93)

"People always say to be cautious about high blood pressure and high cholesterol… Now I always checked the cholesterol."(MRF2F: 472-476)

Participants of the three target populations generally possessed a reasonable level of knowledge regarding CHD prevention, which might probably be a due effect on a good knowledge of CHD risk factors. In addition, it is interesting to note that many participants highlighted 'taking CHD medication as prescribed' and 'medical checks' as important preventive measures to avoid future cardiac incidence and adverse CHD risk. One LRP female participant who viewed the issue of medication as one of the important measures to control CHD-related condition said:

"I think it is not [solely a] preventive measure, but to control… For example, you may need to take antihypertensive medication to keep your blood pressure to normal if you have high blood pressure. It may not be returned to normal. But at least you can control it. I do not know whether it can be totally cured."(LRP10F: 211-215)

Taking medicine to reduce future disease risk was particularly emphasised by many of the participants among the MRF groups and MI groups. One female MRF participant who takes medication described this as a kind of daily necessary habit:

"… What I do the first thing after getting up from bed is taking medication… Then, I go to the market. Then, I go back home, I have the medication for the heart. It is taken 4 times a day…" (MRF2F: 841-845)

Again, another female MI participant strongly emphasised taking medication as an important preventive measure for CHD said:

> *"Everybody needs to take pills. They are very irritating. Totally 6-7 tablets daily, everybody needs to have them… this is a need."(MI2F: 213-218)*

Furthermore, one female MRF participant perceived 'medication' as the more important measure to reduce disease risk when compared with lifestyle modifications:

> *"[For good diet and exercise], [they are] not so serious for us. I think you will not die if you do not do exercise for one day, right? For example, you will not have exercise when you go for a trip… Taking medication is the most important. [All participants responded 'yes' at the same time]" (MRF2F: 856-862)*

Regular medical check as a preventive measure also frequently emerged from the data as one LRP participant raised:

> *"I guess that if you have an early [medical] assessment and you know that you may have heart disease. It [CHD] can be [prevented] if you control it earlier..." (LRP10F: 174-176)*

The findings regarding issues of 'medication' and 'medical check' as preventive measures might suggest that medical interventions and treatments of CHD as preventive information were highly credible among the present sample of Hong Kong Chinese people.

Category 2: Perceptions of CHD

The second category that emerged from the data was the perceptions of CHD. Based on the participants' descriptions of feeling and perceptions of the disease – CHD, two subcategories emerged: perceived seriousness of CHD, and perceived risk.

Perceived Seriousness of CHD

Based on their perceptions of CHD, many of the LRP, MRF and MI participants had underestimated the seriousness of this disease, which was revealed by their expressions such as: *"I do not worry especially for coronary heart disease."*; *"Considering which kinds of the diseases I get worried, I think CHD is not"*; and *"I think I have overlooked it [CHD]… I do see poster or banners about talks on coronary heart disease. But do we really benefit from these talks if we are not patients of coronary heart disease? This is important"*. As from participants' descriptions, the disease nature and the impact of CHD in society were underestimated. Participants believed that CHD was: *"an invisible disease"*, often characterised with *"an insidious process"* and quick symptom episodes, as well as *"a disease easily for one to die and its suffering is not long lasting"*, which placed them in a position to undermine the disease severity. Participants' perceptions of the impact of CHD in the societal context and a lack of the awareness of CHD were demonstrated. This condition was reflected in several participants' descriptions: *"I think the Hong Kong people are not concerned with this issue [CHD]"*, *"Rare to hear [it]"*, and *"Now, it is more often to talk about women's health assessment"*.

Many participants often compared CHD with other diseases in terms of disease severity, by which the severity of CHD was undermined. Stroke, diabetes, hypertension, and severe acute respiratory syndrome (SARS) were perceived as more important diseases and more likely to be reported by participants. Cultural and lay ideas regarding 'health' provide insights on the perceptions of seriousness of illnesses. The Hong Kong Chinese participants in this study highly emphasised the importance of physical and mobility independence rather than think about CHD. For instance, being physically and mobility dependent due to stroke was perceived to create more suffering as expressed by a male who had both a minor stroke and CHD in the past was a typical example of this category:

> *"I am afraid of the recurrence of stroke. I am really afraid of it as I did not know why I had a stroke. I saw stroke patients with paralysis in the arms and legs and they couldn't walk well. If I had it, then I will suffer much. … Coronary heart disease has been already existing [laughed]. Now I am afraid of stroke the most. … Stroke has a profound impact. I am really afraid of [stroke]." (MRF3M: 1412-1459)*

Again, one MRF female participant said:

> *"…I think that it does not matter for which types of disease. The most important thing is to prevent hemiplegia." (MRF2F: 436-437)*

SARS as an infectious and incurable disease was perceived with great despair and urgency, which influenced participants' perception and led them to undermine CHD seriousness as one LRP male participant said:

> *"… I think the impact of CHD when compared with SARS… ah… CHD I think is [a disease] with gradual progression and we are not aware of it immediately. We may think we are healthy. We don't know that some stuff is accumulating causing CHD. But SARS is an acute condition and happens immediately. Basically, two are different. CHD to me the degree of danger is small." (LRP3M: 179-185)*

Feeling of accursed suffering as a result of hypertension and diabetes was commonly emphasised among participants who had these health problems. The perception that hypertension would lead to stroke which eventually cause suffering overwhelmed the participants. Great concentration and effort to control high blood pressure was indicated from participants' descriptions. Participants commonly highlighted their preoccupation with day-to-day lifestyle modification(s) for the sake of the health problem such as high blood pressure instead of CHD as one MRF female participant said:

> *"I got used to it [regular exercise] as I have done it for a long time. I think I need to have it after I know that I have high blood pressure." (MRF2F: 663-664)*

Participants with diabetes, who were overwhelmed by the sufferring resulting from the disease complications, and were possibly preoccupied by the Chinese cultural belief that eating is "a kind of fortune and joy", suffered tremendously as a result of dietary restriction. These were exemplified by the following excerpts:

> *"For diabetes, I had heard many things about it. I heard many had to ampute limbs and legs; eyes couldn't see; and many of them died. Diabetes is a big issue…. Not heard about CHD is a big issue."(MI1M: 1051-1053)*

> *"I think DM is the most threatening… I have been restricted to many kinds of food. What should I eat?" (MI2F: 443-446)*

> *"You have to control your eating… I need to take care of the whole family. I prepare meal for them. But I cannot eat what I prepare. My daughters say that I should avoid some dishes. Do you think that it is the difficulty? I buy and prepare all the dishes. I do not eat them after finishing cooking… It is meaningless to live a long life. You cannot do many*

things… I cannot eat freely in the restaurant… I have avoided food for over 10 years and I lost my interest in life. I cannot taste well now." (MRF2F: 721-728, 762-767)

Stroke, hypertension, diabetes and SARS were more likely to be regarded as more serious health problems when compared with CHD. This was consistent with previous findings whereby CHD was repeatedly under-reported as a major health concern (Gabhainn, et al., 1999; Mosca, et al., 2000; Vanhecke, Miller, Franklin, Weber, McCullough, 2006). In addition, participants likened CHD to a sudden event with minimal suffering leading to a peaceful and silent death. This romantic idea about CHD might account for participants' undermining the severity of CHD as aforesaid. And if this were true, then, it is high time that increasing CHD awareness and imparting accurate messages about CHD through public education should be done without delay.

Perceived Risk

Perceived risk was identified from the data as a subcategory. Participants' descriptions demonstrated the influences of: (1) CHD risk factors, (2) CHD symptoms, (3) age, (4) optimism, (5) an idea of disease suffering, and (6) medical reliance in estimating their risk and threat posed by CHD. Issues of risk factors, symptoms and age as factors were frequently reported by most of the LRP, MRF, and MI participants in risk formulation; despite each participant being grouped into different levels of risk for CHD.

CHD risk factors such as eating habits, regular exercise, family history of CHD, obesity, stress, menopause, diabetes and high blood cholesterol were reported by participants' risk formulation. Participants believed that they did not have CHD risk factors as they perceived to be at low risk for CHD was described by one LRP male participant:

> *"I think I have less chance [to have CHD]…it is because I do not eat animal organs, I do not take greasy stuff, no smoking and alcohol drinking, and therefore less risk. No family history of CHD and so the risk is much lower… Up to now, my checks and the figures are normal. Up to now, my risk is low." (LRP3M: 162-170)*

For those participants, including males and females of LRP, MRF and MI groups, who were able to identify their own CHD risk factors, they reported their fear and perceived their risk for CHD by saying:

> *"…because I am overweight. I did not exercise much. I know my risk – less exercise, overweight…Therefore, I still worry about I will have that problem [having heart disease]." (LRP1F:134-143)*
>
> *"I am a bit worried because my character is nervous. I recognised that over age 50, with menopause, will increase chance [of having heart disease]." (LRP1F: 237-240)*
>
> *"I feared sometimes because of high cholesterol level, 6.5, any time could have adverse consequences." (LRP3M: 108-110)*
>
> *"I become more aware of it as my family members had this disease." (MRF4F: 353-355)*
>
> *"I thought that I had many risk factors. They included working pressure, diet and unfixed time for rest. I had them all. Also for my figure, I have been a fat boy since I was a child. I thought that I must have it one day. And I smoked a lot previously." (MRF3M: 808-812)*
>
> *"I know that I am now a patient and I know that it is a chronic illness. I am more aware of my health than before. For diet, I have the intervention on diet restriction." (MI3M: 492-494)*

Perceived CHD risk to the attributed risk factors among the present sample of participants was quite consistent with Perkins-Porras and colleagues' (2006) study in that high percentages (72%) of patients with a positive family history attributed heart disease to heredity, high percentages (85%) of obese patients to being overweight, and almost half (49%) of sedentary patients to lack of exercise.

Presence of CHD symptom was one strategy that could be employed by participants to evaluate their risk for CHD. Based on participants' descriptions, participants who experienced CHD symptom(s) perceived themselves at risk for CHD. Likewise, as for those who believed that they did not have symptoms of CHD, they did not see themselves at risk for the disease. This condition was exemplified in the words of one MRF male participant who recalled that he underestimated his own risk in the past. He refused his doctor's suggestion to undergo a cardiac investigation as he did not have any chest pain and other bodily symptoms:

> **"***Why I did not do it [cardiac catheterisation] as I thought that I did not have any problem. I thought that it was psychological problem. I did not have pain here [pointing to the chest]. I did not get any problem all over the body." (MRF3M: 224-227)*

Age was another issue adopted by participants in risk formulation. Participants particularly those who perceived themselves too young to have CHD, reported low risk for CHD. Few older participants had a different opinion of their own risk perception as one MRF female participant in her seventy said:

> *"There is no need to be afraid. I am now 70 years old… What is there to be afraid of?*

Earned [my life] already." (MRF4F: 868-872)

Being optimistic to CHD risk was identified as an issue to negate personal risk for CHD from the participants' descriptions. A male MI participant who believed his optimistic character is a beneficiary to negate future CHD risk despite the facts that he has a history of MI, his age is old and still currently a cigarette smoker said:

> *"I think I have been an optimistic person since I was a student. I do not worry much. Although I am sick, I do not suffer. So, I think that no suffering is equal to no illness. I do not think that a person can decide when he should die. I do not think that it is a must for the elderly to die earlier than the young people. There is no absolute rule [laughed]." (MI3M: 616-621)*

With reference of the aforesaid quote, an idea of suffering posed by CHD emerged as a factor involving participants' perception of risk for CHD. A number of participants were preoccupied that CHD as a disease causes little suffering which influenced them to be less likely to view CHD as a threatening disease and hence, undermined their risk perception for CHD. Again, as one LRP female said:

> *"I worry a bit [about heart disease]… However, I think [die of] of heart disease as good. Do not suffer." (LRP1F: 254-256)*

In addition, some participants stated that they were highly dependent on their doctors to look after their health as an account to negate risk and threat posed by CHD. One LRP male participant who is currently a cigarette smoker waiting for a hospital appointment for a cardiac catheterisation procedure said.

> *"Why should I be afraid? No need to be afraid. Now, the medical technology is so good. They [medical professionals] will not leave me half way untreated. For sure, they must*

treat me." (LRF7M: 244-246)

Another verbatim excerpt regarding a MI participant who was depended on the medical doctor to look after his health in the past and hence overlooked diabetes and hypertension as risks for CHD till the incidence of cardiac event said:

> "…*They [medical and health professionals] said that diabetic people generally had high blood pressure. Therefore, I didn't [think of this]. I thought that I always have the doctor [to follow with] and should not be scared! ..." (MI1M: 221-224)*

Reliance on medical doctor as an issue involving participants' risk evaluations might be viewed as a due effect of defense mechanism. Being dependent on medical doctors to look after their health, participants might be likely to free themselves from being preoccupied with any disease risk and threat, and place themselves outside the parameters of risk associated with CHD.

As far as the issues including risk factors, symptoms, age, optimism, an idea of disease suffering, and medical reliance involving risk perception were considered, there was a possibility that a phenomenon of "optimistic bias" might explain those participants who reported that they are at low risk for CHD in this study. The phenomenon of "optimistic bias" or "unrealistic optimism" is referred to people who tend to underestimate their own risk for CHD, and such phenomenon has been widely elucidated in the literature (Avis, Smith, Mckinlay, 1989; Green, et al., 2003; Marteau, Kinmonth, Pyke, Thompson, 1995; Moran, Glazier & Armstrong, 2003; Vanhecke, et al., 2006; Van Tiel, Van Vliet & Moerman, 1998).

Category 3: Risk Control Efficacy

The third category was identified as risk control efficacy. Based on the participants' descriptions of their risk control of CHD, four subcategories emerged: (1) planning of health actions, (2) control over risk reducing behaviour, (3) perceived opportunities to understand CHD, and (4) chest pain appraisal or perceptions.

Planning of Health Actions

Majority of MRF and MI participants were more likely to describe their lifestyle modifications as well as health actions such as adhering to regular medical checks and acting to learn more about CHD because they recognised their health problems. As one MRF male said:

> *"I have many great changes. I am cautious about diet. I eat less fatty food. I mean I try my best to reduce them. For salty food, I eat less too… I exercise once every morning and after dinner…This was the advice from the dietitian. I am fat also. I need to reduce weight. I consult the dietitian half yearly…" (MRF1M: 876-883)*

Another exemplified excerpt was that of a MRF male participant who emphasised about his deliberate efforts on lifestyle changes and maintaining a relaxed life by saying:

> *"…I take more serious in my daily life… I now follow the food and exercise pyramid… I followed the warm-up exercise…I do it [exercise] five times per week. I was very cautious in diet. For example, how much salt I need to take, how much food I need to take a day and the problem of potassium and sodium. The most important thing is to avoid sodium, but having potassium as stated by the dietitian. For fish, there are some fish which are high in potassium, like sardines, and fresh fish. I need to avoid much salt… I am happier when compared with before. I reduced stress." (MRF1M: 562-587,*

611-612)

However, participants' descriptions of planning their health actions in relation to CHD risk factors reduction among the LRP groups demonstrated the influence of personal characteristics. Based on the descriptions, some participants in particular the younger males and females were less likely to pursue healthy lifestyles by saying: *"I do not choose food due to the healthy issue. I do not have such a thinking."*, *"I am not so serious to have a strict eating menu"*, *"I am not concerned about the cholesterol or whether the food is fatty or not. I eat according to my preference."*, *"I do not have a plan for exercise"*, and *"Do I think of the changes (eating habits)? At the moment, I am not. I think I am still young."* On the contrary, some participants, who were older and were able to identify their personal risk for CHD, were readily to describe their health actions by saying: *"I am now very careful. So, I keep doing exercise and try to have a healthy diet."*, *"I am concerned about diet, exercise and health"*, *"I do not smoke and drink"*.

Regarding the intent and actions to seek more information about CHD prevention, the younger LRP participants reported that they were less likely to have an intention to acquire knowledge of CHD as one female said:

> *"Maybe I have not much time for it. Maybe there are road shows about health information in the shopping center. But I do not have an intention to look at the messages. I seldom do so" (LRP10F: 464-467)*

This was in contrast with those older LRP participants, as participants said:

> *"Now I do not have this illness. But when I hear about any preventive measures, any prevention from the newspaper, for example, exercise to do, I will quickly go for it." (LRP1F: 143-146)*

> *"We need to know more about this disease. We should ask the professionals and then [we] will become clearer [about the disease]." (LRP1F: 353-355)*

Furthermore, the older LPP participants were more likely to say words such as *"I have regular consultation with the doctors in order to keep a better health"*, *"I have a yearly body check"*, when compared with the younger participants. Participants in this sample showed that there was a difference in the planning of health actions between the young and older participants of the LRP groups, despite all the participants having good knowledge about CHD risk factors as found in this study. This finding was consistent with previous studies in which young adults were commonly reported to have low intention to initiate health-related actions (Gabhainn, et al., 1999; Steptoe et al., 2002). Moreover, in respect to barriers pertaining initiation of health-related behaviour, the results of this present study paralleled with a European study conducted by Lappalainen, Saba, Holm, Mykkanen, Gibney (1997), both identified lack of time, giving up favorite foods and willpower as barriers. Optimistic bias might be a plausible reason for young participants in this study that reflected low readiness to health behaviour, and it might also explain why despite having good knowledge about CHD lifestyle risk factors, no translation into health actions ever occurs. This finding, therefore, re-iterates the urgent need for imparting messages to the young population. Pathogenesis of CHD may begin early in life, while poor lifestyle factors associated with pathological changes in the coronary arteries can go on for years to bring about CHD (Lynch & Smith, 2005).

Older participants of the LRP groups were more likely to attempt health actions. This finding was in contrast to the previous studies (Danielsson & Aberg, 1995; Farooqi, et al., 2000; Gabhainn, et al., 1999). While Farooqi, et al. (2000) and Gabhainn, et al. (1999) found their older participants of the general public regarded that it was too late for them to initiate healthy lifestyles, Danielsson and Aberg (1995) found that two-thirds of their participants (aged 40-64 years) were less likely to have healthy eating habits. In this study, two possible reasons can be used to explain the readiness to attempt health actions among older participants of LRP groups. Firstly, older people might have come to realise that they are no longer young. Middle age people experience health problems like CHD which commonly appears around age 40 or over in male, and 50 or over in female. As a result of an increased awareness of health risks due to aging, from middle age onward, people become more health conscious, and are more readily to initiate healthy lifestyles. Secondly, retirement allows people to have more time to spend on healthy lifestyles such as going to bed earlier, regular early morning exercise, a relaxed life with no stress. All these could have contributed to the health consciousness of an elder in this study.

In this study, participants with multiple CHD risk factors and MI were ready to attempt health actions. Their readiness was contrary to the previous reports conducted over the last decade, indicating that people at high risk and/or with CHD were not likely to make significant changes for health lifestyle behaviour (Marcuccio et al., 2003; Moore, Dolansky, Ruland, Pashkow, Blackburn, 2003; Shepherd, et al., 1997). The findings of this present study might reflect cohort effects in that this sample of Chinese MRF and MI participants, who were older in ages, viewed doctors as an authority. They conform without questioning, follow medical checks, seek medical help for health information, start with every suggested health actions, and comply according to the expectation of the medical health professionals. This was reflected in the words of one male participant in this study who said:

> *"The only reason is that I trust the doctor. He prescribes me with the right drug after the assessment on me… It is a must to trust the doctor… You'd better not to see the doctor if you do not trust him. You must respect the doctor." (MRF1M: 987-1004)*

Another explanation could be related to the strong family obligations to give care to a family member who is sick in the Chinese culture (Holroyd, 2003). On the other hand, the sick person does not want to impose burden to the family members. This condition was indicated in this study by one of the participants description:

> *"I have totally abstained from [alcohol consumption]. My daughter comments that I am afraid of death. But I say that it is not the issue. The issue is that I am afraid of giving her a burden if I am sick". (MI1M: 1664-1668)*

Therefore, in order to avoid excessive burden onto the family, it is highly likely that high-risk participants with multiple CHD risk factors and MI in this study would deliberately initiate and adhere to health-related actions.

Control Over Risk Reducing Behaviour

Although participants reported that they were ready to attempt health actions in respect to CHD risk factor reduction, difficulties in lifestyle changes also emerged from the data. Based on participants' descriptions, these difficulties primarily consisted of information about a control of diet, regular exercise and stress. Of these difficulties, diet control and regular exercise were commonly emphasised by many of the participants as problematic. A LRP male participant with hypercholesterolemia expressed his difficulty in dietary control described:

> *"The dietitian told me to consume two ounces of meat daily that was roughly smaller than a purse in size and was this small [making a sign with his fingers]. Two bowls of rice was allowed to be consumed daily. Then I told the dietitian that I was sure if only two bowls [of rice] were allowed, she [the dietitian] would not have me in the street but in the hospital… Hah! [laugher] I am afraid [I did not follow her advice]" (LRP3: MP3: 134-144)*

Similarly, a MI male participant who was in the course of pursuing a dietary modification expressed his dilemmas as:

> *"My problem is [that] I cannot restrict on my diet… It is much better now as I am trying to reduce it. I try to have restriction on one meal but not the next…I have a big stomach. I feel hungry all the time, I eat a lot… I am afraid that my arteries will be blocked again. No one can promise you that you will not have another attack. I had heard from a patient, who I met when we were doing exercise together, [he] had [artery] blockage for 3 times… I have the hesitation after I heard this message. I do not know when I will have the blockage again as I like food so much." (MI3M: 777-792, 811-817)*

Again, a MI female participant described her control on diet:

> *"I will sometimes lost control of my diet. I also have fried food." (MI4F: 534-535)*

While Chinese people see eating as a kind of fortune, diet control may never come easy in the Chinese culture. This was illustrated by participants' descriptions:

> *"Everybody ate as much as he could in the past. They thought that it was a kind of fortune to have food to eat." (MRF1M: 768-769)*

> *"…as a human being … with food there, it is sad if you can't eat. If you imposed control day-to-day, I think there was no joy of going on living." (LRP1F: 399-403)*

Chinese people have a keen taste for food and good cooking primarily for its taste (Li & Hsieh, 2004; MacLennan & Zhang, 2004) and therefore, it is understandable that participants were less likely to refuse tasteful food if meals were served. Nonetheless, taste as an important factor for food has been identified in a study by Neumark-Sztainer, Story, Perry, Casey (1999), as one young LRP male participant described a difficulty in his eating of fatty food:

> *"…it is because I enjoy eating, I usually think that the food is delicious and the satisfaction of enjoying it. I will think the taste is fantastic and I will not particularly think of the oil content." (LRP3F: 481-485)*

As such, the tradition of Chinese eating attitudes and habits is a possible barrier for controlling diet or to overeat. In addition, the Chinese food tradition might be affected by the changes in westernisation and urbanisation. Given the proliferation of Western type fast food outlets in Hong Kong, it appears likely that the healthy dietary goals are not met by many people and an increase in adverse outcomes such as obesity and diabetes are already apparent within the Chinese population (MacLennan & Zhang, 2004). Moreover, western type of fast food with fewer healthy food choices might explain a difficulty in avoiding eating less healthy food especially in the younger participants in this study. These conditions were reported by participants:

"It is difficult. For people of working class, talking about lunch, it is simple to know not take the meal, which is greasy. If you did not have it, there was no choice for you." (LRP3F: 655-658)

"It is difficult to control if you eat outside. But it costs expensive to eat healthy food. For the healthy food, I feel it is not enough to fill you up…" (LRP9M: 513-515)

Likewise, with changes in modernisation, city lifestyle filled with stress and rushes might also contribute to inadequate rest and exercise in this study population as the LRP working-class males said:

"For people working in Hong Kong, generally the endurance of doing exercise, I think ….is difficult to maintain… I think now in Hong Kong, half out of ten [people] have to O.T. [overtime work]. No off time… Time is taking less; he has to go for the basic daily living activities, e.g., having meal… The priority for exercise is low. People will do the necessary things first, such as, after work she has to hurry up shopping for the dinner…. After cooking for the dinner, it's already 10pm. Then take a rest, spend a while to watch T.V. before bedtime. The next morning again goes to work… For exercise, in fact, same for every one it is difficult." (LRP3M: 665-694)

"In the past, I enjoyed doing exercise because I felt good after sweating. After became a teacher, however, I would rather spend my time to bed. As a teacher … for three (years)… now this is the third year [as a teacher] … from the second year onwards, I had already given up doing exercise! [Laugher] If there is time left, I would rather to have a sleep…It is because after I finished work. I feel tired. I want to sleep once I feel tired. Therefore, no such time to do exercise [laughing]…" (LRP3M: 450-469)

Ultimately, difficulty in reducing stress was identified. Coping with health problems, a female participant described how she was overwhelmed by frustration:

"…I have many diseases. I have the feeling that I want to give up. Have a feeling that I couldn't open up myself." (LRP8F: 669-710)

Again, a male MI participant who felt tensed and could not maintain a relaxed state described:

> *"For instance, I am not rich and I have two sons. Both of them are better off. I am not relying on them. I am still working and earn a living for myself. I do not need to pay rent. I earn living for myself. According to these circumstances, I should have a happy family. There is no stress. There are no others [troubles]. But in some circumstances, that is, the human brain such as when something happen, I stress out. I don't want to stress out sometimes. But, that is, when you get it out of your mind, it is still thinking and coming out. That is, sometimes, you have stress in your work. I don't want to think of it but my brain always thinks [of] it. There is no way to take it easy." (MI1M:1919-1931)*

The findings of the present study were consistent with Farooqi, al. al.'s (2000) study findings, where difficulty in maintaining regular exercise and ameliorating stress in relation to coronary health were due to the barriers such as a lack of time and busy at work. The current findings also highlighted that provisions of effective remedies to facilitate healthy lifestyle such as time management, promotion of health-related physical activities, and healthy food choices are not only necessary but crucial.

It is interesting that difficulties in smoking cessation and avoidance of excessive alcoholic drinking were less likely reported in the current sample of participants; this finding could warrant further discussion. In recent decades, public health initiatives in cigarette hazards awareness have been prevailing and the danger of smoking has been a major health campaign in Hong Kong. A possible reason that accounts for the findings in this study might be that majority of the participants might have quitted cigarette smoking, or it could also be that they did not smoke because of the intensive increased awareness in smoking hazards, and thus, becames not a concern for the participants of this study. This was revealed in the words of one LRP male participant who said:

> *"The most important is that smoking is not good for health. After smoking, it is smelly with teeth stained in yellowish, leading to poor lung function ... There are many disadvantages but not an advantage." (LRP9M: 583-586)*

As for alcohol drinking, studies indicate that drinking rates and patterns in Hong Kong tend to be lower than those in other countries including China and UK (Griffiths, Lau, Chow, Lee, Kan, Lee, 2006; Janghorbani, Ho, Lam, Janus, 2003). Possible explanations could be that the cultural norms in Hong Kong encourage light drinking as beneficial for health, and that excessive drinking is less socially accepted are suggested by Griffiths, et al. (2006). The custom of social drinking rather than solitary drinking is a possible factor that might influence lesser drinking frequency and amount (Wei, Derson, Xiao, Li, Zhang, 1999). Trinidad, Chou, Unger, Anderson, Li (2003) reported that in Chinese culture, family values, family bonding and harmony are beneficial factors against alcohol and tobacco use. Moreover, several studies report that approximately one-thirds to one-half of the Chinese people have a protective genetic factor that slows down the removal of acetaldehyde during alcoholic metabolism (Goedde et al., 1992; Chen et al., 1999; Luezak, Wall, Cook, Shea, Carr, 2004), which causes Chinese people be susceptible to flushing when they drink alcohol (Wall & Ehlers, 1995). This may make people feel sick and prevent them from drinking large amounts of alcohol as suggested by Wall & Ehlers (1995). This condition was reported in the present study as a LRP male participant said:

"For drinking, I do not have such habit. It is expensive to drink as well. Besides, I feel discomfort after drinking, and suffer from an unsteady feeling." (LRP9M: 586-589)

Therefore, the genetic accounts, cultural and social norms might be the possible predictive factors to explain the drinking attitudes and habits of the present sample. If this is the case, they might have occasional light drinking and/or not drink alcohol. Thus, they might not be concerned about the difficulty in avoiding excessive alcohol consumptions when in public or social gathering with their friends or colleagues. As mobilising resources and targeting remedies based on the needs of a given population in facilitating healthy lifestyle, the findings of this study revealed and highlighted important information in a local scene regarding the control in smoking cessation and alcohol drinking among the Hong Kong Chinese people.

Perceived Opportunities to Understand CHD

Perceived opportunities to understand CHD as a subcategory emerged from the qualitative data was identified. Some participants expressed that CHD as a disease was difficult to understand. For example, a male MI participant, who had received a cardiac rehabilitation program, emphasised that being a member of the general public, the way he was prior to his illness, the disease was not easy to understand:

"… In fact, putting simply, from a general public and from a layman perspective, that means my heart has problem, I do not think of….is not thinking to the extent of these words "heart disease". Because when you mentioned these words 'heart disease', those words I hold a feeling of being severe…You will collapse. …or die [some participants agreed and laughed]. Or like watching movie, and then afterwards, immediately appear

with many relatives and the doctor… However, I still got a feeling that my problem might be in the heart… I did think. But [I] didn't think that it was a heart disease. It was because our knowledge of heart disease was inadequate. Heart diseases have many kinds such as CHD, myocardial infarction, heart failure. By now I know. At that time, I had no idea what they were and what were their symptoms…" (MI1M: 1017-1036)

Based on participants' descriptions, many reported that they lacked accessibility to CHD information. A young male participant of LRP group who indicated that it was difficult to locate CHD information said:

"… Those pamphlets are not detailed enough. They are only 1-2 pages of some issues and preventive methods, and [the information is] not very detailed. For internet, ah … sometimes … ah … not sure [whether] they are right or not and may be not updated. So, if you want to find a means to know exactly what CHD is, for me I feel it is difficult." (LRP2M:372-377)

Participants often expressed finding someone or seeking appropriate resources to ask for health information relating to CHD as difficult. In the words of the male MI participant:

"… For the dietary issues, aspects relating to eating and nutrition were difficult to find. You asked the nurses; the nurses would say, would say that they didn't know; or would say some [other] thing, or couldn't book an appointment [for dietitian]. My queries [about dietary issues] were not answered..." (MI1M: 1547-1555)

Similarly, another elderly female participant from the LRP group raised a query regarding heart information. She expressed her difficulty in seeking out people to verify the information:

"I heard from the radio saying that eating tomato is good for the heart. I do not know whether it is true or not…It is not easy [to ask others for information]. All I knew I heard from old ladies. They don't have much knowledge [laugher]" (LRP6F: 219-229)

The present study finding that CHD was difficult to comprehend was consistent with previous reports, in which both layman and CHD patients reported to have difficulties in articulating the processes that contribute to CHD and consequently resulted to misconceptions about CHD (Angus et al., 2005; Karner, et al., 2003; Wiles & Kinmonth, 2001). In addition, the lack of accessibility for CHD information found in this study was echoed by Steenkiste, et al's (2004) and Farooqi, et al's (2000) studies. These studies reported the insufficient information about CHD and its prevention experienced by the study samples.

Plausible explanations for the present study findings might include: firstly, lay public and patients' understandings of CHD and their needs for CHD information might be currently under-explored. This could lead to a great incongruence between CHD information and health messages that were delivered by healthcare professionals to the lay public and patients. This is a phenomenon that has been constantly highlighted in the literature (Allmark & Tod, 2006; Angus, et al., 2005; Wiles & Kinmonth, 2001). As a result, the present study might imply a pressing need for the health professionals to explore lay public's and patients' understandings about CHD and their needs for CHD information as well as to provide the information that were understood, interpreted and usable by these clients.

Secondly, there might be limited effective public health education and campaigns given to CHD as a result of an increased attention given to other recent health problems in Hong Kong, such as, SARS and Avian flu. This might contribute to a decrease in awareness of CHD, and disengage the lay public from a social facilitating environment to acquire opportunities of pursuing a better knowledge and information to understand about CHD. To prevent CHD, it is important to promote such a social facilitating environment where people can share common social concerns, discuss life issues including health, illness, and healthy behaviours regarding CHD, and gain informational support to promote cardiac health and prevent the disease. Studies have presented evidence to show that impaired social network have been increasingly recognised as an important predictor of CHD etiology (Rutledge, et al., 2004), disease progression (Rutledge, et al., 2004; Wang, Mittleman, Orth-Gomer, 2005b), and prognosis (Janevic, Janz, Dodge, Wang, Lin, Clark, 2004; Rutledge, et al., 2004). For instance, Rutledge, et al. (2004) reported that women who were suspected with CHD, with higher social network scores showed a consistent pattern of reduced CHD risk, such as lower rates in smoking, hypertension and diabetes when compared with those with lower social network scores. According to the study report on findings about cardiac angiogram, women with higher social network scores had less CHD progression (Rutledge et al., 2004). In addition, the mortality rates showed that women with low social network scores displayed more than twice the death rate of those with high scores (Rutledge et al., 2004). Therefore, this might urgently imply that adequate and effective public campaign has an important role in promoting a social facilitating environment for people to understand and be aware of CHD and its prevention.

Chest Pain Appraisal or Perceptions

Many MRF and MI participants described retrospectively that they underestimated their perceptions of risk for CHD because they failed to recognise their chest pain as cardiac in origin. These participants highlighted that if they could have an accurate detection of chest pain symptom, they could clearly conceptualise the condition that they are vulnerable to CHD, which could further influence how they manage and decide on the subsequent management of CHD.

Based on the descriptions, both male and female participants commonly highlighted their immediate thoughts of chest discomfort for muscle, nerve or bone pain, as well as stomach or lung problems by saying: *"…think that it is nerve or bone pain. It's something squeezing."*; *"I did not know what caused the pain. But I thought that it was related to muscle..."*; *"At first, I feel that there is indigestion in my stomach like heart burn. So I went to see the doctor for antacids…"* and *"At that time, I thought of the respiratory problem or pain in the lung."* These findings concurred with the previous studies indicating that subjects either with or without a cardiac history failed to recognise chest pain or attributed chest pain to other health problems, and thus, regarded the pain symptom as not serious resulting in delay in seeking appropriate health care (Burnett, Blumenthal, Mark, Leimberger, Califf, 1995; Finnegan, et al., 2000; Lefler, & Bondy, 2004; Leslie, Urie, Hooper, Morrison, 2000; McKinley, Moser & Dracup, 2000; Meischke, Ho, Eisenberg, Schaeffer, Larsen, 1995; Schoenberg, Peters & Drew, 2003; Tod, Read, Lacey, Abbott, 2001). This explicitly demonstrated that when confronted with symptoms as a threat to health, people appear to actively construct cognitions and beliefs to conceptualise their conditions. Their cognitions are important influences at all stages of their experience of an illness (in this case CHD), including the perception of symptoms; searching for attributions for the underlying disease; changing of personal behaviours and conforming to health lifestyle modifications to affect the course or development of the illness.

One plausible reason to explain the failure to evaluate chest pain in this study sample might be that the participants were unfamiliar with the chest pain symptom associated with heart problem. Another explanation might be due to the impact of the immediate emotional responses during chest pain. Participants share similar perceptions with the previous studies in that a cardiac emergence should be a dramatic event; and that the expectation of chest pain associated with CHD should be a sharp and severe crushing pain accompanied by collapse and unconsciousness (Finnegan, et al., 2000; Leslie, et al., 2000; Ruston, Clayton, Calnan, 1998). The fact, however, is that the onset of pain symptom could be gradual and intermittent, and very often it may cause emotional arousal such as denial or fear of the implications of being ill, and may provoke the cognitive appraisal to adapt a “wait and see” coping approach. These aspects of experience were largely not recognised. More importantly were the participants’ inherent engagement of lay strategies that include resting, praying, waiting, taking drinks or having over the counter remedies; all these strategies prolonged the time before seeking appropriate treatment. Thus, it was reported that patients might experience chest pain for days, weeks or even months prior to seeking help (Schoenberg, et al., 2003; Finnegan, et al., 2000). Inappropriate responses to a heart symptom were further indicated by an empirical study conducted by Ruston, et al. (1998). When compared to non-delayers, delayers for a cardiac event were less likely to see themselves as potentially at risk. Delayers were less able to describe a wider range of symptoms of a heart attack, and were more likely to self-treat their symptoms (Ruston, et al., 1998).

Appraisal of chest pain by participants with MRF and MI in this study sample could be better understood in the context of Leventhal, Nerenz and Steele's self-regulatory model (1984), which has been used to explain individuals' cognitive representation of and coping with a health threat. The model suggests the cognitive representation of and coping with a health threat (in this case chest pain) underly an information-processing system. The information-processing system is divided into two parallel pathways. When thinking of chest pain as a health threat, one pathway involves the creation of a cognitive representation of a chest pain, which relies on objective knowledge identifying the chest pain and the development of a coping plan to manage chest pain. This coping response is a controlled process. Another pathway involves the creation of an emotional response to the chest pain, which relies on subjective personal experiences and the development of a coping plan for the management of emotion. This coping response for emotion is an automatic process. These two coping processes, controlled and automatic, may interact in ways that are mutually facilitating or mutually interfering to each specific situation.

Participants not attributing chest pain to the heart might be a problem of cognitive representation of the control coping process, that is, inadequate objective knowledge of the participants to identify chest pain as cardiac in origin. Even when participants possessed the cognitive representation of the chest pain as a threat that was cardiac in origin, emotional factors such as denial (Dracup et al., 1995; Tod et al., 2001), fear of the implications of having heart disease (Tod et al., 2001), or post-traumatic stress (Alonzo, & Reynolds, 1998) might lead to an initial decision of not seeking appropriate attention to reduce CHD risk, which was the automatic process of coping. Thus, the finding of this study might address the cognitive and emotional factors involved in the course of recognising chest pain as cardiac in origin, determining the awareness of self being at risk of having CHD and appraising subsequent coping plan(s) such as initiating healthy lifestyles to reduce CHD risk.

Chest pain is a common reporting symptom in respect to CHD (Greenlund et al., 2004). Ruston, et al. (1998) indicate that being the most critical factor signaling the possibility of a cardiac incidence and medical help-seeking is that whether one can recognise the symptom as cardiac in origin while experiencing chest pain. Therefore, the finding of this current study was consistent with the previous studies that chest pain was commonly experienced by most participants of MRF and MI, and that chest pain as the most significant typical symptom assured recognition of having CHD or a cardiac event.

Both genders of the MRF and MI groups in this study reported retrospectively that they experienced chest pain. The fact that men were more likely to experience chest pain than women has been reported in some studies (Culic, Eterovic, Miric, Silic, 2002; Meshack et al., 1998; Mona, Schei, Hole, 2006), but not by others (Goldberg et al., 1998; Grace et al., 2003; Meischke, Larsen, Eisenberg, 1998). Gender differences in reporting chest pain might be less conclusive in the present study, in particular a limitation of the convenience sampling of MRF and MI participants.

Comparison of data Between Target Populations: LRP, MRF and MI

The analysis of the data in this qualitative study also involved a comparison of the similarities and differences among the participants of LRP, MRF and MI groups. The analysis showed that among the twelve subcategories, participants of the three target populations were similar in the four subcategories: *modifiable and non-modifiable risk factors* and *knowledge of prevention* under the main category of *CHD knowledge*; *perceived seriousness of CHD* in the main category of *perceptions of CHD*, as well as the *perceived opportunities to understand CHD* of the *risk control efficacy* category. However, there were differences among target populations regarding the other subcategories. They were the *pathological causes of CHD*, *external forces in causing CHD*, *CHD trends*, and *symptoms of CHD* in the main category of *CHD knowledge*; *perceived risk* in *perception of CHD* main category; and *planning of health actions*, *control over risk reducing behaviour* and *chest pain appraisal or perceptions* under the main category of *risk control efficacy*. A summary of the categories and subcategories comparing the LRP, MRF and MI populations are shown in Table 5.3. In this table, similarities in subcategories across target populations were shaded.

Table 5.3 Comparative summary of categories and subcategories among three target populations

Categories	Subcategories (focus group)					
	LRP		MRF		MI	
Categories	Subcategories (focus group)	Male Total: 5 groups	Female Total: 2 groups	Male Total: 2 groups	Female Total: 2 groups	Male Total: 2 groups
CHD knowledge	Pathological causes of CHD (1 4 6 8 & 10)	Pathological causes of CHD (2 3 5 7 & 9)	Pathological causes of CHD (2 & 4)	Pathological causes of CHD (1 & 3)	Pathological causes of CHD (2 & 4)	Pathological causes of CHD (1 & 3)
		External forces in causing CHD (2 & 3)	External forces in causing CHD (2 & 4)		External forces in causing CHD (4)	External forces in causing CHD (1 & 3)
	Modifiable and non-modifiable risk factors (1 4 6 8 & 10)	Modifiable and non-modifiable risk factors (2 3 5 7 & 9)	Modifiable and non-modifiable risk factors (2 & 4)	Modifiable and non-modifiable risk factors (1 & 3)	Modifiable and non-modifiable risk factors (2 & 4)	Modifiable and non-modifiable risk factors (1 & 3)
	CHD trends (1 4 8 &10)	CHD trends (2 3 & 9)		CHD trends (3)	CHD trends (4)	CHD trends (1 & 3)
	Symptoms of CHD (1 4 6 8 &10)	Symptoms of CHD (2 3 5 7 & 9)	Symptoms of CHD (2 & 4)	Symptoms of CHD (1 & 3)	Symptoms of CHD (2 & 4)	Symptoms of CHD (1 & 3)
	Knowledge of prevention (1 4 6 8 & 10)	Knowledge of prevention (2 3 5 7 & 9)	Knowledge of prevention (2 & 4)	Knowledge of prevention (1 & 3)	Knowledge of prevention (2 & 4)	Knowledge of prevention (1 & 3)

Continued Table 5.3

Perception of CHD	Perceived seriousness of CHD (4 6 &10)	Perceived seriousness of CHD (2 3 & 9)	Perceived seriousness of CHD (2)	Perceived seriousness of CHD (3)	Perceived seriousness of CHD (2 & 4)	Perceived seriousness of CHD (1)
	Perceived risk (1 4 6 &10)	Perceived risk (2 3 5 7 & 9)	Perceived risk (2 & 4)	Perceived risk (1 & 3)	Perceived risk (2 & 4)	Perceived risk (1 & 3)
Risk control efficacy	Planning of health actions (1 4 6 8 &10)	Planning of health actions (2 3 5 7 & 9)	Planning of health actions (2 & 4)	Planning of health actions (1 & 3)	Planning of health actions (2 & 4)	Planning of health actions (1 & 3)
	Control over risk reducing behaviour (1 4 6 8 &10)	Control over risk reducing behaviour (2 3 5 7 & 9)	Control over risk reducing behaviour (2 & 4)	Control over risk reducing behaviour (1 & 3)	Control over risk reducing behaviour (2 & 4)	Control over risk reducing behaviour (1 & 3)
	Perceived opportunities to understand CHD (1 4 6 8 &10)	Perceived opportunities to understand CHD (2 3 5 7 & 9)	Perceived opportunities to understand CHD (2 & 4)	Perceived opportunities to understand CHD (1 & 3)	Perceived opportunities to understand CHD (2 & 4)	Perceived opportunities to understand CHD (1 & 3)
			Chest pain appraisal or perceptions (2 & 4)	Chest pain appraisal or perceptions (1 & 3)	Chest pain appraisal or perceptions (2 & 4)	Chest pain appraisal or perceptions (1 & 3)

Shaded area = similarities across three target populations

Blank area = no data indicated

The majority of participants of the target populations held similar information about *the modifiable and non-modifiable CHD risk factors* that included poor eating habits, a lack of exercise, smoking, increased alcohol consumption, high blood pressure and blood cholesterol level, diabetes, obesity, stress, a family history of CHD and age. Most target-groups participants had similar *knowledge of CHD prevention* such as maintaining healthy eating habits, regular exercise and a relaxed life; avoiding smoking and excessive alcohol consumption, paying attention to blood pressure and cholesterol level, adhering to the medication and attending regular medical checks. Regarding *perceived seriousness of CHD*, underestimation of CHD was acknowledged by the majority groups (50% or over) of participants of the LRF (6 out of 10 groups), MRF (2 out of 4 groups), and MI (3 out of 4 groups) populations. For *perceived opportunities to understand CHD*, all groups of participants across the three target populations perceived inadequacy to understand the disease and expressed lack of resources regarding coronary health education.

In the subcategory of *pathological causes of CHD*, comparatively most of the participants in the MRF and MI groups acknowledged specifically that the blockage is located in the coronary vessel(s) instead of the other bodily blood vessels, which was perceived by many of the LRP participants. The phenomenon was exemplified in the words of a MRF male participant who explained what CHD meant to him:

> *"It is a problem in the coronary blood vessels. The coronary blood vessels become narrower…" (MRF3M:180-190)*

On the contrary, in the words of a young male participant of a LRP group aged 21-23, who was vague about CHD pathogenesis:

> *"My opinion is that CHD and heart disease are the same thing. As I remember, heart disease is that the heart does not function well and thus, cannot pump the blood and with blockage… The chamber of heart that pumping the blood gets blocked" (LRP9M:48-56)*

On the subcategory of *external force(s) in causing CHD*, seven out of eighteen focus groups attributed the universe, fate, supernatural force or luck as causes of CHD (as shown in Table 5.3). Gender and age differences in perceiving these causes of CHD from the interview data were inconclusive in the present study. Of the seven groups, five groups of participants who believed that the external force(s) cause CHD were from the MRF and MI populations, with two groups from the LRP population. This finding revealed that participants with MI, CHD and/or CHD-related health problems were more likely viewed CHD to be caused by the external force(s) and might use this idea as a coping strategy while living with their health problems, and which were consistently reported from two previous studies conducted in the Hong Kong Chinese populations regarding coping with illness conditions over which people had little control (Chan & Twinn, 2007; Mok et al., 2004).

Regarding the subcategory *CHD trends*, only one group of the MRF population reported knowledge of CHD trends (shown in Table 5.4), suggesting that the MRF groups might be less likely to know the CHD trends than the LRP and MI groups. Gender differences on knowledge about CHD trends were inconclusive in the present study. However, older participants were also less likely to have knowledge of CHD trends.

Table 5.4 Comparative summary of *CHD trends* subcategory

	LRP										MRF				MI			
	Female					Male					Female		Male		Female		Male	
Focus group	1	4	6	8	10	2	3	5	7	9	2	4	1	3	2	4	1	3
Age range			70-88					76-88	66-72		57-67	54-77	52-76		65-72			
CHD trends data	√	√		√	√	√	√			√				√		√	√	√

Shaded area = no *CHD trends* data indicated, √ = *CHD trends* data indicated

The fifth subcategory of CHD knowledge category was *symptoms of CHD*. In comparing the data, the MRF and MI participants were more likely to identify typical CHD symptoms including chest pain, shortness of breath, jaw discomfort, arm and shoulder numbness, a raised of blood pressure and blood cholesterol and the ‘other associated’ symptoms such as back pain, sweating, vomiting and dizziness, whereas the LRP participants were more likely to state chest pain, shortness of breath, dizziness and believed CHD as a disease with no observable symptom. This indicated that the MRF and MI groups were more likely to state CHD symptoms when compared with the LRF groups. Gender difference in reporting symptoms was inconclusive in the present study. A comparative summary regarding symptoms of CHD across target populations is shown in Table 5.5.

Table 5.5 Comparative summary regarding symptoms of CHD among LRP, MRF and MI populations

	LRP										MRF				MI			
	F					M					F		M		F		M	
Focus group	1	4	6	8	10	2	3	5	7	9	2	4	1	3	2	4	1	3
Chest pain		√	√	√	√	√	√		√	√	√	√	√	√	√	√	√	√
Shortness of breath	√	√		√			√		√	√	√	√	√	√	√	√	√	√
Jaw discomfort											√		√		√		√	
Arm or shoulder discomfort				√							√	√	√		√		√	√
High blood pressure				√		√					√		√	√			√	√
High blood cholesterol																	√	√
Back pain															√			√
Sweating				√							√		√	√			√	√
vomiting															√	√		√
dizziness	√			√		√					√		√	√			√	√
No observable symptoms	√				√	√		√	√						√			

LRP= low risk public, MRF= multiple risk factors population, MI= myocardial infarction population, F=female groups, M= male groups, √ = symptom reported

In the subcategory of *perceived risk*, participants of LRP, MRF and MI groups commonly reported risk factors, symptoms and age as factors in perceiving their own risk for CHD. However, regarding the issues of risk factors and symptoms, the LRP participants were more likely to describe themselves as low risk for CHD as they believed they did not have any risk factors and experience any CHD symptoms; whereas the MRF and MI participants were more likely to describe themselves as high risk for CHD and/or CHD recurrence as they were able to identify their CHD risk factors and experienced CHD symptoms. For age as an issue for risk perception, the majority of LRP participants perceived less risk for CHD in relation to young age, with only two out of seven groups of participants who were older did not perceive risk for CHD. However, among the MRF and MI groups, three out of five old age groups did not perceive risk for CHD, with only two out five groups who had high perception of risk in relation to old age. For the issues of optimism, disease suffering and medical reliance as factors in the course of risk perception, the LRP participants were more likely to adopt these factors to negate their personal risk for CHD than those in the MRF and MI groups. A comparative summary regarding perceived risk among LRP and MRF and MI populations is shown in Table 5.6.

Table 5.6 Comparative summary regarding perceived risk among LRP, MRF and MI populations

	LRP										MRF				MI			
	F					M					F		M		F		M	
Focus group	1	4	6	8	10	2	3	5	7	9	2	4	1	3	2	4	1	3
Issue of risk factors	√	√	√		√	√	√		√	√	√	√	√	√	√	√	√	√
Issue of CHD symptoms	√		√		√		√		√	√	√	√	√	√	√		√	√
Age	√				√	√	√	<u>√</u>	<u>√</u>	√	<u>√</u>	<u>√</u>	√	√	<u>√</u>			
Optimism	√		√															√
Rely on medical doctor		√	√						√									√
Issue of disease suffering	√									√								

LRP= low risk public, MRF= multiple risk factors population, MI= myocardial infarction population, F=female groups, M= male groups, √ = data indicated, Blanked = no data indicated, underline = perceived risk decreased because of old age

In the subcategory of *planning of health actions*, most MRF and MI participants had motivation to undertake lifestyle modifications and initiate health actions such as attending regular medical checks and preventive knowledge to reduce CHD risk. On the contrary, there was a great difference in *planning of health actions* in relation to CHD risk prevention among the LRP groups, in which older participants were more likely to undertake lifestyle preventive measures and pursue CHD knowledge to reduce disease risk than the younger participants.

Based on the descriptions of LRP, MRF and MI participants, similar difficulties primarily consisted of information about a control of diet, regular exercise and stress regarding the subcategory of *control over risk reducing behaviour*. However, LRP participants in particular among the young age groups were less likely to control risk reducing behaviour than the older LRP participants and those in the MRF and MI groups.

On the subcategory of *chest pain appraisal or perceptions*, participants of all MRF and MI groups reported their appraisal and perceptions of chest pain. On the contrary, participants of LRP groups did not provide data in this issue. Among the MRF and MI participants, there was no great gender difference in chest pain appraisal and perceptions.

Identified Categories and Subcategories Underpinning the Chinese People's Concept of 'Awareness of CHD Risk Factors Reduction'

While highlighting how the identified categories and subcategories underpin Chinese people's awareness of CHD risk factors reduction, possible inferences might be drawn from which these categories and subcategories are important factors, interweaving with issues arising from the demographical profiles such as age, attributes of personal character and health status, the emotional factor, as well as socio-cultural beliefs and practices of the present study sample that could impinge the course of personalisation to CHD risk, and the process from one's personalisation of risk to control of CHD risk factors reduction. Taking all these issues together entailed the possible way(s) that the Hong Kong Chinese people of the current sample conceptualised the awareness of CHD risk factors reduction.

The Course of Personalisation to CHD Risk

The role of knowledge as a crucial moderating factor can influence people's beliefs and perceptions of CHD. People's causal beliefs about CHD associated with their perceived risk factors have been reported (Perkins-Porras et al., 2006). Identifying causes of CHD may engender a sense of predictability and control over disease, and so as to help lifestyle changes of an individual, thereby promoting primary and secondary CHD prevention. The current Chinese sample reported a reasonable knowledge of CHD risk factors, which may in one hand empower some of the participants (being reported in the present study) to estimate their own CHD risk, and may further reinforce their daily lifestyle changes to reduce future disease risk. Concomitantly, on the other hand having reasonable risk factor knowledge might not guarantee a risk evaluation leading to the performance of health behavioural actions among other participants, in particular among the young Chinese in the low risk population, which was reported in this study. Such finding was quite consistent with previous studies in which study samples having knowledge about CHD risk factor had no effect on the change of health behaviour to prevent CHD (Khalid et al., 1994; Shepherd et al., 1997). Plausible inferences could be drawn on the fact that participants' optimistic bias and issues related to their cultural beliefs and practices might influence participants to personalise their own CHD risk in a lesser extent and thus, reduce the effect to act on lifestyle changes for risk reduction.

Optimistic bias, a phenomenon that emerged in present study, compromised the process of personalisation to CHD risk. Regarding themselves as of young age, being optimistic in character, being free from any CHD symptoms and risk factors, coupled with an underestimation of CHD severity, indicate that the present sample of participants placed themselves outside the parameters of CHD risk and that preventive measures were not imperative in their cases.

Culturally, believing life stressors (such as illness and disease) are predetermined by fate and accepting things are controlled by the nature of the universe as traditional concepts

(Bond, 1996; Chan & Twinn, 2007; Mok et al., 2004; Phillips & Pearson, 1996) might disengage the Chinese participants from the readiness to assess their own risk for CHD. Another aspect rendering a barrier to personalisation to CHD risk could be the socio-cultural perspective on the concept of 'sick role'. As formally promulgated by Parson (1951), the sick role confers rights and obligations on a sick person (Miczo, 2004). The person has the right to exemption from attributions of responsibility for acquiring the illness, and the obligation to not only seek competent medical help, but also follow the guidance of a physician and cooperate with that help in promoting recovery from the illness (Miczo, 2004). A number of the present Chinese participants, both low risk and at high risk participants, might highly depend on the medical doctors' interpretations of CHD and its symptoms, as well as any person whose duties is to look after their health, which might prevent participants to evaluate own personal risk for CHD and thus, attenuate their perceptions of CHD risk.

As discussed earlier, the cognitive and emotional factors attenuating participants' appraisal to recognise chest pain as cardiac in origin might render their failure to conceptualise the condition that they were in fact being vulnerable to CHD. In addition, inadequate social facilitating environment as an issue underpinned the difficulties in understanding CHD, which might reduce participants' ability or opportunities to inform their personal CHD risk.

In short, the aforesaid discussions were the possible inferences resting on participants' personalisation to CHD risk, which underpinned the Chinese people's awareness of CHD risk factors reduction in this study.

The Process from the Personalisation of Risk to Perceived Control of Risk

Being personalised to CHD risk in a greater extent, is more likely for an individual to perceive a control to reduce risk, which has been supported in previous studies (Ali, 2002; Mosca et al., 2006). This could explain why participants of this study perceived themselves at risk for CHD or at high risk for future CHD events thus recognizing the need to reduce their CHD risk.

The personalization of risk may not necessarily lead to people controlling the risk although one would hope that once a person have knowledge of the risk, one would aim to control that risk. Such process could be impacted by barriers and mediators associated with the socio-cultural factors inherent in the Chinese society. Hwang (1977) studied the coping strategies used by the Chinese people. The study revealed five different modes of coping strategies: (1) mobilisation of personal resources, (2) seeking help from social resources, (3) appealling to supernatural power, (4) adopting the philosophy of doing nothing and (5) avoidance. Therefore, as far as control over CHD risk is concerned, the Chinese participants might appeal to the supernatural power in determining the course of the disease and/or adopt a philosophy of doing nothing. Such an approach could be used as coping strategies as influenced by their traditional beliefs and philosophies regarding the roles of fate and the nature of the universe in the management of life stressors. These strategies could be barriers to the process from one's personalisation of risk to perceived risk control.

Traditional Chinese eating culture and the development of urbanisation and westernisation in Hong Kong, a proliferation of unhealthy fast food, a stressful city lifestyle and lack of time for regular exercise were also the possible barriers for maintaining a healthy lifestyle in this Hong Kong Chinese sample. In addition, the lack of a social facilitating environment to provide information for lifestyle modifications could also be an obstacle in the course of CHD risk control.

Apart from these barriers, the Chinese socio-cultural concept of the sick role suggests that a sick person should follow the guidance of a physician and cooperate with that help in promoting recovery from the illness. As such, participants with health problems who perceived themselves as high risk for CHD might act in a way to conform to physicians' every recommendation regarding healthy lifestyle changes. Another mediator for risk control could be that the Chinese views the family as the basic and the most important unit of human life, and the moral force of family obligations to provide care to a family sick member is emphasised in the Chinese tradition (Holroyd, 2003). As such, participants of the present Hong Kong Chinese sample, especially those with CHD and CHD-related health problems would deliberately adhere to lifestyle modifications for fear of further burdening family members. As a result, this reinforced an initiation of health actions and a control over risk reducing behaviour.

In summary, the issues: (1) optimistic bias, (2) cultural concepts of fate and the nature of the universe, (3) family values and (4) the sick role, (5) cognitive and emotional appraisals in response to chest pain, (6) Chinese culture and practices on eating habits, as well as (7) the Hong Kong social environment for CHD risk factors reduction discussed within the contexts of the identified categories and subcategories were the substantial concepts primarily involved in the course of personalisation to CHD risk and the process of one's personalisation of risk to take control over CHD risk, which in turn reflect the Hong Kong Chinese people's awareness of CHD risk factors reduction. As the conceptualisation of the Hong Kong Chinese's awareness of CHD risk factors of reduction was presented, some implications for nursing practice in assessing individuals' awareness in this area will be addressed in the next section.

Implications for Nursing Practice in Assessing Individuals' Awareness of CHD Risk Factors Reduction

The importance of Individualised Assessment of Awareness of CHD Risk Factors Reduction

The categories and subcategories that emerged from the data revealed the cognitive, affective, behavioural and social aspects intrinsic to the ‘awareness of CHD risk factor reduction’. The cognitive aspect entails the objective knowledge of CHD. The affective aspect comprises of the emotional and perceptual elements that represent the categories of chest pain appraisal, perceived seriousness of CHD, and perceived risk. The behavioural aspect includes categories of planning of health actions and control over risk reducing behaviour. The social aspect represents the perceived opportunities to understand the disease via the social facilitating environments. These categories explained the Chinese concept ‘awareness of CHD risk factors reduction’. They serve as substantive pieces of information reflectng the spectrum of attributes of one’s awareness of the importance of CHD prevention. Individuals make sense of CHD at different levels of cognition. One implication is that while nurses examine awareness in this area, individualised assessment should also be encouraged.

A Thorough Evaluation on Cognitive, Affective, Behavioural and Social Aspects

In reality, a wide range of situations surrounds the ‘awareness of CHD risk factors reduction’. These identified categories and subcategories interface with and act as modifying factors, which in turn, make them plausible to apply to, and explain a variety of human situations. For instance, one may acquire CHD knowledge; hence increase health awareness; and engage in health behaviour to reduce disease risk via information obtained from the social facilitating environment such as the health campaigns. Others, on the other hand, may recognise themselves at high risk of CHD through symptom appraisals or past life-threatening experience(s), for example, a heart attack. These individuals may actively search for CHD-related information to pursue strict healthy lifestyles and to control future disease risk. More importantly, while failure to perceive self as "at risk" due to optimistic bias may impede one's intention to pursue knowledge, to plan for health actions, and to control health behaviour for the suggested lifestyle changes. Therefore, another implication would be that a thorough evaluation on each of the cognitive, affective, behavioural and social aspects of awareness becomes crucial in nursing assessment in the course of CHD prevention and health promotion.

In order to conduct a thorough evaluation of people's awareness to CHD risk factors reduction, an instrument needs to be developed. Thus, based on the results of this Phase One of the study, the following section presents the item generation.

Item Generation

Items were developed based on the identified categories and subcategories (see Table 5.2) regarding 'awareness of CHD risk factors reduction' in the qualitative study. Data from the focus group interviews were carefully reviewed by categories and subcategories and preliminary items were developed from participants' words, phrases, expressions and themes as well as in the supportive quotes for each subcategory. Many items were repeatedly generated by different participants. Items generated were selective and representative of the samples and thus, have face validity. Further, these preliminary items were revised for clarity and conciseness, and were reviewed by the researcher and researcher's supervisor to be certain that the content of each subcategory was representative of awareness to CHD risk factors reduction. Through this process, a final consensus was reached and a list of 70 items arranged by subcategories was produced as shown in Table 5.7. In order to show clearly how items were generated from the relevant quotes of the identified subcategories, a table of the categorisation of subcategories illustrated with the relevant quotations are attached in Appendix 5.1.

The generated 70 items (the psychometric evaluations of this 70-item instrument to 59-item and then to the final 43-item will be discussed in Chapter 7) consists of 32 items for CHD knowledge category, 11 items for perceptions of CHD category, and 27 items for risk control efficacy category as shown in Table 5.7. Thirty items were reverse sentences in order to avoid acquiescence (Spector, 1992) and were reverse-scored. A five-point Likert scale was used as categorical responses as 4 = "definitely true", 3 = "mostly true", 2 = do not know/unsure", 1 = "mostly false", and 0 = "definitely false". Each item contributed equally to the score of the category or subcategory. Scores for awareness of CHD risk factors reduction were obtained by summing the item scores. Higher scores indicated a higher level of awareness of CHD risk factors reduction.

Table 5.7 Initial instrument items by categories and subcategories

Initial instrument items generated	Categories and *subcategories*
	Category 1: Knowledge of CHD
1. CHD is a disease due to the narrowing or blockage of blood vessels supplying the heart	*Pathological causes of CHD*
2. CHD is often associated with fate or bad luck ®	*External forces in causing CHD*
3. Smoking increases the chance of CHD	*Modifiable risk factors and non-modifiable risk factors*
4. Increased alcohol consumption decreases the chance of CHD ®	
5. Bad eating habits increase the chance of CHD	
6. Stress increases the chance of CHD	
7. CHD is often associated with a lack of exercise	
8. Diabetes increases the chance of CHD	
9. CHD is often associated with an increased blood pressure	
10. CHD is often associated with a raised blood cholesterol	
11. Obesity increases the chance of CHD	
12. Family history of CHD increases the chance of CHD	

13. Old age increases the chance of CHD	
14. Women are more likely than men to be affected by CHD ®	
15. CHD is a major cause of death	*CHD trends*
16. The incidence of CHD is increasing in young people	
17. CHD is a disease of old-people ®	
18. CHD has no symptoms ®	*Symptoms of CHD*
19. CHD causes chest discomfort	
20. CHD causes discomfort in the jaw	
21. CHD causes shortness of breath	
22. CHD causes back pain	
23. CHD causes pain or numbness in the arms or shoulders	
24. Healthy eating habits can prevent CHD	*Knowledge of prevention*
25. A relaxed life can prevent CHD	
26. A good exercise habit can prevent CHD	
27. Regular medical checks can prevent CHD	
28. Paying attention to blood pressure can prevent CHD	
29. Paying attention to blood cholesterol level can	

prevent CHD	
30. CHD requires long-term medication	
31. Not smoking can prevent CHD	
32. Avoiding alcohol can prevent CHD	
	Category 2: Perceptions of CHD
33. I am more likely to concern about diabetes than CHD ®	*Perceived seriousness of CHD*
34. I am more likely to concern about high blood pressure than CHD ®	
35. I am more likely to concern about stroke than CHD ®	
36. I am more likely to concern about an infectious disease than CHD ®	
37. I don't bother about CHD ®	*Perceived risk*
38. I don't bother about CHD because I have no risk factors for CHD ®	
39. I don't bother about CHD because I have no signs and symptoms of CHD®	
40. I am too young to have CHD ®	
41. I don't bother about CHD because I am optimistic®	
42. I don't bother about CHD because the doctor looks after my health ®	

43. I don’t bother about CHD because it causes little suffering®	
	Category 3: Risk control efficacy
44. I try to take CHD preventive measures	*Planning of health actions*
45. I try to eat regular meals	
46. I try to avoid fatty food	
47. I try to avoid food high in bad cholesterol	
48. I try to avoid food high in calories	
49. I try to avoid food high in salt	
50. I try to avoid over eating	
51. I try to do exercise at least 30 mins everyday	
52. I try to relax	
53. I try to avoid smoking	
54. I try to avoid drinking too much alcohol	
55. I try to have a regular body check	
56. I try to learn more about CHD	
57. Sometimes, I find it difficult to avoid fatty food ®	*Control over risk reducing behaviour*
58. Sometimes, I find it difficult to avoid food high in bad cholesterol ®	
59. Sometimes, I find it difficult to avoid food high in calories ®	

60. Sometimes, I find it difficult to avoid food high in salt ®	
61. Sometimes, I find it difficult to avoid over eat ®	
62. Sometimes, I find it difficult to maintain a relaxed life®	
63. Sometimes, I find it difficult to maintain regular exercise®	
64. I find it difficult to understand CHD ®	*Perceived opportunities to understand CHD*
65. I find it difficult to locate resources for CHD information ®	
66. I find it difficult to find someone to ask about CHD ®	
67. Chest discomfort will make me immediately think of a muscle or bone problem®	*Chest pain appraisal or perceptions*
68. Chest discomfort will make me immediately think of a nerve problem ®	
69. Chest discomfort will make me immediately think of stomach problem ®	
70. Chest discomfort will make me immediately think of breathing problem ®	

® Indicates reverse item

Conclusion

In conlcusion, three categories and twelve subcategories emerged from the qualitative data that were collected based on focus group interviews. The domains surrounding the 'awareness of CHD risk factors reduction' resulting from the related literature were clearly supported and corresponded empirically by the identified categories and subcategories of the qualitative study. Ultimately, this qualitative study finding provided information to enhance current understanding about the Chinese people regarding CHD knowledge, perceptions of CHD and risk control efficacy, which in turn reflected the levels of awareness of CHD risk reduction.

As shown in Table 5.3, the twelve subcategories were: (1) pathological causes of CHD, (2) external forces in causing CHD, (3) modifiable/non-modifiable risk factors, (4) CHD trends, (5) symptoms of CHD, and (6) knowledge of CHD prevention under the main category of CHD knowledge; (7) perceived seriousness of CHD, and (8) perceived risk under perceptions of CHD main category; (9) planning of health actions, (10) control over risk reducing behaviour, (11) perceived opportunities to understand CHD, and (12) chest pain appraisal or perceptions under risk control efficacy main category. Based on the subcategories, instrument items were generated. After item generation, a series of psychometric testing was conducted and will be explained in Chapter 6.

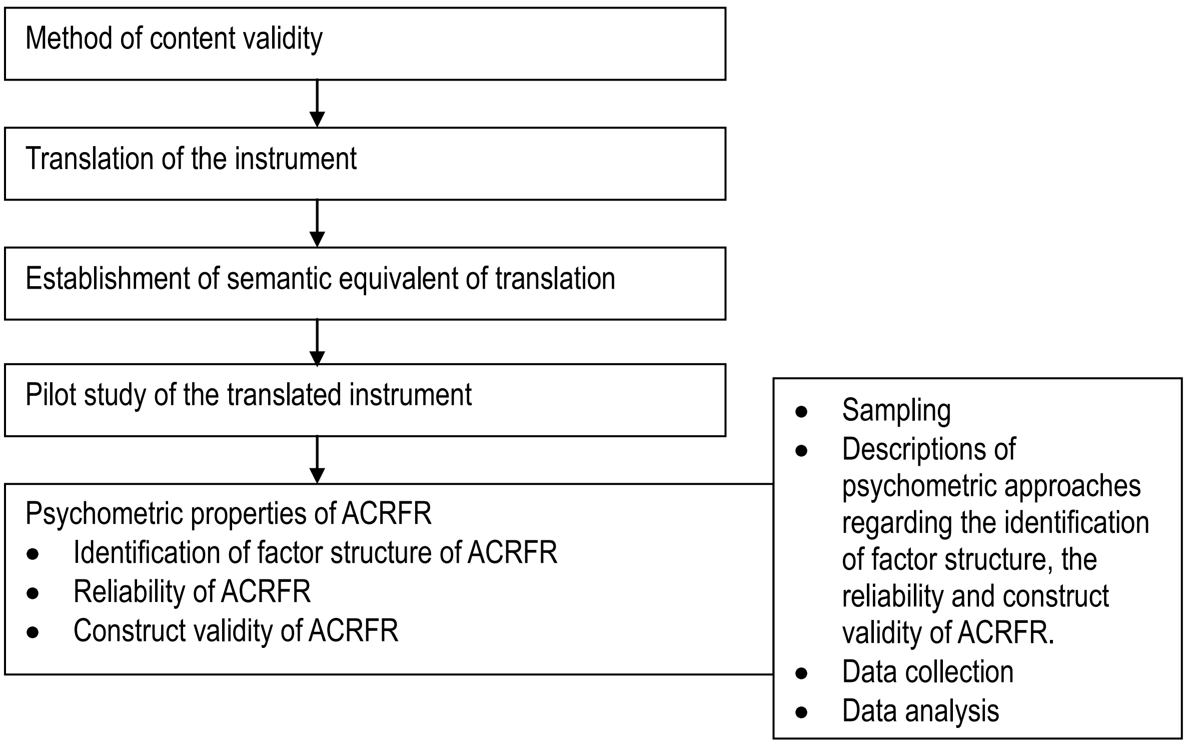
CHAPTER 6

METHODS OF PHASE II STUDY

Introduction

Phase II study focuses on the psychometric evaluation of the instrument measuring Awareness of CHD Rsk Factor Reduction (ACRFR). The methods included content validity, identification of factor structure, reliability and construct validity of ACRFR. The translation of instrument items from English to Chinese, establishing the semantic equivalence of translation, and a pilot study of the instrument were performed after the establishment of content validity and will be addressed later in this chapter. In view of the complexity of this phase of the study and the series of methodological approaches employed, an overview of the organisation of this chapter is shown in Figure 6.1.

Figure 6.1 An overview of the chapter organisation



This chapter firstly describes the method to establish content validity using a panel of experts. The translation of instrument, the establishment of semantic equivalence and the pilot study of the instrument will be addressed next. Sampling for psychometric properties of the instrument regarding the identification of the factor structure, reliability and construct validity of the ACRFR will be described. Descriptions of psychometric approaches included the identification of factor structure, the reliability and construct validity of ACRFR. The data collection and data analysis will be delineated. Lastly, ethical considerations of the research study will be addressed.

Establishing the Content Validity of ACRFR

Content validity refers to the content representativeness or content relevance of the items of an instrument which measures the intended construct (Lynn, 1986). It is fundamental to the validation of all instrumentation. Content validity is usually established in a two-stage process: a developmental stage and a judgment-quantification stage (Lynn, 1986). In the development stage, the dimensions of a concept being measured are identified, items are generated and the instrument is constructed. In the judgment-quantification stage, experts determine if the individual items and the entire instrument are valid and adequate to measure the concept.

In the previous chapters, the developmental stage of the content validity of ACRFR had been established by a review of the literature about the concept, the theoretical framework adopted together with the identification and clarification of the dimensions of the concept through focus groups interviews, in which the development of items was undertaken. Mishel (1998) asserted that as data were based on clinical interviews by focus group participants, the content was a valid description of the concept by those involved. With this valid description of the concept, the development of items was undertaken, which further established connections to the concept. As such, the development stage of content validity of ACRFR was established.

In this section the method of determining content validity, the process of judgment-quantification stage will be described. For the judgment-qualification stage, a panel of experts was employed to determine if the individual items and the entire instrument were content valid and adequate. Seven experts were invited to evaluate individual items as well as the entire instrument in terms of its relevancy and adequacy to measure the concept 'ACRFR'. Experts were selected based on their credentials in test construction and expertise in cardiovascular care. They were:

1. A nursing unit manager with more than 10 years experience in coronary care
2. A registered nurse working in coronary care unit (CCU) with more than 10 years experience
3. A cardiologist working in CCU with 7 years experience in cardiac specialty
4. A registered nurse working in cardiac rehabilitation unit with more than 10 years experience in coronary care
5. A physiotherapist working in cardiac rehabilitation unit
6. An academic (professor) who is also a research scientist with expertise in cardiac rehabilitation area and test construction
7. An academic (professor) who is also a psychologist with expertise in test construction

The purpose of the study was explained to the experts. Categories and subcategories identified from the Phase 1 qualitative study as well as the operational definition of the construct being measured by the ACRFR were communicated to the panel. Each of the panel experts was provided with rating forms (Appendix 6.1 and Appendix 6.2) to evaluate the relevancy and adequacy of the ACRFR instrument respectively. The evaluation consisted of two parts. The first part (Appendix 6.1) required the experts to rate the relevancy of each item (total = 70 items) in measuring the intended category and/or subcategory. The rating was given on a 4-point rating scale with 1 = “not relevant”, 2 = “unable to assess relevance without item revision”, 3 = “relevant but needs minor alteration”, and 4 = “very relevant and succinct” (Lynn, 1986). In order to assis the panel of experts in rating the relevancy of the items according to the categories and subcategories, the panel was also given the descriptions of these categories with subcategories stated as follow:

1. CHD knowledge – this category intends to measure respondents’ knowledge about CHD in terms of the subcategories including pathological causes of CHD, external forces in causing CHD, the modifiable and non-modifiable CHD risk factors, CHD trends, symptoms of CHD, and knowledge of CHD prevention.
2. Perceptions of CHD – this category intends to measure respondents’ perceptions of CHD in terms of the subcategories of perceived seriousness of CHD and perceived risk.
3. Risk control efficacy – this category intends to measure respondents’ efficacy of CHD risk control in terms of the subcategories including the chest pain appraisal/perceptions, planning of health actions, control over risk reducing behaviour, and perceived opportunities to understand CHD.

The second part consisted of 4 questions, addressing whether (1) the entire instrument in measuring the overall construct ACRFR was adequate, (2) if words in each item were appropriate and clear, (3) the instructions for using the instrument, and (4) the format or layout of the instrument were clear and acceptable (Appendix 6.2). Regarding the adequacy of the entire instrument in measuring the overall construct, the question: “Does the entire instrument adequately measure the awareness of CHD risk factors reduction?” was posed. Similar to the first part of the evaluation, the experts were asked to evaluate this question in a 4-point rating scale of 1 = “not adequate”, 2 = “unable to assess adequacy without item(s) revision”, 3 = “adequate, but needs minor alteration”, and 4 = “very adequate and succinct”.

Only 4 = “very relevant / adequate and succinct” or 3 = “relevant / adequate but needs minor alternation” were judged as content valid for each individual item and the content was accepted as adequate for the entire instrument. The extent of agreement was quantified by a percentage which indicated the proportion of experts who rated an item as content valid and the entire instrument as content adequate. As the panel consisted of seven experts, according to Lynn (1986) the minimal acceptable percentage of agreement for each item-content relevancy and the entire-content adequacy was 86% (six out of seven experts). Furthermore, an index of content validity (CVI) of at least 0.80 was proposed (Polit & Hungler, 1999), indicating a minimum of 80% of the total items achieving as content valid (i.e. a rating of 3 or 4). Expert reviews continued until the aforementioned minimum criteria of the percentage of agreement and the CVI was reached.

Translation of the ACRFR Instrument

As instrument items were developed from participants’ words, phrases and themes of quotes in the English version and the instrument will be administered to the Hong Kong Chinese population, vigorous procedures of translating instrument items and establishing semantic equivalence of the translation were adopted in order to minimise possible semantic errors. This section describes the translation processes and presents the semantic equivalence of translation of the developed instrument.

Translation Processes

Brislin's (1986) model of translation was adopted to guide the translation. The model involved four steps.

Step 1: Forward Translation of the Developed Instrument

The original English (the source language = SL) version of ACRFR was translated into Chinese (the target language = TL) version by the researcher. As a moderator in the focus group interviews and a bilingual native Chinese, the researcher gained better understanding about the content of the instrument and had familiarity with the target population. Therefore, the conditions enhanced the equivalence of translation.

Step 2: Review of the TL Version by a Monolingual Reviewer

A native male Chinese monolingual reviewer was invited to review the Chinese version of instrument items as translated in step 1 for any incomprehensible wordings or ambiguity in meaning. The reviewer had no knowledge of English and had expertise only in the Chinese language. He would thus, be sensitive to the grammatical errors that may have occurred in the Chinese version (Brislin, 1986). Any errors identified in step 2 were revised prior to step 3 that consisted of backward translation.

Step 3: Backward Translation of the TL Version

A bilingual registered nurse was invited to translate the TL version, which had been finalised from step 2, back into English (back-translated version). The bilingual nurse was "blinded" to the original English version of the developed instrument. A "blind" backward translation of TL version ensured the meaning of the TL version to be adequately reflected in the back-translated version without any prior knowledge about the content of the instrument.

Step 4: Review for Linguistic Equivalence

The researcher compared the back-translated version and the original English version (SL) for linguistic congruence. Items with apparent discrepancies were examined. Any error identified, starting with the 4-step cycle or back-translated by another bilingual person in step 3 continued until a maximum equivalence was achieved.

By following the steps in the Brislin's (1986) model of translation, there was no distortion in semantic meaning between the SL and the backward translation of TL versions although various differences in word usages were identified for the two versions, for examples, 'poor eating habit' and 'bad eating habit', 'bone problem' and 'skeletal problem'. No alterations of the original TL version were made. In case of any possible undetected errors during translation, an equivalence evaluation by comparing the English SL and the Chinese TL versions were further undertaken by a bilingual committee review. The aim was to establish semantic equivalence of translation.

Establishing Semantic Equivalence of Translation

A bilingual committee review was employed to establish the semantic equivalence of translation. Guidelines for the number of reviewers have varied from four to ten, or even up to 20 persons in an oral tradition. In this study, a group of 5 professionals were invited as reviewers to evaluate the semantic equivalence of each item by directly comparing the English version with the Chinese version. Three professionals had a Master Degree while the other two had a Bachelor Degree. They were the doctor, dentist, nursing lecturer and two nurses. The evaluation used a four-point Likert scale of 1 = 'inappropriate' to 4 = 'very appropriate' (Appendix 6.3). From a guideline that has been passed down in an oral tradition, an item would be deemed as appropriate by ≥ 80% of the evaluators who rated the item as '3' or '4' in terms of appropriateness. According to this criterion, all items of the instrument were rated in scale ‘3’ and ‘4’ by more than 80% of raters.

After semantic equivalence of translation was established, a version of Chinese instrument (Appendix 6.4) was prepared for the pilot study that will be described in the following sections.

Pilot study of the ACRFR Instrument

A pilot study of the developed instrument was conducted to identify any problems regarding the administration and clarity of the items prior to the start of data collection in the actual main research project, to examine the distributions of item scores for any possibility of response bias and to perform the instrument reliability. Pilot study is regarded as a trial run to assess the feasibility of the main study (Polit & Hungler, 1995; Portney & Watkins, 2000). Generally, about 10 people similar to subjects who will be used in the main study are recruited (Nieswiadomy, 1998).

Recruitment of the Participants of the Pilot Study

Participants were recruited from an elderly community center, dental clinic, a cardiac unit and a cardiac rehabilitation and prevention center, which were the accessible venues for the recruitment of subjects in the psychometric validation study. The present pilot study consisted of 12 participants and they were grouped as low risk public, multiple risk factor and MI populations. Three low risk participants from the community center and dental clinic, five participants with multiple risk factors from the cardiac unit, as well as four MI participants from the cardiac rehabilitation and prevention center were invited to join the pilot study. The details of selection criteria for low risk, multiple risk factors and MI participants, as well as the accessible venues for recruitment are described in the main study for psychometric testing (pages 179-182).

The participants in the pilot study were provided with the study details and informed consents were obtained prior to the administration of study questionnaires. Face-to-face interviews were conducted in the community center, the dental clinic, the cardiac unit and the cardiac rehabilitation center. The face-to-face interview allowed the investigator to observe and identify any questionnaire items that were found to be difficult for the participants to comprehend or respond to. Administration time was recorded. Participants were also asked for comments on the questionnaire after completion.

Data Analysis of the Pilot Study

Data analysis included basic descriptive statistics and Cronbach's alphas. Sample demographics were presented by descriptive statistics including the mean, standard deviation and range. The distributions of item scores were examined for any possibility of response bias. Cronbach's alphas was performed to assess the internal consistency of the instrument.

Sampling for Psychometric Properties of ACRFR: Identification of Factor Structure, Reliability and Construct Validity

Target Populations

As the instrument ACRFR was developed for measuring awareness of CHD risk factor reduction in the low risk general public, subjects with multiple risk factors either with or without CHD, as well as those with MI, ensured a heterogeneous sample thus increasing the variance in instrument development and enhancing its accuracy when used on subjects with variations (Denzin & Lincoln, 1994; Kline, 1997; Morse, 1991). The sample for identification of factor structure, testing reliability and construct validity consisted of the low risk public (LRP), population with multiple risk factors (MRF) comprising of subjects with or without CHD, as well as the population with a confirmed diagnosis of myocardial infarction (MI).

Sampling Method

Convenience and snowball sampling method was used to facilitate the recruitment of a sufficiently large number of readily accessible participants for testing the psychometric properties of the instrument. Based on the inclusion criteria, methods to locate the aggregated populations of subjects included: (1) asking participants whether they knew of anyone in the households and people in social gathering places, e.g. church, who were willing to participate, (2) approaching the public domains including community centers and organisations for the possibility of recruiting subjects for the study, (3) seeking approval for recruiting subjects in a cardiac unit of an acute hospital and in a cardiac rehabilitation and prevention center of a community-based hospital.

Accessible Population

The recruitment of participants was approvd by four organizations. They included an elderly community center in Eastern Hong Kong, a dental clinic in Kowloon, a cardiac unit of an acute hospital in Western Hong Kong and a cardiac rehabilitation and prevention center of a hospital in Central Hong Kong (same recruitment venue as in the Phase 1 study). In addition, subjects who were willing to participate were recruited from different geographical sites through the snowball method. This resulted in obtaining a sufficient sample that fulfils the study selection criteria, and increasing the likelihood of recruiting a representative sample of subjects from different geographical locations and health care settings as well as socio-cultural groups.

Low risk public was primarily recruited from the public domains including the elderly community center and the dental clinic, and among households and churches. The multiple risk factors population including those with or without CHD was recruited in the acute cardiac unit, whereas the MI subjects were from the cardiac rehabilitation and prevention center.

Sampling of Participants

Each population group: the low risk public (LRP), population with multiple risk factors (MRF) comprising of subjects with or without CHD, as well as the population suffering from myocardial infarction (MI) had a set of recruitment criteria as described below.

Inclusion criteria for the LRP were:

1. Participants aged 18 or over.
2. Participants are cognitively stable with no history of mental illness.
3. Participants have no history of MI and no history of receiving a cardiac rehabilitation program.
4. Participants who had no more than three of the listed risk factors as stated in the screening list of CHD risk factors employed in the Phase 1 study (this screening list will be described in the next paragraph).

Inclusion criteria for the MRF group were:

1. Participants aged 18 or over.
2. Participants are cognitively stable with no history of mental illness.
3. Participants are not in a critically ill stage during their hospitalization.
4. Participants have no history of MI and no history of receiving a cardiac rehabilitation program.

5. Participants who have four or more of the listed eight risk factors as stated.

Inclusion criteria for MI group were:

1. Participants aged 18 or over.
2. Participants are cognitively stable with no history of mental illness.
3. Participants who had a confirmed medical diagnosis of MI and received a cardiac rehabilitation program.

To collect subjects' information about CHD risk factors, the screening list of eight CHD risk factors (Shepherd et al., 1997) employed in the Phase 1 study was used in this phase of study (complete wording of the questions / statements about the eight risk factors are in Appendix 4.6).

1. Personal history of CHD, hypertension or diabetes
2. Family history of CHD
3. A history of smoking cigarettes
4. Drink an average of three or more 'units' of alcohol per day for every day, most days (4-7 days a week) or 1 to 3 days a week (a unit measured as a glass of wine, half pint of ale).
5. Exercise 30 minutes/day less than once a month
6. Poor eating habit and poor eating attitude which is defined as participants not monitoring two or more out of the 4 dietary components: fat, cholesterol, calories or salt in diet, and choose the attitudinal statement indicating not concerned about diet and eating with no regard to health or nutrition
7. Are not concerned about healthy lifestyle which is defined as participants choose the statement indicating no concern about lifestyle and not willing to make sacrifices

to live healthily.

8. Participants with total cholesterol level ≥ 5.3 mmol/l, or have no knowledge about cholesterol as a risk factor and do not know their cholesterol level.

Sample Size Determination

Sample Size for Factor Structure Identification

Guidelines for sample size in factor analysis have been in somewhat of a flux. Kline (1997) suggested a 2:1 ratio of subjects-to-variables, with a minimum of 100. Others have suggested that a subjects-to-variables ratio of 4:1 or 5:1 was sufficient for exploratory factor analysis (EFA) (Hair, Anderson, Tatham, Black, 1995; Floyd & Widaman, 1995). Gorsuch (1983) stated that there should be at least 5 subjects per variables and that a sample size of at least 200 was ideal. Polit-O'Hara (1996) proposed that there should be at least five to ten subjects per variable. In the present EFA, guidelines regarding a ratio of 4:1 of subjects-to-variable, with at least 200 subjects were used to determine the sample size. That was a sample of 236 subjects based on the developed instrument with 59 items.

Sample Size for Internal Consistency Reliability

For subscale-to-total correlations and subscale correlations, a minimum of 85 subjects with a 0.30 medium effect size, for power of 0.8 at the level of 5% significance was estimated (Cohen, 1988).

Sample Size for Test-retest Reliability

Only 106 participants agreed to complete the instrument twice. This group of participants was used for test-retest reliability using intraclass correlation statistical method.

Sample Size for Construct Validation for Confirmatory Factor Analysis (CFA)

A guideline of 5-10 subjects per variable was used (Floyd & Widaman, 1995). Another independent sample of 231 subjects was used, at a ratio of 5:1 of subject-to-variable for a 43-item instrument that was derived from the EFA.

Sample Size for Construct Validation for Hypotheses Testing

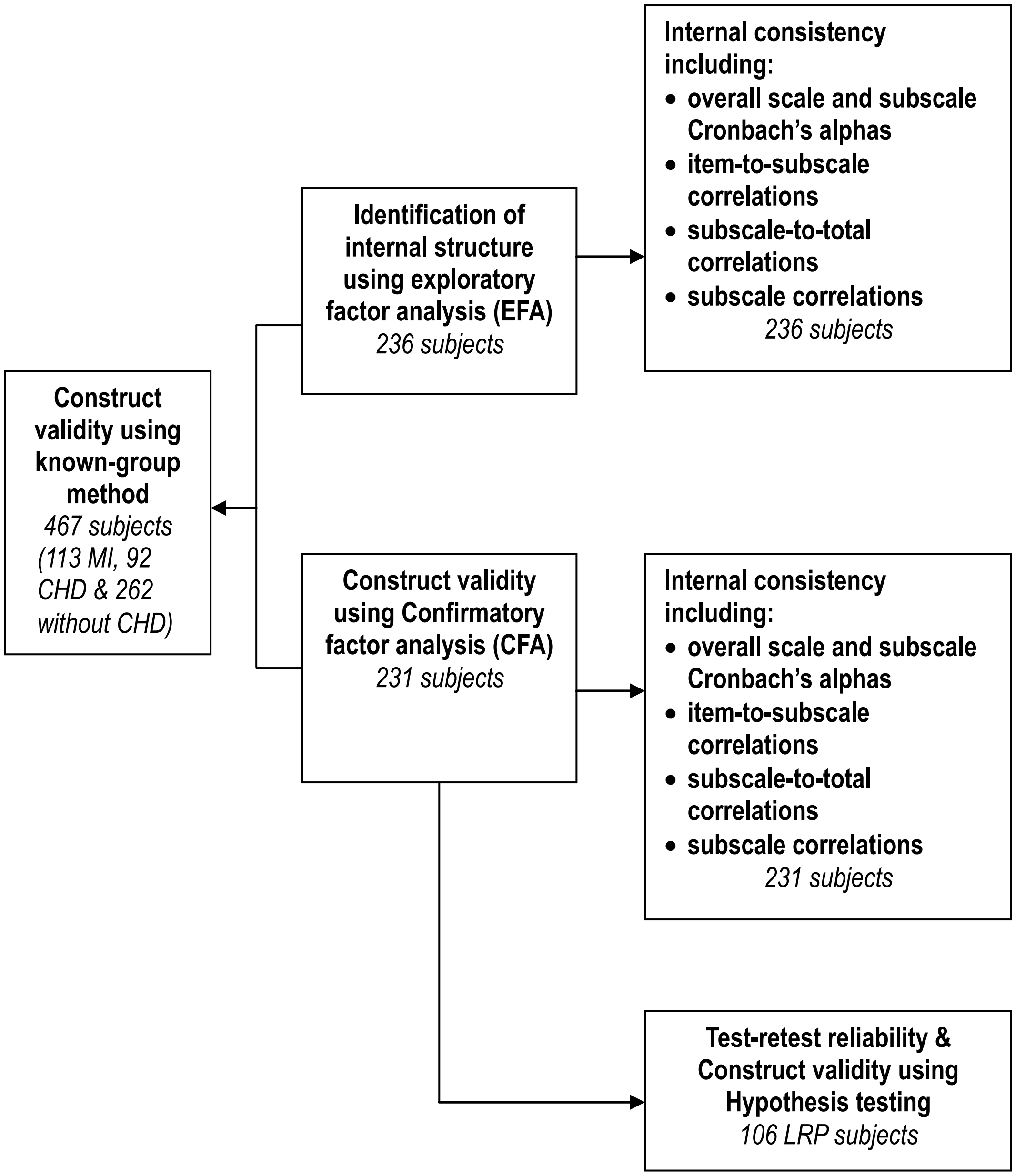
For correlational study, a minimum of 85 subjects with a 0.30 medium effect size, power of 0.8 at the level of 5% significance was required (Cohen, 1988). The final sample, however, was 106 subjects. This group of sample was the same group of participants used in the test-retest reliability as they were the participants willing to complete the four sets of study instruments (ACRFR, GSES, MSPSS and HADS) twice.

Sample Size for Construct Validation for Known-groups Method

For oneway analysis of variance, a minimum of 52 subjects per group using a medium effect size of 0.25, for power of 0.8 at 5% significant level was required (Cohen, 1988). In view of the constraint in recruiting an adequate number of participants with a history of CHD, the present sample comprised of participants in the EFA and CFA samples. The final sample comprised of 113 MI participants with cardiac rehabilitation training and 354 participants who did not receive cardiac rehabilitation training, in which 92 subjects with a history of CHD and 262 subjects without a CHD history.

In the current study, the minimum sample size requirement in each of the validation and reliability methods was met. Details in the numbers of subjects would be further indicated in the result for each of the validation and reliability methods. Distribution of participants for each of the validation methods and reliability methods are summarized in Figure 6.2 below. A total of 467 subjects were recruited in the second phase of the study. For factor structure identification using exploratory factor analysis (EFA), the sample comprised of 236 subjects, whereas for construct validation using confirmatory factor analysis (CFA), the sample comprised of 231 subjects. These two samples contained near equal proportions of the LRP, MRF, MI participants. The scale reliability tests surrounding overall scale and subscale Cronbach's alphas, item-to-subscale correlations, subscale-to-total correlations, and subscale correlations were performed in both EFA and CFA samples. There were 106 subjects who agreed to complete the study measures twice for the purposes of establishing the test-retest reliability of ACRFR and the construct validity using hypothesis testing approach. In order to obtain sufficient subjects to establish construct validity using known-groups method, the entire study sample (n=467), comprising participants of EFA and CFA samples, was used.

Figure 6.2 Subject distributions for the identification of factor structure, reliability and construct validations



Descriptions of Psychometric Approaches:

Identification of Factor Structure, Reliability and Construct Validity of ACRFR

Identification of the Internal Structure of the ACRFR

Exploratory factor analysis (EFA) is a method to identify the internal dimensions of the ACRFR. It is a statistical technique to indicate how the observable variables cluster together in terms of internal consistency to form the underlying dimensions of a construct (Anastasi & Urbina, 1997; Floyd & Widaman, 1995; Lynn, 1993; Polit-O'Hara, 1996; Portney & Watkins, 2000).

EFA basically has two general uses. One of the uses is in instrument development, where underlying dimensions of a construct are identified. The instrument development begins with a large pool of items that are derived on the basis of theory, adaptations from other instruments, or in-depth qualitative interviews. Items are administrated to a sample of subjects and data are factor analysed to determine which items should be discarded and which should be used to create summated scales, or to remove items that do not measure the construct of interest and thus improve the validity of the instrument (Lynn, 1993; Polit-O'Hara, 1996; Tabachnick & Fidell, 2001). Furthermore, if a researcher aims to develop scales of items with very clean loading patterns, EFA can be used to reduce the number of items on an instrument by eliminating items that fail to load on any factor or that load at approximately equal levels on two or more factors (Floyd & Widaman, 1995). Common factor analysis which is one type of exploratory factor analysis can usually provide valuable insights into the internal structure of a measuring instrument (Floyd & Widaman, 1995; Gorsuch, 1983; Hair et al., 1995).

The second use of exploratory factor analysis is for the item reduction, in which a set of variables is summarized into a new set of a smaller number of variables called factors (Kline, 1997; Hair et al., 1995; Floyd & Widaman, 1995; Polit-O'Hara, 1996). It is a convenient way to streamline the primary analyses (Polit-O'Hara, 1996) and is typically achieved by the use of principal components analysis which is the second type of exploratory factor analysis (Floyd & Widaman, 1995; Gorsuch, 1983).

In the present study, EFA using common factor analysis (principal axis factoring) was used to identify underlying dimensions of the ACRFR, in which items were determined to be retained or discarded. Items derived from the focus group interviews were removed if not representing the underlying dimensions. Factor rotation was performed in order to improve interpretation of the results. Sampling items and factors were based on rotated factor matrices instead of unrotated factor matrices. Varimax rotation was used to produce reasonable and simple factoring structure (Floyd & Widaman, 1995; Kline, 1998). Factors were kept uncorrelated in the varimax rotation, which maximised the inclusion of possible items, and was used in the exploratory factor analysis.

In order to determine an interpretable factoring structure, criteria were used for extracting the factors and sampling items in the EFA. These criteria were as follows:

<u>Scree Test Criterion.</u>

The scree test plots the eigenvalues of the unrotated factors on a coordinate plane and examines the slope of the line connecting them. From the scree plots, a discontinuity in the steep slope of the plot that separates the larger, more important factors (those in the steep slope) from the smaller, less reliable factors (those in the approximately horizontal line) (Hair et al., 1995; Polit-O'Hara, 1996). It is suggested that this is the cutoff (the discontinuity in the steep slope of the plot) for retaining factors and is determined as the point at which deleting a given factor will not result in discarding significant variance (Floyd & Widaman, 1995, Thompson, 2004). The scree test tends to yield fairly reliable results when the sample size is large (Polit-O'Hara, 1996). In the present study, the discontinuity in the steep slope of the plot was used as one of the criteria.

Percentage of Variance Criterion

The factoring procedure usually will stop after a large portion of the variance has been extracted, usually aiming at 50% or more of the total explained variance according to Streiner's (1994) suggestion (cited in Floyd & Widaman, 1995), and/or until the last factor accounts for only a small portion of variance, usually less than 5% of contributing variance (Polit-O'Hara, 1996). Floyd and Widaman (1995) suggest that if the total variance of a factor solution is low, continuing factor procedures by eliminating variables with relatively weak factor loadings may be possible to perform in order to improve the total variance of the factor solution. Gorsuch (1983) and Hair et al. (1995) point out that if a factor does not add very much to the information already extracted, it would not be worth extracting and interpreting. In present study, these guidelines and/or criteria were taken into account in the course of obtaining a factor solution.

Eigenvalue Criterion

For the ACRFR, the factors with eigenvalues less than 1.0 were considered as insignificant and disregarded (Hair et al., 1995; Thompson, 2004).

Variables (Items) with Significant Factor Loadings

Item with a factor loading of at least 0.3 was regarded as significantly loaded to a factor (Kline, 1997; Polit-O'Hara 1996). Items with <0.3 factor loading were regarded as failing to load on a factor and were removed. Greater emphasis is usually placed on the marker variables (items), which are the pure variables with significant high factor loadings correlating with only one factor (Polit-O'Hara,1996). A complex variable (item) is a variable correlating with more than one or several factors. Complex variables were avoided and removed because those variables with similar complexity may correlate with each other because of their complexity and not because they relate to the same factor (Floyd & Widaman, 1995; Tabachnick & Fidell, 2001). On the other hand, Plotnikoff (1994) suggested that a complex variable could be considered to belong to a given factor if its correlation was 0.4 or higher (cited in Barrett, Plotnikoff, Raine, Anderson, 2005). The author further suggested more importantly that in some instances, the complex variable should be retained in a respective factor so as not to sacrifice important content validity if the variable contributed to the validity of the factor (Plotnikoff, 1994 cited in Barrett, et al, 2005). The aforesaid guidelines or suggestions regarding items sampling in EFA were taken into accounts during factoring procedures for the current study.

An increase of the number of significant items (variables) improves factor stability. On each factor, three items that have significant factor loadings are generally needed (Gorsuch, 1983; Kline, 1997; Floyd & Widaman, 1995). Factors with no significant variable loading were deleted (Gorsuch, 1983). In this study, one of the criteria for factor extraction was that a factor should contain at least three significant item variables

A Priori Criterion

A priori criterion is a simple reasonable criterion under certain circumstances, in which the analyst has prior knowledge about the factors to extract before undertaking the factor analysis (Hair et al., 1995). With this criterion, the analyst selects the desired number of factors to be extracted in a computer program. In this research study, since items were generated based on the identified categories and sub-categories resulting from the qualitative interviews, the investigator gained some degree of knowledge from the identified categories/subcategories which posed a relationship to the factor structure. A priori criterion to extract factors was used as one option to obtain an interpretable factoring structure. The initial analysed factoring pattern(s) with the absence of priori criterion was firstly examined carefully. Then evaluations were undertaken to determine if this initial analysed factoring pattern corresponded to the prior knowledge regarding the identified categories/subcategories resulting from the qualitative interviews. A priori criterion was used by selecting a desired number of factors to be extracted if evaluations indicated that the initial factor pattern paralleled to the identified categories/subcategories.

Reliability of the ACRFR

The usefulness of a measurement relies on the extent of data as accurate and meaningful indicators for a construct being measured. Reliability reflects the extent to which a measurement is free from error and is consistent (Portney & Watkins, 2000). Therefore, establishing reliability for an instrument is fundamental and necessary conditions of a valid test. Internal consistency and test-retest reliability were therefore used to establish reliability of the ACRFR as explained in the next section.

<u>Internal Consistency of ACRFR</u>

Internal consistency reflects the scale homogeneity, the extent to which items measure various aspects of the same characteristic (Portney & Watkins, 2000). Non-homogeneous items do not provide a good estimate of reliability (Mishel, 1998). Portney and Watkins (2000) suggest that it is desirable to evaluate each subscales separately for internal consistency if the scale was multidimensional. It is also appropriate to examine the correlations of items to the respective subscales if the instrument consists of subscales (Nunnally & Bernstein, 1994).The values of Cronbach’s alphas of the overall scale and subscales, as well as the corrected item-to-subscale correlations was used to evaluate the internal consistency of the ACRFR. A Cronbach's alphas value of 0.6 to 0.70 was accepted as good reliability for new instruments (Clark & Watson, 1995; Kline, 2000b; Mishel, 1998; Polit, & Hungler, 1995). Nunnally (1978) stated that in item analysis, corrected item-to-subscale correlations above 0.3 are usually considered good. Other authors suggested that the usual rule of thumb for corrected item-to-subscale should be above 0.2 (Streiner & Norman, 1995). In the present study, Cronbach's alphas value of at least 0.6 and corrected item-to-subscale correlation of at least 0.2 were used as the criteria for internal consistency reliability.

In developing a multidimensional measure, one application of the criterion of internal consistency involves the correlation coefficients between subscale-total scores and total scale score. This evaluates the extent of internal associations to which subscales relate to the total scale. Subscales were considered as different functional dimensions defining a particular construct that is being measured and therefore, a range of correlation coefficients would be expected when subscales correlated with the total scale. Unlike reliability test using Cronbach's alphas in which a higher correlation is generally a better correlation, too high a correlation coefficient may be considered as redundant; too low a correlation coefficient indicates little or no relationship and may be considered a reason to eliminate (Anastasi & Urbina, 1997; LoBiondo-Wood & Haber, 1994). Bubela, et al. (1990) suggested that a configuration acts to increase the measurement sensitivity of the construct which is seen when the subscales of a test tend to be relatively uncorrelated with each other but will correlate well with the total score of the test. In the clinical situation, it is extremely difficult to develop tests that reflect such a pattern of configuration. A moderate correlation around 0.40 to 0.70 between subscales indicates that the subscales are relatively specific and unique in the representation of the construct (Bubela, et al., 1990).

In summary, in the evaluation of internal consistency, the overall scale and subscales Cronbach's alphas, the item-to-subscale correlations, subscale-to-total correlations, as well as the correlations of subscales were used in this study.

Test-retest Reliability of ACRFR

One of basic premise of reliability is the stability of the measuring instrument. Test-retest reliability is used to establish that an instrument is capable of measuring a variable with consistency (Portney & Watkins, 2000). Two weeks test-retest reliability using intraclass correlation statistical method was employed in this study to assess the stability of the instrument. Two weeks is a reasonable interval (Nunnally & Bernstein, 1994) to avoid fatigue, learning, or memory effects but close enough to avoid genuine changes on the measured scale items. The initial overall scale and subscales scores were compared with those scores that were obtained two weeks later from the same sample of subjects. A value of >0.70 for test-retest reliability has been suggested (Kline, 2000a). The low risk public (LRP) group was invited for the test-retest reliability to ensure the scale stability over time. It was because various clinical inputs of CHD knowledge and risk factor management might have occurred among the MRF subjects in the hospital and the MI subjects in the cardiac rehabilitation center and thus, there was a higher possibility of external factors affecting the stability test. As there were 106 LRP subjects (23% of the total sample, n=467) who agreed to participate in the test-retest, the analysis was performed with this subgroup.

Construct Validity of ACRFR

Construct validity reflects the ability of an instrument to measure an abstract construct (Nieswiadomy, 1998; Portney & Watkins, 2000). In the present study, confirmatory factor analysis, hypotheses testing, and known-groups method were employed to establish construct validity of the ACRFR.

Establishing Construct Validity Using Confirmatory Factor Analysis (CFA)

CFA was performed using an independent sample to cross-validate the underlying factors or structure of a generated model (Long, 1983). CFA consists of model specification, model identification, parameter estimation, assessment of model fit and model modification. Since the CFA procedures were based on the results of the identification of internal structure of ACRFR using the technique of exploratory factor analysis, details of the procedures regarding model specification, model identification, parameter estimation and model modification are presented in the results section of CFA, after identification of factor structure of ACRFR using EFA, whereas the methods for assessment model fit and the criteria used to determine model modification are included in this section that follows.

The assessment of model fit.

CFA was used to validate the internal structure of the ACRFR as identified by EFA. A number of goodness-of-fit criteria were used to determine whether the data fit into the identified internal structure. They included the likelihood-ratio chi-square (χ^2) test, the root mean square error of approximation (RMSEA), incremental fit statistics and the comparative fit index (CFI). They are commonly cited indices for assessing data-model fit (Tabachnick & Fidell, 2001, Thompson, 2004). Chi-square (χ^2) test and RMSEA are based on the analysis of residuals by comparing the discrepancies between the implied and observed covariance matrices. The discrepancies are expected to be minimal (Hu & Bentler, 1995; Lee, 2003). A non-significant value for χ^2 test is the acceptable index to indicate model fit. As the significance of χ^2 is affected by sample size, χ^2 / df is more likely to be used as data-model fit criteria. A value of <2.00 is used as an indicator (Newcomb, 1994). For the RMSEA, a value < 0.8 is the acceptable index to indicate model fit (Browne & Cudeck, 1993). Regarding the incremental fit statistics: the non-normed fit index (NNFI) and incremental fit index (IFI), and the CFI, are all based on the idea of comparing the proposed model to an extreme model with absolutely no interrelationships in order to indicate a good fit of data to the identified model structure (Lee, 2003; Thompson, 2004). An index of ≥ 0.9 is an acceptable value (Hu & Bentler, 1995). The incremental fit statistics and the CFI can provide information, which is independent to sample size and statistical significance test information. It provides information about practical significance, in which a statistically significant effect can be evaluated for its practical usefulness in explaining the data (Bentler & Bonett, 1980). The uses of the incremental fit and comparative fit indices in the present study served to provide important adjunct information in evaluating the model.

If the data were to indicate a good fit to the model, validity of each parameter would also have to be examined as suggested in the literature (Bollen, 1989; Byrne, 1998; Hoyle, 1995; Lee, 2003; Long, 1983). A t-value of >2.00 and a complete standardized score of <1.00 indicated a significant parameter. The factor loading of each item was also examined for any inappropriate negative value.

The criteria for model modification.

The last step in CFA was model modification which suggests additional parameters to improve model fit. It has been indicated that any model modification has to be carefully examined (Bollen, 1989; Kelloway, 1998; Stevens, 2002). The principle danger in post hoc model modification is that this procedure is exploratory and involves considerable capitalization on chance. Therefore, in this study no model modification was performed if the data already achieved a good fit for the factor structure.

Establishing Construct Validity Using Hypothesis Testing

A hypothesis testing approach was employed to demonstrate the construct validity. The premise of this method is that the investigator used the concept underlying the ACRFR to develop the hypotheses, test the hypotheses, and on the basis of the findings, make inferences concerning whether the underlying concept of ACRFR is adequate to explain the findings (LoBiondo-Wood & Haber, 1994). The underlying domains of ACRFR relate to knowledge about, attention to, and personalisation of, as well as self-regulatory functions over CHD risk factors reduction. Hypotheses for ACRFR were related to the self-efficacy theory, theory of social support, and the theory of information-processing psychology.

Self-efficacy is defined as the personal cognitive beliefs one holds about his/her capability to execute the action required for managing a subject matter (Bandura, 1997), to adjust one's life to multiple demands owing to illness (Bonetti et al., 2001), or to deal with a variety of difficult demands in life (Schwarzer & Jerusalem, 1995). Individuals with a strong sense of self-efficacy are more likely to manage and execute control over a subject matter. Based on the attributed domains of ACRFR and the self-efficacy theory, a higher level of awareness for CHD risk reduction of an individual reflected one's stronger sense of personal beliefs to execute control over disease risk. Thus, a positive relationship between ACRFR and self-efficacy is hypothesised. To test this hypothesis, the Chinese version of General Self-efficacy Scale (GSES) was used to measure the self-efficacy.

One of the social support theories defines social support in terms of its perceived availability (Brehm & Kassin, 1993). This approach suggests social support involving different kinds of potential assistance. For instance, supportive others can provide information about the threat one encounters and how he / she might deal or cope with the threat. When applied to CHD risk reduction, the role of social support is more likely to enhance one's awareness for reducing disease risk by providing knowledge or information about the disease and the means of risk reduction. Therefore, a positive relationship between ACRFR and social support is hypothesised. To test this hypothesis, the Chinese version of Multidimensional Scale of Perceived Social Support (MSPSS) was used to measure the social support.

Donald Norman is the representative of information-processing psychology. He believes that human emotions play an important part in our cognitive system and the regulatory system. The role of positive emotions increases conductive thoughts to survival and hence, increases one's awareness of self healthcare in disease prevention, whereas negative emotions are destructive regarding awareness of self care (Hergenhaln & Olson, 1993). ACRFR represents a spectrum of cognitive information-processing activities connoting information (knowledge) about, attention to, personalisation towards, and the regulatory control for CHD risk reduction, of which are interfered by negative emotions. Therefore, a negative relationship between ACRFR and negative emotions was hypothesised. To test this hypothesis, the Chinese version of Hospital Anxiety and Depression Scale (HADS) was used to measure emotions.

Arising from the above descriptions, three following hypotheses related to ACRFR were tested:

Hypothesis 1: There is a significant positive correlation between ACRFR total score and the Chinese version of General Self-efficacy Scale (GSES) total score.

Hypothesis 2: There is a significant positive correlation between ACRFR total score and the Chinese version of Multidimensional Scale of Perceived Social Support (MSPSS) total score.

Hypothesis 3: There is a significant negative correlation between ACRFR total score and the Chinese version of Hospital Anxiety and Depression Scale (HADS) total score

Correlational analysis using Pearson product-moment coefficient for normally distributed data and Spearman rank correlation coefficient for nonnormal data were employed to test the hypotheses regarding the expected correlations of ACRFR score with the scores of GSES, MSPSS and HADS.

Details of the GSES, MSPSS, and HADS used for the hypothesis testing is explained under the section of study measures in pages 200-202.

Establishing Construct Validity Using Known-groups Method

Construct validity of the ACRFR was examined by known-groups method. This method is based on the premise that a valid instrument is able to differentiate individuals who are known to be different on the construct the instrument intends to measure (Polit & Hungler, 1999; Portney & Watkins, 2000).

In this study, the total 'awareness' mean scores and subscale mean scores were compared among MI subjects, CHD subjects and subjects with no history of CHD. The MI subjects had received a cardiac rehabilitation program, whereas the CHD subjects and non-CHD subjects did not have a history of participating in the cardiac rehabilitation program. MI subjects who had completed a cardiac rehabilitation program would be likely to have a significant difference in the total mean score and/or subscale mean scores, when compared with those who did not receive any cardiac rehabilitation program, that is, the CHD subjects and non-CHD subjects. A cardiac rehabilitation program consists of 16 sessions including teaching cardiac knowledge, drug knowledge and risk factor handling, enhancing self-care and complications, enhancing cholesterol and dietary awareness, establishing an exercise regimen and management of stress, which are the elements relevant to the ACRFR that measures the domains of (i) knowledge about, (ii) attention to, (iii) personalisation of, as well as (iv) self-regulatory functions over a subject matter, that is, CHD risk factor reduction.

Empirically, the advantages of the program have been documented in increasing people's capability to regulate the relevant aspects. For instance, Aoun and Rosenberg (2004) documented that the HeartSmart (a cardiac rehabilitation program) participants demonstrated significant better health-related behaviour, confidence to diet and exercise, dietary fat intake, cardiac knowledge and quality of life scores than the non-participants. Papageorgiou, Fotinakis, Tsitskari and Giasoglou (2004) reported that exercise training in cardiac rehabilitation program enhanced patients' motivation to know, to gain knowledge, to experience stimulation and accomplishment.

Warrington, Cholowski and Peters (2003) reported that participants receiving a home-based cardiac rehabilitation program had significant positive changes in quality of life, knowledge of angina and exercise tolerance. Merz et al. (1996) reported that patients enrolled in a long-term cardiac rehabilitation program demonstrated enhanced cholesterol awareness, lower total cholesterol values, and more frequent achievement of total serum cholesterol of <5.2 mmol/L.

Arising from the above empirical evidences, MI subjects, who had received a cardiac program, were assumed to have a higher level of awareness of CHD risk factor reduction in terms of the relevant measuring domains, when compared with those who did not receive any cardiac program. Therefore, this study employed this method of known-groups comparison to establish the construct validity.

Data Collection

This section presents the measures that were used to collect data for this study. These included the measures used for hypotheses testing, the 59-item Chinese version ACRFR instrument (Appendix 6.4), and the demographic and health history (Appendix 4.5) form with the inclusion of the risk factor information sheet (Appendix 4.6). The measures for hypothesis testing included the Chinese version of General Self-Efficacy Scale (GSES) (Appendix 6.5), the Chinese version of Multidimensioal Scale of Perceived Social Support Scale (MSPSS) (Appendix 6.6), and the Chinese-Cantonese version of the Hospital Anxiety and Depression Scale (HADS) (Appendix 6.7). The procedure of data collection is described in the latter part of this section.

Study Measures

<u>The Chinese Version of General Self-Efficacy Scale (GSES)</u>

The Chinese version of GSES includes 10 items (Appendix 6.5). The scale was designed to reflect to a broad and stable sense of personal competence to deal effectively with a variety of difficult demands in life (Schwarzer & Jerusalem, 1995) or to adjust one's life to multiple demands owing to illness (Bonetti et al., 2001). It was originally in German (Luszczynska, Scholz, Schwarzer, 2005), and it has been adapted in different languages including Chinese (Schwarzer & Jerusalem, 1995; Zhang & Schwarzer, 1995). A typical item is "Thanks to my resourcefulness, I can handle unforeseen situations." Possible responses are 1 = not at all true, 2 = hardly true, 3 = moderately true, and 4 = exactly true, yielding a total score between 10 and 40, with higher score indicating high level of efficacy. In a sample (n=1933) of three countries (Germany, Poland and South Korea), Luszczynska and colleagues (2005) reported consistent evidence showing that GSES associated with other psychological constructs including social cognitive variables, health behaviors, well-being, behavior-specific self-efficacy and coping strategies, which confirmed the validity of the scale. The reliability, Cronbach alphas ranged from 0.86 to 0.94 in Germany, Poland and South Korea populations that consisted of students, swimmers, patients with cancer, cardiovascular and gastrointestinal diseases (Luszczynska et al., 2005). The Chinese version of GSES has been validated with satisfactory reliability and discriminate index among the Chinese populations (Shen & Tang, 2004; Wang & Liu, 2000; Zhang & Schwarzer, 1995). General self-efficacy has been suggested as a universal construct, which means that it characterises a basic belief that is inherent in all individuals (Luszczynska et al., 2005), as well as a cross-cultural commonality of beliefs about efficacy to produce effects by personal action is likely to be expected (Bandura, 2002). Taking all the aforesaid accounts together, the scale was therefore, used to establish construct validity using hypothesis testing approach in this study (as described in page 196). In the present study, the Cronbach alphas of GSES was 0.89 and test-retest reliability was 0.88.

<u>The Chinese Version of Multidimensional Scale of Perceived Social Support Scale (MSPSS)</u>

The Chinese version of MSPSS includes 12 items (Appendix 6.6). It measures three sources of support: family, friends and significant others (Chou, 2000). The scale consists of seven points from 1 = strongly disagree to 7 = strongly agree, with higher scores representing better support. Good psychometric properties of construct and concurrent validities are supported and high internal consistency of the scale has been reported in the Chinese population (Chou, 2000). Its good psychometric properties as established in the Hong Kong Chinese population and the appropriateness for hypothesising its underlying measuring constructs in enhancing one awareness to reduce disease risk are described earlier (in page 196). The MSPSS was used in the construct validation using hypothesis testing approach for the present study. The Cronbach alphas of the scale in this study was 0.93 and test-retest was 0.90.

<u>The Chinese-Cantonese Version of the Hospital Anxiety and Depression Scale (HADS)</u>

The Chinese version of 14-item HADS measures the negative emotions of anxiety and depression (Appendix 6.7). Fixed response selections scored from 0 to 3 are used. The scores range from 0 to 42, with higher scores representing greater level of negative emotions or psychological distress. The concurrent and criterion validities of the HADS were supported in a study using a Chinese sample and the internal consistency was reported as Cronbach alphas from 0.77 to 0.86 (Leung, Wing, Kwong, Lo, Shum, 1999). There are several characteristics of HADS that rendered it suitable to demonstrate construct validity using hypothesis testing approach in the present study (as described in page 197). HADS typically does not rely on any somatic symptoms in the assessment of negative emotions of anxiety and depression. This eliminates any possible assessment error, which might be associated with somatic symptoms of participants with illness, say coronary diseases. Likewise, the scale renders its relevant use in participants without the disease to assess emotional status as it is a scale not based on symptom-specific. The scale (Chinese-Cantonese version) was found to have comparable linguistic equivalence to the original English version (Leung, Ho, Kan, Hung, Chen, 1993) and good psychometric properties had already been demonstrated in the Hong Kong local setting (Leung, et al., 1999). In addition, the simplicity, brevity and user-friendliness of HADS (Chinese-Cantonese version) prevented the participants from being overloaded. Taking all the accounts together the scale was therefore, used to establish construct validity using hypothesis testing approach as described (in page 197). In the present study, the Cronbach alphas of the scale was 0.84 and test-retest was 0.88.

<u>The Chinese Version of ACRFR Scale</u>

The Chinese version of 59-item ACRFR measures aspects including: CHD knowledge, perceived seriousness of CHD, perceived risk, planning of health actions, control over risk reducing behaviour, perceived opportunities to understand CHD, and chest pain appraisal or perceptions regarding the awareness of CHD risk factors reduction. The instrument consists of five points from 0=definitely false to 4=definitely true, with higher scores representing greater level of awareness for CHD risk factors reduction. In the present study, the psychometric properties were undertaking and the Cronbach alphas of the scale was 0.82 and test-retest was 0.89.

The Demographic, Health History and Risk Factor Information Forms

The demographic data included age, sex, marital status, educational level and the socio-economic status. The health history information included the past health history, the current health history and information of hospitalisations. The risk factor information sheet included data about the eight CHD risk factors as previously described. When interpreting the study findings, collection of these data provided clear background information about the participants.

Data Collection Procedures

Ethics approval was obtained from the university and hospital ethics committees (Letters of ethics approval were included in Appendix 4.1 and 4.2). All personnel of recruitment sites were approached with the study details and permissions to undertake the study were sought.

Potentially eligible subjects were given full explanation of the purpose and nature of the study. Informed consents (Appendix 4.3 for English version & Appendix 4.4 for Chinese version) were obtained after providing the explanation. Confidentiality of data was assured. Eligible participants in the public domains were invited to complete the questionnaire(s) in the elderly community center and the dental clinic. For participants recruited through snowball method, they completed the questionnaires in the areas according to their convenience, for example in church, working places and homes. Questionnaires were collected right after completion. Data collection in the cardiac unit for participants with multiple risk factors was commenced after their clinical conditions had been stabilised. For MI subjects, they were invited to complete the questionnaires in the rehabilitation center.

In order to establish the test-retest reliability for the instrument, repeated administrations of the test in a two-week interval were performed among subjects who agreed to complete the questionnaire twice. Various clinical inputs of CHD knowledge and risk factor management might have anticipated among the MRF subjects in the hospital and the MI subjects in the cardiac rehabilitation center. In view of a higher possibility of such external factors affecting the stability test, the MRF subjects and MI subjects were not involved in the stability testing.

Data Analysis

The statistical techniques including descriptive statistics, factor analysis, and inferential statistics were employed. Of those analyses including EFA, the Statistical Package for Social Sciences (SPSS) for Windows software version 12 was used for analysis. The Linear Structural RELation (LISREL) software version 8 (Joreskog & Sorbom, 1996) was used to perform CFA.

Descriptive statistics, including the frequency of distribution, the mean, the standard deviation, pairwise scatter plots, skewness and kurtosis, as well as the Kolmogorov-Smirnov one sample test were used for samples descriptions and checking missing data, assumptions of linearity and normality.

The factor analysis statistical techniques: EFA and CFA were used to identify and validate the factor structure of ACRFR. Factor analysis as multivariate technique, multivariate outliers were screened by Mahanlanobis Distance Square (Tabachnick & Fidell, 2001). Along with the assumptions of normality and linearity inspecting by descriptive statistics, the assumptions of multicollinearity and singularity were checked by the detetminant in EFA and the standard multiple correlation (SMC) in CFA. The assumption of factorability of data was checked by Kasier-Meyer-Olkin (KMO) and Barlett's test of sphericity. The criteria levels of the statistical techniques are further described in pages 207-209.

Inferential statistics, including cross-tabulation using chi-square statistics, one-way analysis of variance, post hoc test and the Pearson product-moment coefficient of parametric tests, as well as the Mann-Whitney U, Kruskal-Wallis test, and the Spearman rank correlation coefficient of non-parametric tests were used. Cross-tabulation using chi-square statistics, one-way analysis of variance and Kruskal-Wallis test were used in checking homogeneity of EFA and CFA study samples. In validating the construct, one-way analysis of variance, post hoc test, Kruskal-Wallis and Mann-Whitney U were used for known-groups method, and Pearson product-moment coefficient and Spearman rank correlation coefficient were used for hypothesis testing. The level of significance in this study was set at $\alpha = 0.05$, indicating a 5% risk of committing type I error.

In analysing reliability, Cronbach's alphas for the overall scale and subscale internal consistency, correlated item-to-subscale correlation, Spearman rank correlation coefficient for the subscale-to-total correlations and the subscale-to-subscale correlations, as well as Intraclass correlation coefficient for the test-retest reliability were used. The level of significance Spearman rank correlation coefficient was set at $\alpha = 0.01$, indicating a 1% risk of committing type I error.

In addition, regarding data analysis in this section, parametric and non-parametric statistics are discussed. In the latter part, establishing statistical assumptions is addressed in detail.

Parametric and Non-parametric Statistics

There is a debate about the use of parametric and non-parametric methods in analysing the data for inferential statistics. The non-parametric statistics has been described as the appropriate method for making statistical inferences when the assumptions of normality and homongeneity of variance cannot be satisfied, and when the data are not measured on the interval or ratio scales (Portney & Watkins, 2000). On the other hand, parametric tests are generally considered robust enough to withstand even major violations of the assumptions without seriously affecting the validity of statistical outcomes (Nunnally & Bernstein, 1994).

Generally, the criterion of normality assumption is considered in determining the use of parametric or non-parametric statistics, although there is controversy about the robustness of using the parametric test for ordinal data. Gaito (1980) suggested that when the ordinal data are normally distributed, the intervals between any data points becomes well defined in terms of the area under the probability curve and the data can be treated as interval data. Regarding the measurement levels of data, authors suggest that although data from individual items are clearly ordinal, the total score is usually treated as interval. The premise is that the operation of summing items to obtain a total score implies the use of a scaling model to convert data from a lower (ordinal) to a high (interval) level of measurement (Nunnally & Bernstein, 1994).

A debate about the power superiority of the parametric test over the non-parametric test is also discussed. Many researchers prefer to use parametric tests for they are generally more sensitive in detecting a significant result than the non-parametric tests, which involve ranking scores rather than comparing precise metric changes (Portney & Watkins, 2000). On the other hand, Portney and Watkins (2000) indicated that a nonparametric test is as powerful as a parametric test if the study sample size is large. For instance, a nonparametric test may require a sample size of 50 to achieve the same degree of power as a parametric test with 30 subjects (Portney & Watkins, 2000). Furthermore, with larger nonnormal populations, the nonparametric statistics may actually be more powerful (Neave & Granger, 1968 as cited in Portney & Watkins, 2000; Portney, & Watkins, 2000). Portney and Watkins (2000) further pointed on that as the statistical power is an issue only when significant results are not obtained, researchers need not be concerned with the relative power of non-parametric tests when the null hypothesis is rejected.

In this study, where appropriate, non-parametric tests were performed to make statistical inferences if the assumption of normality was not met. Using this method of data analysis was based on a number of reasons. Firstly, data collected from subjects with pathological conditions, in the likelihood, may be represented by skewed distributions rather than symmetrical ones. Secondly, convenience samples obtained as a result of the nonprobability sampling to some extent limit the representative of normal distributions. Thirdly, nonparametric tests could actually be more useful and powerful with large nonnormal samples. Fourthly, as the statistical power is an issue only when significant results are not obtained, the significance of the findings were examined and interpreted in due course.

Establishing the Statistical Assumptions

For parametric tests such as Pearson's product-moment coefficient of correlation, assumption of normality was evaluated. For factor analysis (EFA and CFA), statistical assumptions of absence of outliners, normality, linearity, absence of multicollinearity and singularity and factorability of data were inspected.

The Assumption of Absence of Outlier

As factor analysis is a multivariate technique, it is sensitive to outlier values. To examine multivariate outliers in EFA and CFA, the method of Mahalanobis distance was used. Mahalanobis distance is "the distance of a case from the centroid of the remaining cases, where the centroid is the point created at the intersection of the means of all the variables" (Tabachnick & Fidell, 2001, p.68). Mahalanobis distance was evaluated as χ^2 with degrees of freedom equal to the number of item variables, at the significant level of $p < 0.001$. A multivariate outlier was identified if the value of Mahalanobis distance exceeds the critical χ^2 value with degrees of freedom equal to the number of item variables, at the significant level of $p < 0.001$.

The Assumption of Normality

For each of the study variable being analysed using parametric statistics, the Kolmogorov-Smirnov one sample test obtaining from the descriptive statistics was computed to evaluate the assumption of normality. A non-significant result of Kolmogorov-Smirnov one sample test with $p > 0.05$ indicates that the assumption of normality is met (Pallant, 2001). In factor analysis, normality of the item variables was assessed by the examinations of skewness and kurtosis. When the distribution is perfectly normal, a skewness and kurtosis value of zero is obtained (Pallant, 2001; Tabachnic & Fidell, 2001).

The Assumption of Linearity

Linearity implies relationships among pairs of item variables are linear. This assumption is important as EFA and CFA rely on reliable correlation in the analysis. As correlation can only reflect linear relationship, but not non-linear relationship, EFA and CFA cannot take into account any curvilinear relationship between the item variables. The analysis is degraded when linearity fails. (Tabachnick & Fidell, 2001). Linearity was checked by inspecting all the pairwise scatterplots. Tabachnick and Fidell (2001) suggested a spot check on few plots on those items with strong skewness, as it is impractical to examine all of the pairwise scatterplots. In the present study regarding EFA and CFA, the five item variables with strong skewness were checked for the assumption of linearity.

The Assumption of Absence of Multicollinearity and Singularity

Multicollinearity and singularity cause statistical problems affecting the analysis of structure in factor analysis. Multicollinearity indicates that the variables are highly correlated, whereas singularity refers to the redundancy of variables in which one of the variable is a combination of two or more of the other variables (Tabachnick & Fidell, 2001). The assumption of multicollinearity and singularity was checked by examining the values of the determinant or the standard multiple correlations (SMC). The value of determinant should be nonzero. For SMC, no value should be exceeded 0.99, as a value of SMC = 1 indicates the presence of singularity, while a value approaches to 1 indicating the presence of multicollinearity (Tabachnick & Fidell, 2001). In the present study, the determinant was used in EFA using software SPSS for Windows, and SMC was examined in CFA using the Linear Structural RELation (LISREL) software.

The Factorability of the Data

Factor analysis depends on the strength of item variable correlations. A matrix that is factorable should include several sizable correlations. Barlett's test of sphericity and the Kasier-Meyer-Olkin (KMO) measure of sampling adequacy were two statistical methods used to determine the factorability of data (Tabachnick & Fidell, 2001). Barlett's test tests the null hypotheses that the correlations of item variables of the test instruments are zero. A rejection of null hypothesis is expected to indicate that item variables are correlated. The statistic method of KMO measure of sampling adequacy measures whether the distributions of values in the correlation matrices of the item variables of the instruments are adequate for conducting factor analysis. A value of greater than 0.6 indicates that the data was factorable (Tabachnick & Fidell, 2001).

Ethical Considerations of the Research Study

Maintaining the ethical standard is important in conducting research involving human participants. Basic ethical principles of protection of human dignity, beneficence and justice as stipulated in the Declaration of Helsinki were carefully attended to and thoroughly adhered to in the current study (Fromer, 1981; The National Commission for the the Protection of Human Subjects of Biomedical and Behavioral Research, 1979; World Medical Association, 2002).

The principle of the protection of human dignity ensured human autonomy and self-determination. This guideline highlights the voluntary basis of participation in the research study. Participants' rights to give the informed consent were assured by providing adequate information regarding the purpose of the study, participants' involvement in the research, the expected risks, discomfort and benefits, as well as the ways in which participants' particulars and data would be handled. Written consent was obtained prior to the data collection. Participants were assured of their rights of withdrawal from the study, right to refuse to answer any question(s), or freedom to terminate the session at any time, for whatever reason, without prejudice and recrimination.

The principle of beneficence implies the duty of the investigator not to cause any harm to the participants. The invasion of privacy, prolonged administration of study measures causing fatigue and disturbing clients at the time when receiving their usual healthcare were the anticipated risks. In order to maintain the issue of privacy, the participants were guaranted anonymity during tape-recording. Participants' name and particulars were not disclosed or made directly identifiable in any publish report. Each participant was assigned a code. All data sheets, audiotapes, transcripts, field notes and questionnaires were kept confidential and secured in locked files. Only the researcher of the study had access to the raw data or study record during and after the study, and the researcher was responsible for its safekeeping. The data were kept in a locked cabinet, kept for 10 years according to the ethics guidelines and will be completely erased after 10 years. For the possibility of prolonged administration of study measures causing fatigue, the time required to complete the questionnaire was less than 20 minutes. Great attention was given to participants' non-verbal behaviour in order to detect the fatigue response. Data collection in clinical settings for participants with multiple risk factors and MI commenced after their clinical conditions had been stabilised, or in a convenient time without disturbing participants when receiving their usual healthcare or medical consultations.

The principle of justice refers to the obligation of maintaining participants' right to fair treatment. Participants were informed that the researcher who recruited the participants was not involved in providing the healthcare to the participants. All the participants were assured that any of their decisions to decline to participate in the study, or withdraw after partial participation will not have any adverse effects on their healthcare. Participants were provided with the researcher's contact telephone number to make any clarifications of queries about the study if required.

Conclusion

This chapter described the methodology used for the psychometric evaluation of the ACRFR. The three groups of participants were described each with a justification for inclusion. A number of statistical analyses were used to assess its reliability and validity. The next chapter presents the results of Phase two of the study.

CHAPTER 7

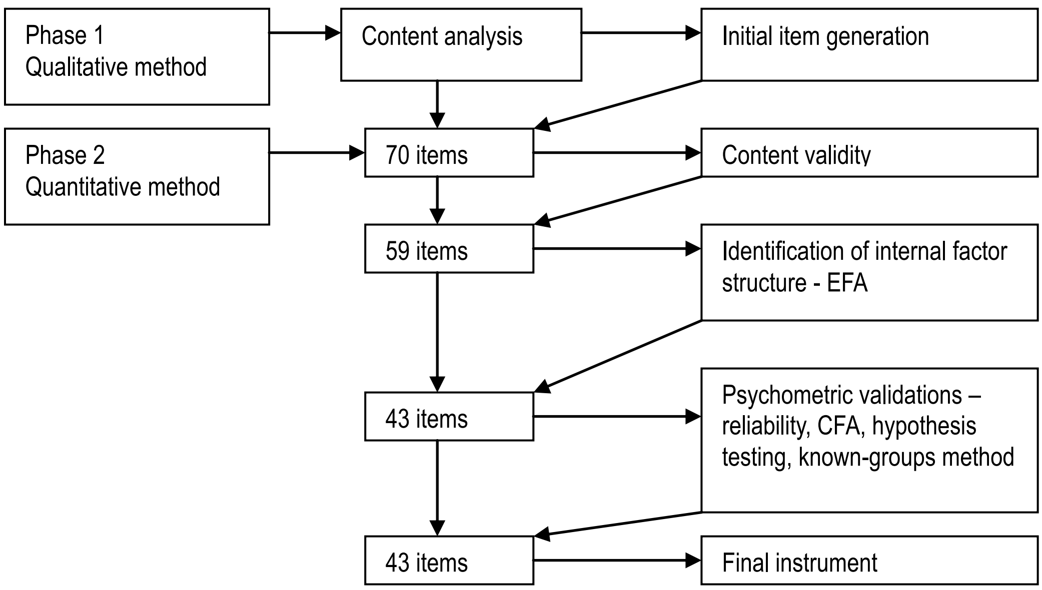
RESULTS OF PHASE II STUDY

Introduction

This chapter presents the results of phase II study. It commences with the result of the content validity followed by the results of the pilot study. After the identification of the internal structure of ACRFR using the statistical technique of exploratory factor analysis (EFA), the results of the scale reliability are presented. The results regarding construct validations of ACRFR using confirmatory factor analysis (CFA), known-groups method and hypothesis testing are reported in the latter part of this chapter. Lastly, the chapter ends with a summary of results for the Phase II study.

The numbers of instrument items that were generated from each stage of the psychometric analyses were indicated in the following flow chart (Figure 7.1), and the results of the present study regarding the psychometric evaluations will be discussed in relation to the flow chart accordingly.

Figure 7.1 Generation of items in each stage of the psychometric analyses



Results of Content Validity

This judgment-quantification stage of content validity consisted of two stages of expert reviews. The results of stage 1 will be firstly reported followed with the results of stage 2.

Stage 1 Review: Entire Instrument

For the content validity of the overall measure, 86% of the experts agreed it was adequate to measure the concept (see Table 7.1 page 215). Only one of the experts did not rate the adequacy of the entire instrument in measuring the concept and suggested to review some of the items of the scale (i.e., items 24-29 and items 31-32, which will be addressed in the next section: Stage 1 Review: Individual Items). However, all experts rated that the "words in each item are understandable" and the "format of the instrument" as acceptable. Regarding "the instructions for using the instrument", one expert suggested to change the instructions to make it more clear, simple and explicit. Detailed outcomes of the review regarding individual items are presented in the next section.

Table 7.1 Content validity of the instrument items

	% of agree-ment	Expert (E) rating						
		E1	E2	E3	E4	E5	E6	E7
1.CHD is a disease due to the narrowing or blockage of blood vessels supplying the heart	100	4	4	4	4	3	4	3
2.CHD is often associated with fate or bad luck ®	100	4	4	4	4	4	4	4
3.Smoking increases the chance of CHD	100	4	4	4	4	4	4	4
4.Increased alcohol consumption decreases the chance of CHD ®	100	4	4	4	4	4	4	4
5.Poor eating habits increase the chance of CHD	100	4	4	4	4	4	4	3
6.Stress increases the chance of CHD	100	4	4	4	4	4	4	4
7.CHD is often associated with a lack of exercise	100	4	4	4	4	4	4	4
8.Diabetes increases the chance of CHD	100	4	4	4	4	4	4	4
9.CHD is often associated with an increased blood pressure	100	4	4	4	4	4	4	4
10.CHD is often associated with a raised blood cholesterol	100	4	4	4	4	4	4	4
11.Obesity increases the chance of CHD	100	4	4	4	4	4	4	4
12.Family history increases the chance of CHD	100	4	4	4	4	4	4	4
13.Old age increases the chance of CHD	100	4	4	4	4	4	4	4
14.Women are more likely than men to be affected by CHD®	86	4	3	4	4	4	2	3
15.CHD is a major cause of death	100	4	4	4	4	4	4	4
16.The incidence of CHD is increasing in young people	100	4	4	4	4	4	4	4
17.CHD is a disease of old-people ®	100	4	4	4	4	4	4	4
18.CHD has no symptoms	86	3	4	4	4	4	Blank	4
19.CHD causes chest discomfort	100	3	4	4	4	4	4	4
20.CHD causes discomfort in the jaw	100	3	4	4	4	4	4	4
21.CHD causes shortness of breath	100	3	4	4	4	4	4	4
22.CHD causes back pain	86	3	4	4	4	4	2	4
23.CHD causes pain or numbness in the arms or shoulders	100	3	4	4	4	3	4	4
24.Healthy eating habits can prevent CHD	100	4	4	4	3	4	3	4
25.A relaxed life can prevent CHD	100	4	4	4	3	4	3	3
26.A good exercise habit can prevent CHD	100	4	4	4	3	4	3	4
27.Regular medical checks can prevent CHD	100	4	4	4	3	4	3	4

	% of agree-ment	Expert (E) rating						
		E1	E2	E3	E4	E5	E6	E7
28.Paying attention to blood pressure can prevent CHD	100	3	4	4	3	4	3	3
29.Paying attention to blood cholesterol level can prevent CHD	100	3	4	4	3	4	3	4
30. CHD requires long-term medication	100	4	4	4	3	4	3	4
31.Not smoking can prevent CHD	100	4	4	4	3	4	3	4
32.Avoiding alcohol can prevent CHD	100	4	4	4	3	4	3	4
33.I am more likely to concern about diabetes than CHD ®	86	4	4	4	3	4	1	4
34. I am more likely to concern about high blood pressure than CHD ®	86	4	4	4	3	4	1	4
35. I am more likely to concern about stroke than CHD ®	86	4	4	4	3	4	1	4
36. I am more likely to concern about an infectious disease than CHD ®	86	4	4	4	3	4	1	4
37.I don't bother about CHD ®	86	4	4	4	4	4	4	Blank
38.I don't bother about CHD because I have no risk factors for CHD ®	100	4	4	4	4	4	4	4
39.I don't bother about CHD because I have no signs and symptoms of CHD ®	100	4	4	4	4	4	4	4
40.I am too young to have CHD ®	100	4	4	4	4	4	4	4
41.I don't bother about CHD because I am optimistic ®	86	4	4	4	1	4	4	3
42.I don't bother about CHD because the doctor looks after my health ®	100	4	4	4	4	4	4	3
43.I don't bother about CHD because it causes little suffering ®	100	4	4	4	4	4	4	3
44.Chest discomfort will make me immediately think of a muscle or bone problem ®	86	1	4	4	4	4	4	4
45.Chest discomfort will make me immediately think of a nerve problem ®	86	1	4	4	4	4	4	4
46.Chest discomfort will make me immediately think of stomach problem ®	86	1	4	4	4	4	4	4
47.Chest discomfort will make immediately me think of breathing problem ®	86	1	4	4	4	4	4	4
48.I try to take CHD preventive measures	100	3	4	4	4	4	4	4
49.I try to eat regular meals	86	4	4	4	4	4	1	4

	% of agree-ment	Expert (E) rating						
		E1	E2	E3	E4	E5	E6	E7
50.I try to avoid fatty food	100	4	4	4	4	4	4	4
51.I try to avoid food high in bad cholesterol	100	4	4	4	4	4	4	4
52.I try to avoid food high in calories	100	4	4	4	4	4	4	4
53.I try to avoid food high in salt	100	4	4	4	4	4	4	4
54.I try to avoid over eating	100	4	4	4	4	4	4	4
55.I try to do exercise at least 30 mins everyday	100	4	4	4	4	4	4	4
56.I try to relax	100	4	4	4	4	4	4	4
57.I try to avoid smoking	100	4	4	4	4	4	4	4
58.I try to avoid drinking too much alcohol	100	4	4	4	4	4	4	4
59.I try to have a regular body check	100	4	4	4	4	4	4	4
60 I try to learn more about CHD	100	4	4	4	4	4	4	4
61.Sometimes, I find it difficult to avoid fatty food ®	100	4	4	4	4	4	4	4
62.Sometimes, I find it difficult to avoid food high in bad cholesterol ®	100	4	4	4	4	4	4	4
63.Sometimes, I find it difficult to avoid food high in calories ®	100	4	4	4	4	4	4	4
64.Sometimes, I find it difficult to avoid food high in salt®	100	4	4	4	4	4	4	4
65.Sometimes, I find it difficult to avoid over eat ®	100	4	4	4	4	4	4	4
66.Sometimes, I find it difficult to maintain a relaxed life ®	100	4	4	4	4	4	4	4
67.Sometimes, I find it difficult to maintain regular exercise ®	100	4	4	4	4	4	4	3
68.I find it difficult to understand CHD ®	100	4	4	4	4	4	4	4
69.I find it difficult to locate resources for CHD information ®	100	4	4	4	4	4	4	3
70.I find it difficult to find someone to ask about CHD ®	100	4	4	4	4	4	4	4
Overall the entire instrument adequately measures the awareness of CHD risk factors reduction	86	3	4	4	3	4	See Comments on pages	3

® Indicates reverse item

Stage 1 Review: Individual Items

In the first stage of the expert review, all 70 items achieved the acceptable level of 86% agreement (six out of seven expert rated 3 or 4), as shown in Table 7.1. Despite all the 70 items being rated and accepted as adequately valid (a rating of 3 or 4), few comments were suggested by the experts.

One of the experts suggested reviewing items 24-29 and 31-32 (Table 7.1), which were items regarding knowledge about CHD prevention as these preventive measures could not actually prevent CHD but instead, could reduce the likelihood of developing CHD events. These items were:

Item 24. Healthy eating habits can prevent CHD

Item 25. A relaxed life can prevent CHD

Item 26. A good exercise habit can prevent CHD

Item 27. Regular medical checks can prevent CHD

Item 28. Paying attention to blood pressure can prevent CHD

Item 29. Paying attention to blood cholesterol level can prevent CHD

Item 31. Not smoking can prevent CHD

Item 32. Avoiding alcohol can prevent CHD

When alterations were made to these items as suggested by the expert, these items were found to be similar to items relating to knowledge about risk factors. For example, if item 24 'Healthy eating habits can prevent CHD' was changed to 'Healthy eating habits will reduce the chance of CHD', the revised item was similar to item 5 'Poor eating habits increase the chance of CHD'. Similarly, if item 31 'Not smoking can prevent CHD' was changed to 'Not smoking will reduce the chance of CHD', the revised item was similar to item 3 'Smoking increases the chance of CHD' (as shown in Table 7.2).

Having considered that some items regarding knowledge on CHD risk factors, to a certain extent, reflect people's knowledge about CHD preventive measures, items 24 to 26, 28 to 29 and 31 to 32 were considered redundant. As for item 27 'Regular medical checks can prevent CHD', item 59 'I try to have a regular body check' reflected one's health action for a regular body check implied an indication of one's knowledge to view regular body check as a preventive means. In view of the comments by experts and to keep the instrument short and focused, item 27 was considered as a redundant item and therefore, deleted. A decision was made to delete items 24 to 29 and 31 to 32 as items 5, 6, 7, 59, 9, 10, 3 and 4 were found to have the similar meanings as shown in Table 7.2.

Table 7.2 Review regarding the deletions of items 24-29 and item 31-32

Suggested reviewing items	Items after changed	Other instrument items
Item 24. Healthy eating habits can prevent CHD	Healthy eating habits will reduce the chance of CHD	Item 5. Poor eating habits increase the chance of CHD
Item 25. A relaxed life can prevent CHD	A relaxed life will reduce the chance of CHD	Item 6. Stress increases the chance of CHD
Item 26. A good exercise habit can prevent CHD	A good exercise habit will reduce the chance of CHD	Item 7. CHD is often associated with a lack of exercise
Item 27. Regular medical checks can prevent CHD	Regular medical checks will reduce the chance of CHD	Item 59. I try to have a regular body check
Item 28. Paying attention to blood pressure can prevent CHD	Paying attention to blood pressure will reduce the chance of CHD	Item 9. CHD is often associated with an increased blood pressure
Item 29. Paying attention to blood cholesterol level can prevent CHD	Paying attention to blood cholesterol level will reduce the chance of CHD	Item 10. CHD is often associated with a raised blood cholesterol
Item 31. Not smoking can prevent CHD	Not smoking will reduce the chance of CHD	Item 3. Smoking increases the chance of CHD
Item 32. Avoiding alcohol can prevent CHD	Avoiding alcohol will reduce the chance of CHD	Item 4. increased alcohol consumption decreases the chance of CHD

Two experts suggested to review for redundant items and preferred to keep the instrument short and focused. One of the experts suggested that an increase in instrument items might increase robustness but it would also decrease participants' completion rates. After reviewing the instrument, three items were considered also as redundant items: item 37 'I don't bother about CHD' (subcategory of perceived risk), item 22 'CHD causes back pain' (subcategory of CHD symptoms), and item 48 'I try to take CHD preventive measures' (subcategory of planning of health actions). For items 37 and 48, they were less specific when compared with other items in their respective subcategories. Item 22 'CHD causes back pain' was deleted because the category regarding CHD knowledge was adequately represented by 19 items with the inclusion of 3 focused items assessing the typical CHD symptoms. Furthermore, prior to the decision to remove these items, the CVI of 0.80 for the total instrument (Polit & Hungler, 1999) as a criterion was maintained even though item deletions were made.

Regarding items 44 to 47 (as shown in Table 7.1), one expert suggested that they should be placed in the subcategory - CHD symptoms under CHD knowledge main category, rather in a subcategory - Chest pain appraisal or perceptions under the main category of risk control efficacy. The expert suggested that these items were about chest pain, which were viewed as knowledge on CHD symptoms. After reviewing these items, they focused on the immediate evaluations for chest discomfort and they were more relevant under the subcategory - Chest pain appraisal or perceptions under risk control efficacy. This suggestion was also supported by the other six experts and therefore, a decision was made to retain the items as a domain of chest pain appraisal or perceptions.

After item deletions, the second round expert review was conducted to evaluate whether the adequacy of the entire instrument was maintained.

Stage 2 Review: Individual Items

Experts were informed of the deletions of items in the subsequent stage of the review. All experts agreed for the item deletions and a 100% expert agreement regarding the adequacy of the entire instrument was achieved

Summary of Content Validity

Content validity was established for the developed instrument. A CVI of 0.84 (59 out of 70 items) was achieved which fulfilled the set criterion of at least 0.80 (Polit, & Hungler, 1999). Each item that was rated as content valid (a rating of 3 or 4) achieved at least 86% of expert agreement. The results of content validity were acceptable for the instrument consisting of 59 items (as shown in Appendix 7.1), with the deletion of 11 items. After the translation procedures and the determination of semantic equivalence of translation of the 59 items as presented earlier in Chapter 6, the Chinese version of ACRFR (Appendix 6.4) was formed and used for the pilot study and subsequent psychometric evaluations.

Results of Pilot Study

A pilot study of the ACRFR was performed to identify any problems in administration including: the clarity of items, the examination of item distribution scores for any possibility of response bias, and the assessment of internal consistency of the instrument. A description of the sample demographics and issues in administration are presented in the following sections.

Demographic Data of the Pilot Sample

Subjects were invited to participate in the pilot study from an elderly community center, a dental clinic, a cardiac unit and a cardiac rehabilitation center, where the sample in the main study would be recruited. A total of 12 subjects participated in this pilot study. Three low risk subjects were recruited from the elderly community center and the dental clinic, 5 subjects with multiple risk factors from the cardiac unit and 4 MI subjects from the cardiac rehabilitation center. The age of the subjects ranged from 44 to 76 (mean = 62.8, standard deviation = 11.0). Sixty-seven percents were males and 33% females. Fifty percents of the participants achieved a secondary educational level. More than 50% of the participants were retired. Sample demographic characteristics are summarised in Table 7.3

Table7.3 Sample demographic characteristics of the pilot study (n =12)

Demographic characteristics	Values
Sex f (%)	
Male	8 (67%)
Female	4 (33%)
Age	
Mean ± Standard deviation (range)	62.8 ± 11.0 (44 – 76)
Education f (%)	
No formal education	1 (8.3%)
Primary	4 (33.3%)
Secondary	6 (50%)
Post-secondary	1 (8.3%)
Employment status f (%)	
Currently working	4 (33.2%)
Retired	7 (58.3%)
Housewife	1 (8.3%)

Issues in the Administration of the Instrument

All participants indicated that the instructions for using the instrument and individual items were easy to read and understand. The time required to complete the instrument ranged from 7 to 10 minutes, which was acceptable without overloading the subjects. The distributions of items scores were examined and no acquiescence bias was detected. The scale internal consistency, using Cronbach's alphas, was 0.81, suggesting satisfactory scale reliability. No modification of the instrument was made after this pilot study.

Identification of the Internal Structure of ACRFR

The sample for internal factor structure identification contained 236 cases. This section consisted of three parts. The first part described the sample demographical characteristics of 232 subjects, with the exclusion of 4 outlying cases. The second part reported the findings on missing data, statistical assumptions of normality, linearity, outliers, multicollinearity and singularity as well as the factorability of data. Factor extraction and rotation are described in the latter part of this section. This part presents the sampling of items and factors to determine the factoring structure of ACRFR.

EFA Sample Demographic Characteristics

With the exclusion of 4 outlying cases, the sample consisted of 232 subjects including 51.3% (n =119) of low risk public (LRP), 24.1% (n = 56) of subjects with multiple risk factors (MRF), and 24.6% (n = 57) of subjects with MI. The whole sample contained 56.5% (n=131) males and 43.5% (n=101) females. The mean age of the whole sample was 60.0 (standard deviation [SD] = 15.6, age range = 19 - 91). Among the LRP ($\leq$ 3 CHD risk factors) and the MRF groups ($\geq$ 4 CHD risk factors), there were 8.4% (n = 10) and 64.3% (n = 36) subjects with a history of CHD, respectively. There were significant difference in sample size between male and female participants among the three groups ($p<0.001$). In the LRP group, there were 32.8% male and 67.2% female participants, whereas in the MRF and the MI groups, there were 76.8% and 86% male participants, and 13% and 14% female participants, respectively. The mean ages of the LRP, MRF and MI groups were 59.7, 60.3, and 60.4 respectively. There was no significant difference in mean age among the three groups of participants. Almost 50% of the LRP participants possessed a primary level of education, whereas in the MRF and MI groups, at least 50% of participants achieved a post secondary educational level. Majority of the LRP participants (52%) were retired. Among the MRF and MI groups, 44.6% and 47.4%

participants were currently working, and 42.9% and 45.6% participants were retired. Details of sample demographical characteristics are summarized in Table 7.4.

Table 7.4 EFA sample demographical characteristics (n = 232)

Demographic characteristics	Low risk public (LRP) group (n=119)	Multiple risk factors (MRF) group (n=56)	MI group (n=57)	P-value
Sex f (%)				<0.001 [a]
Male	39 (32.8%)	43 (76.8%)	49 (86.0%)	
Female	80 (67.2%)	13 (23.2%)	8 (14.0%)	
Age				0.959 [b ns]
Mean $\pm$ SD	59.7 $\pm$ 18.8	60.3 $\pm$ 11.6	60.4 $\pm$ 11.0	
(range)	(19 – 91)	(28 – 86)	(40 -85)	
Education f (%)				0.056 [c ns]
$\leq$ Primary level	59 (49.6%)	22 (39.3%)	16 (28.1%)	
$\leq$ Post secondary level	46 (38.6%)	28 (50.0%)	33 (57.9%)	
$\leq$ Master level	14 (11.8%)	6 (10.7%)	8 (14.1%)	
Employment f (%)				0.001 [a]
Currently working	26 (21.8%)	25 (44.6%)	27 (47.4%)	
Retired	62 (52.1%)	24 (42.9%)	26 (45.6%)	
Others: Housewife / students / unemployed	31 (26.1%)	7 (12.5%)	4 (7.0%)	

Significant level = 0.05; ns = not significant
a=Cross-tabulation using chi-square statistic
b=Analysis of variance
c=Kruskal Wallis test

Missing Data

No missing value was found from a sample of 234 subjects.

Outliers

A total of 236 cases were screened for multivariate outliers using the method of Mahalanobis distance. The criterion for multivariate outliers is Mahalanobis distance at $p<.001$. Mahalanobis distance was evaluated as χ^2 with degrees of freedom equal to the number of item variables (Tabachnick & Fidell, 2001). The present study consisted of 59 items. With the analysis generated in SPSS regression, any case with a Mahalanobis distance greater than critical χ^2 (59) = 98.34 was identified as an outlier. Four cases exceeded the critical value of 98.34.

The outlying cases were examined for incorrect data entries. The data entries of the outlying were correct and accurate. For these four outlying cases, two participants were from the low risk public and two were MRF participants whom demographical data were examined. They were the participants aged 67-86 years, who had a diagnosis of lung and heart diseases. Since no apparent pattern was observed from the data entries including demographics for the outlying cases, a possibility of random errors might be suggested for the outlying cases. Portney and Watkins (2000) indicate that random errors of measurement are due to chance and can affect a subject's score in an unpredictable way. Several authors have suggested performing trial run with and without outliers to see if the outlying cases are truly influencing results (Tabachnick & Fidell, 2001; Thompson, 2004). The trial run of the analyses indicated that the distributions of some items varied between the factor solutions. In view of the outlying cases as possible random errors may affect the factor solution and distort statistics such as bivariate scatterplot (Tabachnick & Fidell, 2001), these four outlying cases were deleted leaving 232 non-outlying cases for subsequent analysis.

Normality

Normality of the observed variables (items) was assessed through examinations of skewness and kurtosis obtained from the descriptive statistics. Some items were found to be negatively skewed (ranging from -1.060 to -3.550) and distributed positively for kurtosis (ranging from 4.066 to 11.836). The negatively skewed items included: 1, 2, 4, 8, 9, 18, 19, 20, 21, 25, 28, 29, 30, 31, 32, 33, 34, 36, 40, 42, 43, 44, 45, 46, 49 and 50. The items with a positive distributed kurtosis included: 2, 4, 20, 28, 30, 33, 36, 42, 49 and 50. Details about item score distributions, skewness and kurtosis regarding the 59 items are shown in Table 7.5. A negatively skewed distribution of variables indicated the respondents' scores clustered at the higher end (i.e. correct response), suggesting a possibility of a ceiling effect that might affect the sensitivity of the scale. However, some authors suggest that in practice, both exploratory and confirmatory factor analysis appear to be relatively robust in a nonnormal variable distribution (Gorsuch, 1983, Floyd & Widaman, 1995). It is indicated that some variables are not expected to be normally distributed in the population, e.g. in clinical samples, and/or often variables are still highly skewed or highly kurtosis even after transformation (Floyd & Widaman, 1995; Tabachnick and Fidell, 2001). Nunnally, & Bernstein (1994) add that parametric tests are generally considered robust enough to withstand even major violations of the assumptions without seriously affecting the validity of statistical outcomes. Tabachnick and Fidell (2001) suggest that normal distributions of variables enhance the factor analytic results but the normality assumptions of variables are not in force. Furthermore, skewness and kurtosis may not make a substantive difference to the results of the analyses if a reasonable sample size (>200 cases) is achieved (Tabachnick and Fidell, 2001). Taking these accounts together, no transformation was performed in the current analysis.

Table 7.5 Item score distributions, skewness and kurtosis of the 59 items

Items	Mean ± SD (range)	Skewness	Kurtosis
1	3.26 ± 0.991 (0-4)	-1.301	1.144
2	3.70 ± 0.667 (0-4)	-2.387	5.870
3	2.27 ± 1.705 (0-4)	-0.191	-1.748
4	3.63 ± 0.768 (0-4)	-2.556	7.181
5	2.39 ± 1.288 (0-4)	-0.286	-0.826
6	1.78 ± 1.655 (0-4)	0.223	-1.609
7	1.89 ± 1.654 (0-4)	0.110	-1.699
8	3.27 ± 1.044 (0-4)	-1.576	1.992
9	3.76 ± 0.656 (0-4)	-3.090	11.123
10	2.50 ± 1.731 (0-4)	-0.533	-1.523
11	2.37 ± 1.775 (0-4)	-0.384	-1.690
12	1.87 ± 1.792 (0-4)	0.132	-1.813
13	1.84 ± 1.759 (0-4)	0.183	-1.770
14	2.39 ± 1.697 (0-4)	-0.357	-1.625
15	2.64 ± 1.621 (0-4)	-0.611	-1.352
16	2.38 ± 1.736 (0-4)	-0.366	-1.659
17	2.65 ± 1.583 (0-4)	-0.501	-1.501
18	3.47 ± 1.136 (0-4)	-1.940	2.268
19	3.60 ± 0.707 (1-4)	-1.705	2.045
20	3.68 ± 0.711 (0-4)	-2.575	6.895
21	3.41 ± 0.888 (0-4)	-1.662	2.708
22	2.77 ± 1.584 (0-4)	-0.759	-1.158
23	2.80 ± 1.547 (0-4)	-0.853	-0.953
24	2.69 ± 1.592 (0-4)	-0.696	-1.234
25	3.47 ± 1.065 (0-4)	-2.103	3.293
26	2.93 ± 1.428 (0-4)	-0.976	-0.586
27	2.25 ± 1.644 (0-4)	-0.172	-1.689
28	2.70 ± 0.845 (0-4)	-3.160	9.618
29	3.01 ± 1.227 (0-4)	-1.179	0.401
30	3.47 ± 1.048 (0-4)	-2.205	4.066
31	3.05 ± 1.277 (0-4)	-1.336	0.575
32	3.02 ± 1.175 (0-4)	-1.060	0.327
33	3.67 ± 0.695 (0-4)	-2.731	8.840
34	3.49 ± 0.944 (0-4)	-1.966	3.327
35	2.71 ± 1.590 (0-4)	0.789	-1.061
36	3.53 ± 0.862 (0-4)	-2.253	5.321
37	2.06 ± 1.760 (0-4)	-0.093	-1.801
38	2.16 ± 1.737 (0-4)	-0.198	-1.749
39	2.13 ± 1.164 (0-4)	-0.080	-0.252
40	3.20 ± 1.060 (0-4)	-1.315	1.198
41	2.74 ± 1.228 (0-4)	-0.640	-0.411
42	3.51 ± 1.057 (0-4)	-2.309	4.256
43	3.40 ± 1.124 (0-4)	-2.002	2.892
44	3.17 ± 1.270 (0-4)	-1.433	0.713
45	3.35 ± 1.138 (0-4)	-1.848	2.268
46	3.45 ± 0.992 (0-4)	-2.133	3.933
47	2.37 ± 1.756 (0-4)	-0.342	-1.715
48	2.73 ± 1.494 (0-4)	-0.775	-1.001

Continued Table 7.5

Items	Mean ± SD (range)	Skewness	Kurtosis
49	3.55 ± 1.201 (0-4)	-2.465	4.311
50	3.74 ± 0.845 (0-4)	-3.550	11.836
51	2.78 ± 1.695 (0-4)	-0.883	-1.070
52	2.57 ± 1.610 (0-4)	-0.664	-1.246
53	2.07 ± 1.702 (0-4)	0.062	-1.776
54	1.84 ± 1.530 (0-4)	0.337	-1.500
55	1.95 ± 1.527 (0-4)	0.206	-1.568
56	1.74 ± 1.466 (0-4)	0.440	-1.316
57	2.26 ± 1.547 (0-4)	-0.114	-1.650
58	2.53 ± 1.584 (0-4)	-0.423	-1.549
59	1.66 ± 1.515 (0-4)	0.563	-1.268

Linearity

Linearity among pairs of item variables was assessed through inspection of scatterplots. With 59 item variables, examinations of all pairwise scatterplots are impractical. Tabachnick and Fidell (2001) suggested a spot check on few plots on those items with strong skewness. From the descriptive statistics, five item variables with strong skewness values ranged from -2.575 to -3.550 (as shown in Table 7.5), suggesting scores clustering at the higher end. These items were items 9, 20, 28, 33, and 50. After the inspection of pairwise scatterplots of these item variables, no evidence of curvilinearity was found.

Multicollinearity and Singularity

Multicollinearity and singularity causes statistical problems affecting the analysis of the structure in factor analysis (Tabachnick & Fidell, 2001). In the current EFA using the software SPSS for window, the assumption of multicollinearity and singularity was checked by examining the value of the determinant. Tabachnick and Fidell (2001) suggest that the value of the determinant should not be exactly zero. In this study, this assumption was met as indicated by a nonzero determinant.

The Factorability of Data

Barlett's test of sphericity and the Kasier-Meyer-Olkin (KMO) measure of sampling adequacy were two statistical methods used to determine the factorability of the data (Tabachnick & Fidell, 2001). In the current study, a significant finding ($p<0.001$) in Barlett's test indicated a rejection of null hypothesis that all correlations of variables were zero, and therefore, factor analysis was considered to be appropriate. The value of the KMO measure of sampling was 0.735, greater than the cut-off value 0.6, indicating that the data was factorable.

Factor Extraction and Rotation

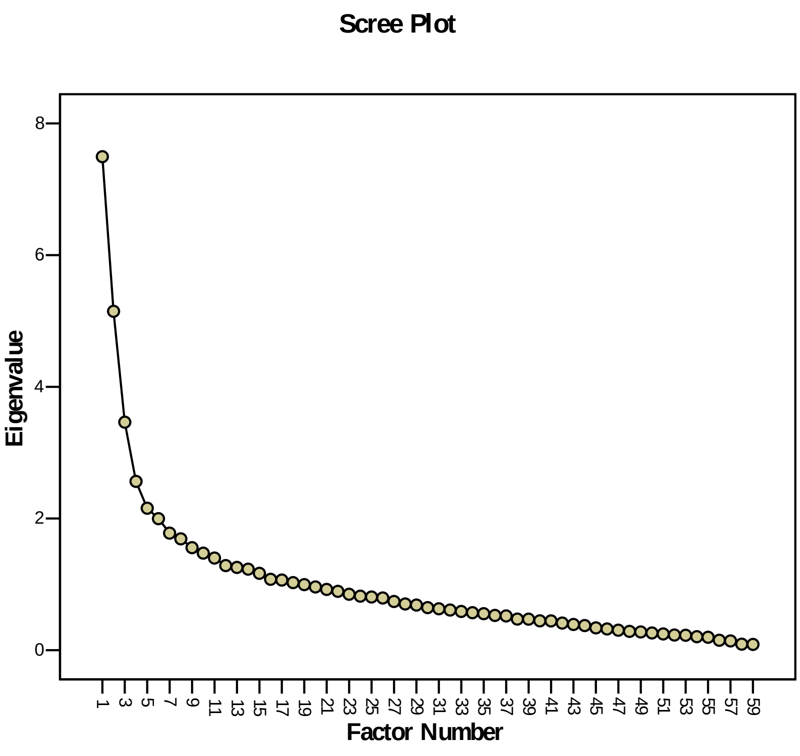
This section describes the sampling of items and factors to determine a factoring structure from a sample of 232 cases. The criteria as described in the methodology chapter were referred to when extracting factors and selecting items including: the scree plot, percentage of the contributing variance, eigenvalues, the number of significant item variables and marker variables, the complexity of item variables, and a priori criteria.

An initial EFA utilising the principal axis factoring with no rotation techniques and eigenvalue of 1.0 as a criterion yielded 18 factors, which accounted for 65.8% of the total explained variance (Table 7.6). Based on the scree plot (Figure 7.2), a discontinuity of the steep slope was around 5 to 7 factors, in which each of the factors contributed more than three percent of the total variance.

Table 7.6 Total variance explained in the unrotated model

Factor	Eigenvalues	% of Variance	Cumulative %
1	7.495	12.703	12.703
2	5.146	8.722	21.425
3	3.463	5.870	27.295
4	2.563	4.345	31.640
5	2.156	3.655	35.295
6	1.997	3.385	38.680
7	1.778	3.013	41.693
8	1.690	2.865	44.558
9	1.557	2.638	47.196
10	1.473	2.497	49.693
11	1.399	2.371	52.064
12	1.284	2.176	54.240
13	1.256	2.129	56.369
14	1.230	2.085	58.453
15	1.168	1.979	60.432
16	1.077	1.825	62.257
17	1.065	1.804	64.061
18	1.025	1.738	65.799

Figure 7.2 Scree plot of unrotated model



Varimax rotation of the 59 items was employed to achieve a better interpretation of data. The rotation method yielded the total explained variance same as the unrotated result. Of the 18 factors (rotated factor pattern shown in Table 7.7), 8 factors (i.e. factors 1, 2, 3, 4, 5, 6, 7, 9) contained at least four items with significant factor loadings (≥0.3). Items of each of these factors were examined in terms of congruency and relevancy. The items in these 8 factors according to the rotated factor pattern are listed as follows.

Factor 1 (Attempts of health actions), the items were:

44. I try to avoid food high in calories.

43. I try to avoid food high in bad cholesterol.

42. I try to avoid fatty food.

45. I try to avoid food high in salt.

46. I try to avoid over-eating.

34. CHD requires long-term medications (complex item).

52. I try to learn more about CHD (complex item).

While examining the items, all items, except item 34 (factor loading of 0.304 in factor 1), concerned with attempts of health actions. Item 34 was found to be a complex item (i.e. an item correlating with more than one factors), which was found to correlate with higher factor loading (0.446) in factor 5 regarding CHD knowledge. In this case, item 34 was more relevant to be placed in factor 5.

Factor 2 (Control of health-related behaviour), the items were:

54. Sometimes, I find it difficult to avoid fatty food.

55. Sometimes, I find it difficult to avoid food high in bad cholesterol.

57. Sometimes, I find it difficult to avoid food high in salt.

56. Sometimes, I find it difficult to avoid food high in calories.

58. Sometimes, I find it difficult to avoid over eat.

53. I try to eat regular meals.

All items in factor 2 regarding the control of health-related behaviour were well-placed except item 53 which was regarded as a misplaced item and was relevantly placed in factor 1 (Attempts of health actions).

Factor 3 (One's perception of risk in relation to CHD), the items were:

24. I don't bother about CHD because I have no signs and symptoms.

23. I don't bother about CHD because I have no risk factors.

22. I don't bother about CHD because the doctor looks after my health

27. I don't bother about CHD because I am an optimistic.

26. I don't bother about CHD because it causes little suffering.

The items in factor 3 were congruent and relevant to one's perception of risk in relation to CHD.

Factor 4 (Opportunities to understand CHD), the items were:

38. I find it difficult to find someone to ask about CHD.

37. I find it difficult to search for CHD information.

7. I find it difficult to understand CHD.

52. I try to learn more about CHD (complex item).

The items, except 52, were congruent and related to the theme regarding the opportunities to understand CHD. Item 52 was a complex and misplaced item and more relevant to be place in factor 1 (Attempts of health actions).

Factor 5 (CHD knowedge), the items were:

21. CHD is often associated with an increased blood pressure.

33. Obesity increases the chance of CHD.

19. CHD is often associated with a raised blood cholesterol.

34. CHD requires long-term medications (complex item).

28. Increased alcohol consumption decreases the chance of CHD.

20. CHD is often associated with a lack of exercise increase (complex item).

4. The incidence of CHD is increasing in young people (complex item).

The items were congruent and related to the knowledge about CHD, including items concerning risk factors, CHD trends and CHD as a disease requiring long term medication.

<u>Factor 6</u> (Perceived seriousness of CHD), the items were:

10. I am more likely to concern about diabetes than CHD.

11. I am more likely to concern about high blood pressure than CHD.

12. I am more likely to concern about stroke than CHD.

13. I am more likely to concern about an infectious disease than CHD.

Items in factor 6 were relevant to one's perceived seriousness of CHD.

<u>Factor 7</u> (CHD knowledge), items were:

41. CHD causes pain / numbness in the arms / shoulders.

32. Diabetes increases the chance of CHD.

30. Poor eating habits increase the chance of CHD.

20. CHD is often associated with a lack of exercise (complex item).

39. CHD causes discomfort in the jaw.

Items in factor 7 were also related to the knowledge of CHD, including items concerning CHD risk factors and symptoms.

<u>Factor 9</u> (CHD knowledge), the items were:

2. CHD is a disease due to the narrowing or blockage of blood vessels supplying the heart.

1. CHD is a major cause of death.

3. The incidence of CHD is increasing in young people (complex item).

9. Smoking increases the chance of CHD.

8. Stress increases the chance of CHD.

The items in factor 9 were congruent to the knowledge about CHD in terms of the cause and risk factors of CHD and CHD trends.

After examining these 8 factors (i.e., factors 1, 2, 3, 4, 5, 6, 7, 9), the item variables within each of the factors were considered interpretable in terms of congruency and relevancy. Factors 8, 11, 13, 14 and 16 consisted of three items with significant loadings. After examining factor 8 and 11, all the three items in each of these two factors were interpretable in terms of congruency and relevancy. The items of factor 8 and 11 are presented below.

Factor 8, the three items were congruent concerning knowledge about CHD:

35. CHD is a disease of old-people.

18. CHD is often associated with fate or bad luck.

5. Women are more likely than men to be affected by CHD.

Factor 11, the three items were congruent concerning chest pain appraisal or perceptions:

14. Chest discomfort will make me immediately think of a muscle / bone problem.

15. Chest discomfort will make me immediately think of a nerve problem.

17. Chest discomfort will make me immediately think of a breathing problem.

Factor 16 consisted of three items and all of them were complex item variables (i.e. each item correlating with more than one or several factors). These items were: *item 23* “I don’t bother about CHD because I have no risk factors” (factor loading -0.322), *item 27* “I don’t bother about CHD because I am an optimistic” (factor loading 0.325), and *item 52* “I try to learn more about CHD” (factor loading 0.357). These items were found to have higher factor loadings and more congruent when placed in other factors. When loaded in Factor 3 (Perception of CHD risk), item 23 had a factor loading of 0.779 and item 27 had a factor loading 0.612. Item 52 when loaded into Factor 1 (Attempts to health actions) obtained a factor loading of 0.312. Factor 16 contributed merely about 1.8% of the total variance and was deleted based on the facts that: (1) a factor with complex item variables are unstable regarding factor stability (Floyd & Widaman, 1995; Tabachnick & Fidell, 2001); (2) the factor contributed only a small accounting variance (1.8%), suggesting that a factor did not add very much to the information already extracted and it would not be worth extracting and interpreting (Gorsuch, 1983; Hair et al., 1995); (3) when items of factor 16 were placed in other relevant factors, they were more congruent with respect to factor content validity and loaded with a higher factor loading.

Factor 13 contained three items that contributed to 2.1% variance. The items were*: item 30* “Poor eating habits increase the chance of CHD” (factor loading 0.348), *item 50* “I try to avoid drinking too much alcohol” (factor loading 0.738), and *item 49* “I try to avoid smoking” (factor loading 0.420). Item 30 was found to be a complex item variable and was more congruent and had a higher loading of 0.425 when placed in factor 7 (CHD knowledge). It has been suggested that at least three items with significant factor loadings are generally needed to ensure factor stability (Gorsuch, 1983; Kline, 1997; Floyd & Widaman, 1995). In view of the small percentage of contributing variance (2.1%) of factor 13 and only two items in the factor affecting factor stability after the exclusion of the complex item 30, this factor was therefore, removed.

Factor 14 contributing 2.1% of the total variance contained one complex item variable, which was *item 41* “CHD causes pain/numbness in the arms/shoulders” (factor loading 0.319). This item was more interpretable and had a higher factor loading (0.552) in factor 7 (CHD knowledge). The remaining two items when placed together in the factor were less congruent. These items were: *item 40* 'CHD causes shortness of breath', and *item 31* 'Old age increases the chance of CHD'. Based on a low contributing variance (2.1%) and containing only two less congruent items in the factor, therefore, factor 14 was also deleted.

Five factors (factor 10, 12, 15, 17 and 18) consisted of less than three significant factor loadings. Each of them contributed with a low variance ranging from 1.7% - 2.5%. These factors would be unstable regarding factor stability (Gorsuch, 1983; Kline, 1997; Floyd & Widaman, 1995) and were therefore, deleted. In addition, when examining the items in factors 5, 7, 8 and 9 as indicated earlier in pages 231-233, they were items under the same category – 'Knowledge about CHD'. Therefore, these items could either be redistributed to other factors or collapsed into one factor after the subsequent factor deletion, as they shared the same category.

Table 7.7 Rotated factor matrix of 18 factors 59-item model

Rotated Factor Matrix

	Factor									
Item	1	2	3	4	5	6	7	8	9	10
achds44	.799									
achds43	.704									
achds42	.688									
achds45	.685									
achds46	.526									
achds51										
achds54		.768								
achds55		.749								
achds57		.709								
achds56		.656								
achds58		.471								
achds53		.322								
achds24			.793							
achds23			.779							
achds22			.621							
achds27			.612							
achds26			.542							
achds38				.905						
achds37				.887						
achds7				.694						
achds21					.622					
achds33					.569					
achds19					.564					
achds34	.304				.446					
achds28					.370					
achds10						.649				
achds11						.578				
achds12						.547				
achds13						.346				
achds41							.552			
achds32							.531			
achds30							.425			
achds20					.400		.403			
achds39							.358			

Continued Table 7.7

	Factor									
Item	1	2	3	4	5	6	7	8	9	10
achds29										
achds35								.684		
achds18								.557		
achds5								.421		
achds6										
achds2									.545	
achds1									.484	
achds4					.410				.466	
achds9									.444	
achds8									.321	
achds48										.779
achds59										.721
achds14										
achds15										
achds17										
achds3										
achds47										
achds36										
achds50										
achds49										
achds40										
achds31										
achds16										
achds52	.312			.336						
achds25										

Continued Table 7.7

Rotated Factor Matrix

	Factor							
Item	11	12	13	14	15	16	17	18
achds44								
achds43								
achds42								
achds45								.305
achds46								
achds51								
achds54								
achds55								
achds57								
achds56								
achds58								
achds53								
achds24								
achds23						-.322		
achds22								
achds27						.325		
achds26								
achds38								
achds37								
achds7								
achds21								
achds33								
achds19								
achds34								
achds28								
achds10								
achds11								
achds12								
achds13								
achds41				.319				
achds32								
achds30			.348					
achds20								
achds39								

Continued Table 7.7

	Factor							
Item	11	12	13	14	15	16	17	18
achds29								
achds35								
achds18								
achds5								
achds6								
achds2								
achds1								
achds4								
achds9								
achds8								
achds48								
achds59								
achds14	.711							
achds15	.654							
achds17	.425							
achds3		.642						
achds47		.560						
achds36								
achds50			.738					
achds49			.420					
achds40				.639				
achds31				.429				
achds16					.542			
achds52						.357		
achds25							.576	

Based on the examination of the rotated factor matrix of the 18 factors (59-item) (Table 7.7), several premises were found to support the first decision of extracting a seven-factor structure:

1. Of the 18 factors, eight factors (10, 12, 13, 14, 15, 16, 17, 18) were considered as unstable factors. Of these eight factors, five factors (10, 12, 15, 17, 18) contained less than three items, and three factors (13, 14, 16) contained complex items and were less interpretable in terms of congruency and relevancy. Four factors (5, 7, 8, 9) carried items that shared the same category about knowledge of CHD which could be collapsed into one factor. The collapsing of these items permitted parsimony in the description of the factor - knowledge about CHD. As a result, 11 factors were deleted, leaving 7 factors considered for extraction.
2. The first seven factors contributed a larger percent of total variance (41.69%) and consisted of interpretable and congruent items. Each of these factors has at least three significant factor loadings. In addition, marker variables of high factor loadings were found in each of these factors.
3. In conducting the qualitative study to explore people's awareness, the researcher gained prior knowledge about the dimensions of ACRFR. The items of the six subcategories including *perceived seriousness of CHD*, *perceived risk*, *planning of health actions*, *control over risk reducing behaviour*, *perceived opportunities to understand CHD* and *chest pain appraisal* under the main categories of the *perceptions of CHD* and *risk control efficacy* correlated with the factors containing items that have resulted from EFA. Several subcategories of items in the main category of *CHD knowledge* could collapse to form one factor to permit parsimony in the description of the phenomenon. Therefore, the priori criterion in the analysis of a seven-factor structure was used.

4. In the scree plot, a discontinuity of the steep slope was around 5 to 7 factors. Choosing a seven-factor structure for analysis corresponded to the result of the scree plot.

As the result of the aforementioned investigations, EFA using principal axis factoring with varimax rotation and choosing 7 factors to be extracted on the initial 59-item dataset was performed. In addition, since a discontinuity of steep slope around 5 to 7 factors was found in the scree plot, a five-factor and a six-factor models were also possible appropriate models for EFA (Floyd & Widaman, 1995; Hair et al., 1995; Polit-O'Hara, 1996; Thompson, 2004). After the analysis of the seven-factor model, the initial dataset of 59-item was analysed using a five-factor and six-factor models accordingly. The intention was to compare and determine which models could contribute a reasonable total variance and provide the best interpretation of items. The results of the EFA for the three models are presented in the next section.

Seven-factor Model EFA

The revised 7 factor model EFA accounted for 41.7% total variance. The percentages of variance for factor 1 to factor 7 were: 12.7%, 8.7%, 5.9%, 4.3%, 3.7%, 3.4%, and 3.0%, respectively. The rotated matrix of the 7-factor model was interpretable in terms of congruency and relevancy by the respective marker items with high factor loadings (as shown in Table 7.8). After examining the rotated 18-factor matrix pattern and the rotated 7-factor matrix pattern, most of items from factor 5, 7, 8 and 9 in the 18-factor matrix pattern were collapsed to form factor 1 in the 7-factor matrix pattern. The seven factors were:

Factor 1 Knowledge of CHD

Factor 2 Perceived ability to monitor of health-related behaviour

Factor 3 Planning to health actions

Factor 4 Perception of risk

Factor 5	Perceived opportunities to understand CHD
Factor 6	Chest pain appraisal / perception
Factor 7	Perceived seriousness of CHD

Eight items with factor loadings less than <0.3 were found (items with no factor loading are shown in Table 7.8). They were item 28, 59, 39, 48, 6, 49, 25, and 5 according to the rotated factor matrix as listed below.

28. Increased alcohol consumption decreases the chance of CHD

59. Sometimes I find it difficult to maintain a relaxed life

39. CHD causes discomfort in the jaw

48. I try to relax

6. CHD has no symptoms

49. I try to avoid smoking

25. I am too young to have CHD

5. Women are more likely than men to be affected by CHD

In view of the low factor loadings of these items, they were deleted from the instrument (Kline, 1997; Polit-O'Hara, 1996). Further discussions of these items will be addressed in Chapter 8 (Discussion of findings).

Table 7.8 Rotated factor matrix of 7-factor 59-item model

Rotated Factor Matrix

Item	Factor 1	2	3	4	5	6	7
achds19	.585						
achds20	.559						
achds8	.553						
achds33	.523						
achds21	.509						
achds32	.473						
achds40	.470						
achds1	.451		.307				
achds30	.443						
achds41	.433						
achds9	.411						
achds4	.400						
achds29	.373						
achds34	.370						
achds52	.354		.305				
achds31	.323						
achds36	.322						
achds28							
achds54		.647					
achds55		.647					
achds56		.590					
achds57		.545					
achds58		.543					
achds53		.495					
achds3		.463					
achds47		.344					
achds51		.336	.323				
achds59							
achds39							
achds48							
achds6							
achds45			.706				
achds42			.692				
achds44			.685				
achds43			.680				
achds46			.522				
achds2			.347				
achds50			.307				
achds49							
achds24				.819			
achds23				.756			
achds22				.575			
achds27				.551			
achds26				.539			
achds25							
achds37					.848		
achds38					.810		
achds7					.702		

Continued Table 7.8

Item	Factor 1	2	3	4	5	6	7
achds18		-.330			.366		
achds35					.360		
achds5							
achds10						.638	
achds11						.492	
achds12						.430	
achds13						.314	
achds15							.543
achds14							.530
achds17							.363
achds16							.307

After the deletion of 8 items, the 51-item of the 7 factors accounted for 45.4% total variance. The percentages of variance from factor 1 to factor 7 were: 14.1%, 9.1%, 6.5%, 4.8%, 3.9%, 3.7%, and 3.3%, respectively. The rotated factor matrix of the remaining 51 items was examined. Factor loadings and the content of items loaded on each factor were examined which revealed that item 50 “I try to avoid drinking too much alcohol” had a factor loading <0.3. Regarding the strength of the factor loading and congruency of content with other items in each of the factors, item 2 “CHD is a disease due to the narrowing or blockage of blood vessels supplying the heart” (factor loading of 0.377) in factor 3 reflected the category - *‘planning to health actions’* (based on the marker variables loading ranging from 0.698-0.510 in this factor) was considered not relevant. Similarly, item 18 (factor loading of 0.330) and item 35 (factor loading of 0.324) were not relevant to the content of other items in factor 4 (based on the marker variables loading ranging from 0.878-0.703 in this factor). While factor 4 represented the category - *‘perceived opportunities to understand CHD’*, item 18 “CHD is often associated with fate or bad luck” and item 35 “CHD is a disease of old people” were considered not appropriate. Although item 18 “CHD is often associated with fate or bad luck” (factor loading of -0.306) was also found to load on factor 2 *‘perceived ability to monitor health-related behaviour’* (based on the marker variables loading ranging from 0.687-0.474 in this factor), it was also not relevant to factor 2. In further examining item 2 and item 35, these items did not significantly load to other factors.

Based on the evaluations of irrelevance of items to the content of the factors and the relative low factor loadings of the items when compared with the marker variables of the factors, these four items (2, 18, 35 and 50) were removed as they did not measure the factor of interest (Lynn, 1993; Polit-O'Hara, 1996; Tabachnick & Fidell, 2001). In addition, in order to achieve the proposed guideline aiming at extracting the total variance of at least 50% as suggested by Streiner (1994) (cited in Floyd & Widaman, 1995), the factor analytic procedures were continued.

A rotated factor matrix containing 47 items contributing 47.0% of total variance was further examined and found that the factor loadings of item 36 "CHD causes chest discomfort" and item 16 "Chest discomfort will make me immediately think of a stomach problem" were below 0.3. In factor 2 *'perceived ability to monitor health-related behaviour'*, three items: item 51 "I try to have a regular body check", item 53 "I try to eat regular meal", and item 47 "I try to exercise at least 30 minutes every day" were found to be more relevant in factor 3 *'planning to health actions'*. Item 51 "I try to have a regular body check" was a complex variable which loaded on factor 2 with the loading of 0.331 and factor 3 with the loading 0.310. Plotnifkoff (1994) suggests that in some instances, item could be placed to a factor if the item contributed important content validity to the factor (cited in Barrett et al., 2005). Therefore, item 51 was included in factor 3 *'planning to health actions'*. Item 47 "I try to exercise at least 30 minutes every day" and 53 "I try to eat regular meal" were less interpretable in terms of item congruency and relevancy when placed in factor 2 *'perceived ability to monitor health-related behaviour'*. Item 47 and 53 were in fact related to factor 3 *'planning of health actions'*, but they did not significantly load to factor 3. A decision was made to remove these two items from factor 2 because they did not reflect the interest of factor 2 (Lynn, 1993; Polit-O'Hara, 1996;

Tabachnick & Fidell, 2001). Item 51 was retained as this item partially loaded on the relevant factor (factor 3 with a factor loading of 0.310). The subsequent item deletion of 36, 16, 47 and 53 was decided.

Following the deletion of the above four items (36, 16, 47, and 53) from the 47 items, a factor structure with seven factors of 43 items accounted for 49.5% of the explained variance (as shown in Table 7.9) and resulted with a clear separation of items by factors (as shown in Table 7.10). Item 51 "I try to have a regular body check" was not a complex variable and it loaded on the expected factor *'planning to health actions'* (that became factor 2 as shown in Table 7.10). Of this 43-item factor model, the percentages of variance from factor 1 to factor 7 were: 15.5% for 'CHD knowledge', 9.4% for 'planning to health actions', 7.1% 'perceived ability to health-related behaviour', 5.5% 'perception of risk', 4.4% 'perceived opportunities to understand CHD', 4.1% 'perceived seriousness of CHD', and 3.5% for 'chest pain appraisal / perception', respectively. Four items (1, 52, 34 and 43) were complex variables. Despite each of these four items loading on a different factor, they were retained after evaluation. Items 1, 34 and 43 were more congruent in the factors with higher loadings. Item 1 "coronary heart disease is a major cause of death" (loading of 0.450), and item 34 "CHD requires long-term medications" (loading of 0.322) have higher correlations with factor 1 *'CHD knowledge'*. Item 43 "I try to avoid food high in bad cholesterol" correlated highly (loading of 0.660) on factor 2 *'planning to health actions'*. For item 52 "I try to learn more about CHD" (loading of 0.318), it was congruent to be placed in the factor 2 *'planning to health actions'* based on content relevance (Plotnifkoff, 1994 cited in Barrett, et al., 2005). The 43-item 7 factors structure accounted for 49.5% of the total variance and was considered close to the proposed guideline aimed at about 50% of the total variance (Streiner, 1994 cited in Floyd & Widaman, 1995), the factoring procedure was therefore, discontinued.

Table 7.9 Percent of total variance explained of the 7-factor 43-item model

Total Variance Explained

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	6.684	15.545	15.545
2	4.058	9.438	24.983
3	3.042	7.075	32.058
4	2.351	5.467	37.525
5	1.904	4.428	41.953
6	1.742	4.052	46.005
7	1.516	3.525	49.530

Factor 1: CHD knowledge; Factor 2: Planning to health actions; Factor 3: Perceived ability to health-related behaviour; Factor 4: Perception of risk; Factor 5: Perceived opportunities to understand CHD; Factor 6: Perceived seriousness of CHD; Factor 7: Chest pain appraisal / perception

Table 7.10 Rotated factor matrix of a 7-factor 43-item model

Rotated Factor Matrix

Item	Factor 1	2	3	4	5	6	7
achds19	.568						
achds8	.567						
achds20	.558						
achds21	.502						
achds33	.500						
achds32	.497						
achds40	.457						
achds1	.450	.305					
achds41	.450						
achds30	.437						
achds9	.404						
achds29	.399						
achds4	.391						
achds52	.349	.318			.312		
achds31	.341						
achds34	.322	.319					
achds44		.743					
achds45		.685					
achds42		.681					
achds43		.660	.323				
achds46		.560					
achds51		.326					
achds54			.776				
achds55			.766				
achds56			.618				
achds57			.614				
achds58			.441				
achds3			.402				
achds24				.835			
achds23				.777			
achds22				.621			
achds27				.557			
achds26				.524			
achds37					.917		
achds38					.859		
achds7					.688		
achds10						.639	
achds11						.556	
achds12						.472	
achds13						.340	
achds15							.638
achds14							.624
achds17							.427

Factor 1: CHD knowledge; Factor 2: Planning to health actions; Factor 3: Perceived ability to health-related behaviour; Factor 4: Perception of risk; Factor 5: Perceived opportunities to understand CHD; Factor 6: Perceived seriousness of CHD; Factor 7: Chest pain appraisal / perception.

As a discontinuity of sleep slope was found around 5 to 7 factors in the scree plot as aforementioned, additional factor analyses were also performed utilising five-factor and six-factor structures. Thus the initial 59-item dataset was re-run, and a five-factor and six-factor were selected respectively as the desired numbers of factors to be extracted in factor analysis computer program.

Five-factor Model EFA

In the five-factor structure, factor 1 included items representing *'CHD knowledge'* and *'planning to health actions'*. Loading ranged from 0.307 to 0.657. Most of the items in *'planning to health actions'* were complex variables, which concurrently loaded on factor 1 and factor 2. Factor 2 with loadings from 0.330 to 0.641 included items about *'perceived ability to monitor health-related behaviour'*, and items about *'planning of health actions'* as aforesaid. A variety of items in factor 3 included 'CHD knowledge', *'perceived seriousness of CHD'* and *'perceived opportunities to understand CHD'*. Loadings on factor 3 ranged from 0.306 to 0.546. While carefully examining the matrix, all the items of *'perceived opportunities to understand CHD'* were complex variables. They clustered to form factor 5 with loading ranging from 0.552 to 0.776. Factor 4 contained items representing *'perception of risk'*. Loadings on this factor ranged from 0.317 to 0.783. The total explained variance accounted by the rotated factors was only 35.3%. The five-factor structure did not produce clearly differentiated content in each factor and a smaller percentages of total explained variance when compared with the seven-factor structure.

Six-factor Model EFA

A six-factor model, accounted for only 38.7% of the explained variance, also had less conceptual clarity than the seven-factor structure. The six-factor structure resulted in the same problems encountered in the earlier five-factor model. Items of *'planning to health actions'* loaded on two factors: factor 1 *'CHD knowledge'* and factor 2 *'perceived ability to monitor health actions'*. Items represented *'chest pain appraisal / perception'* and *'CHD knowledge'* formed factor 6. Factor 3 included items about *'perception of risk'*. Items of *'perceived opportunities to understand CHD'* and items of *'perceived seriousness of CHD'* formed factor 4 and factor 5 respectively.

Based on the analyses and evaluations conducted, the seven-factor (43-items) structure produced clearly differentiated content in each factor. It represented a wider coverage of factors and it contributed the greatest total explained variance. This structure accounted for 49.5% of the explained variance using principle axis factoring as the extraction method. Factor 1 accounted for 15.5% of the explained variance, containing items about *'CHD knowledge'*. Factor 2 accounted for 9.4% variance, representing *'planning to health actions'*. Items represented *'perceived ability to monitor health-related behaviour'* in factor 3 accounting for 7.1% of the explained variance. Items in factor 4 appeared to represent the *'perception of risk'*, contributing for 5.5% variance. Factor 5 contained items about *'perceived opportunities to understand CHD'*. This factor contributed 4.4% of the explained variance. Factor 6 and factor 7 accounted for 4.1% and 3.5% variances, containing items of *'perceived seriousness of CHD'* and *'chest pain appraisal/perception'*, respectively. The items listed by factors are presented in Appendix 7.2 (the final 43-item English and Chinese versions of ACRFR are shown in Appendix 7.2a).

Although factor 5, 6 and 7 accounted for a smaller portion of less than 5% variance, they were in fact retained in the factor solution. The premises were based on firstly, factor 5 *'perceived opportunities to understand CHD'*, factor 6 *'perceived seriousness of CHD'*, and factor 7 *'chest pain perception / appraisal'* emerged as findings from the empirical qualitative study. These factors as aspects of ACRFR were conceptually significant and were important in line with the past literature as discussed earlier. Secondly, each of these three factors appeared within a well-defined pattern of at least three significant (factor loading >0.3) and content-relevant items. Thus, in order to avoid scarifying their conceptual significances and to preserve scale content validity, they were retained. In addition, the results of factor analyses on five-factor and six-factor model structures were less satisfactory in terms of data fitting the model structures and contributing to the total explained variances, these further lent insights to retain these factors and choose the seven-factor model structure.

Results of Reliability

This section reports the results of reliability, which include the internal consistency and the test-retest reliability. In the evaluation of internal consistency, the overall scale and subscales Cronbach's alphas, the item-to-subscale correlations, subscale-to-total correlations, as well as the correlations of subscales will be reported accordingly. The results of test-retest reliability will be presented in the latter part of this section.

Internal Consistency

As shown in Table 7.11, the overall scale of the entire EFA sample demonstrated a high value of Cronbach's alphas, which was 0.82. The Cronbach's alphae of the subscales (factors) were 0.79, 0.81, 0.80, 0.81, 0.90, 0.61, and 0.60, respectively. The internal consistency of the overall scale and all the subscales met the criterion of 0.60. For the analyses among the subgroups: low risk public (LRP), multiple risk factors (MRF) group and the myocardial infarction (MI) group, the overall scale alphas values were 0.80, 0.81 and 0.61, respectively. Of the subgroups subscales Cronbach's alphae, majority were $\geq$0.6, except factor 6 *'perceived seriousness of CHD'* (α=0.59) and factor 7 *'chest pain appraisal / perception'*

(α=0.54) in LRP group, factor 7 *'chest pain appraisal / perception'* (α=0.58) in MRF group, factor 1 *'CHD knowledge'* (α=0.59) and factor 2 *'planning of health actions'* (α=0.24) in MI group.

Table 7.11 Internal consistency of EFA sample (n=232): Cronbach's alphae of the overall scale and subscales of the entire sample and the subgroups

Overall scale / subscales	Cronbach's alphas			
	EFA sample n=232	LRP n=119	MRF n=56	MI n=57
Overall scale (43 items)	.82	.80	.81	.61
Factor 1: CHD knowledge (15 items)	.79	.79	.83	.59
Factor 2: Planning to health actions (7 items)	.81	.76	.84	.24
Factor 3: Perceived ability to monitor health-related behaviour (6 items)	.80	.85	.69	.74
Factor 4: Perception of risk (5 items)	.81	.83	.76	.77
Factor 5: Perceived opportunities to understand CHD (3 items)	.90	.84	.92	.92
Factor 6: Perceived seriousness of CHD (4 items)	.61	.59	.60	.62
Factor 7: Chest pain appraisal / perception (3 items)	.60	.54	.58	.69

The overall scale and subscales internal consistency were also performed in the CFA sample (n=225) as shown in Table 7.12. In the CFA sample, the overall scale alphae of the entire CFA sample and subgroups (LRP, MRF, and MI groups) were 0.85, 0.86, 0.80 and 0.63, respectively. For the subscales alphae, most of them were $\geq$0.6, except factor 1 *'CHD knowledge'* in MRF group (α=0.57) and MI group (α=0.56).

Table 7.12 Internal consistency of CFA sample (n=225): Cronbach's alphae of the overall scale and subscales of the entire sample and the subgroups

Overall scale / subscales	Cronbach's alphas			
	CFA sample n=225	LRP n=116	MRF n=54	MI n=55
Overall scale (43 items)	.85	.86	.80	.63
Factor 1: CHD knowledge (15 items)	.76	.78	.57	.56
Factor 2: Planning to health actions (7 items)	.85	.86	.75	.64
Factor 3: Perceived ability to monitor health-related behaviour (6 items)	.85	.89	.79	.69
Factor 4: Perception of risk (5 items)	.76	.78	.72	.80
Factor 5: Perceived opportunities to understand CHD (3 items)	.86	.81	.84	.88
Factor 6: Perceived seriousness of CHD (4 items)	.68	.78	.60	.60
Factor 7: Chest pain appraisal / perception (3 items)	.70	.71	.74	.69

Table 7.13 presents the corrected item-to-subscale correlations of the EFA sample (n=232) and the CFA sample (n=225). In the entire EFA sample (n=232), all corrected item-to-subscale correlations were greater than the proposed criterion of 0.2. In the entire CFA sample (n=225), 98% item correlations (42 out of 43 items) were greater than 0.2, except item 31 with an item-to-subscale correlation of 0.097.

Of the corrected item-to-subscale correlations among the EFA subgroups, all items in LRP group, 98% of the items (42 out of 43 items) except item 3 in MRF group, and 79% of the items (34 out of 43 items) in MI group were greater than 0.2. The items less than 0.2 as shown in the MI group of the EFA sample were items: 1, 30, 4, 34, 43, 46, 51, 52, and 13 respectively.

For the CFA subgroups, there were 98% items (42 out of 43 items) except item 41 in the LRP group, 86% of the items (37 out of 43 items) in MRF group, and 81% of the items (35 out of 43 items) in the MI group were greater than 0.2. The items less than 0.2 as shown in the MRF group of the CFA sample were items: 8, 32, 1, 4, 34, and 51. For the MI group, items less than 0.2 were item 40, 1, 41, 29, 34, 46, 51, and 3, respectively.

Table 7.13 Internal consistency of EFA sample (n=232) and CFA sample (n=225): corrected item-to-subscale correlations of the entire samples and subgroups

Subscales Items	EFA sample				CFA sample			
		LRP	MRF	MI		LRP	MRF	MI
	n=232	n=119	n=56	n=57	n=225	n=116	n=54	n=55
Factor 1								
Item 19	.552	.528	.618	.286	.516	.446	.490	.310
Item 8	.500	.564	.417	.416	.342	.323	.153	.450
Item 20	.518	.483	.609	.288	.360	.435	.210	.236
Item 21	.427	.432	.506	.204	.449	.416	.381	.334
Item 33	.466	.406	.570	.431	.478	.563	.290	.494
Item 32	.449	.485	.555	.216	.359	.419	-.051	.281
Item 40	.435	.441	.580	.278	.460	.484	.270	.028
Item 1	.434	.509	.349	-.031	.393	.394	.188	.051
Item 41	.411	.330	.498	.469	.307	.140	.299	.118
Item 30	.372	.345	.598	.151	.449	.454	.279	.293
Item 9	.376	.321	.531	.214	.462	.490	.301	.238
Item 29	.341	.325	.346	.351	.435	.573	.541	.137
Item 4	.367	.344	.391	.187	.338	.297	.236	.315
Item 31	.256	.276	.260	.222	.097	.209	-.177	.297
Item 34	.324	.337	.308	-.083	.379	.299	.146	-.160
Factor 2:								
Item 44	.666	.591	.758	.374	.729	.726	.637	.442
Item 45	.588	.592	.647	.252	.729	.751	.572	.733
Item 42	.643	.480	.800	.423	.725	.683	.720	.733
Item 43	.694	.601	.782	.079	.808	.813	.757	.739
Item 46	.525	.544	.477	.047	.626	.690	.347	.151
Item 51	.426	.418	.372	-.122	.457	.420	.166	-.104
Item 52	.418	.332	.423	.028	.454	.459	.316	.225
Factor 3:								
Item 54	.668	.789	.491	.577	.741	.760	.784	.629
Item 55	.652	.732	.492	.618	.771	.850	.720	.575
Item 56	.625	.643	.556	.640	.750	.821	.729	.532
Item 57	.625	.653	.579	.600	.656	.789	.414	.508
Item 58	.444	.563	.333	.279	.595	.663	.423	.349
Item 3	.328	.436	.145	.202	.331	.439	.292	.028

Continued Table 7.13

Subscales Items	EFA sample				CFA sample			
		LRP	MRF	MI		LRP	MRF	MI
	n=232	n=119	n=56	n=57	n=225	n=116	n=54	n=55
Factor 4:								
Item 24	.713	.725	.662	.696	.631	.660	.589	.739
Item 23	.675	.725	.574	.594	.687	.676	.652	.800
Item 22	.565	.574	.612	.446	.393	.449	.204	.567
Item 27	.520	.625	.372	.467	.460	.541	.429	.437
Item 26	.501	.487	.427	.566	.484	.450	.593	.470
Factor 5:								
Item 37	.823	.804	.853	.930	.838	.730	.808	.871
Item 38	.861	.729	.857	.904	.827	.789	.855	.879
Item 7	.702	.588	.827	.693	.564	.473	.488	.597
Factor 6:								
Item 10	.453	.445	.313	.574	.438	.539	.329	.433
Item 11	.425	.345	.626	.379	.558	.662	.518	.456
Item 12	.379	.328	.329	.535	.498	.662	.422	.381
Item 13	.288	.352	.265	<u>.177</u>	.365	.494	.260	.271
Factor 7:								
Item 15	.475	.396	.528	.523	.582	.588	.568	.590
Item 14	.503	.430	.492	.666	.591	.556	.611	.625
Item 17	.273	.227	.201	.373	.400	.435	.511	.312

Underline indicates corrected item-to-subscale less than 0.2

Factor 1: CHD knowledge; Factor 2: Planning to health actions; Factor 3: Perceived ability to health-related behaviour; Factor 4: Perception of risk; Factor 5: Perceived opportunities to understand CHD; Factor 6: Perceived seriousness of CHD;Factor 7: Chest pain appraisal / perception

The subscales-to-total correlations of the EFA sample (n=232) and the CFA sample (n=225), as presented in Table 7.14, were used to assess the degree of homogeneity of ACRFR. Prior to analysis, normality checks on scores were performed using descriptive statistics. The Kolmogorov-Simirnov test showed significant results ($p < 0.005$) for the subscales scores which indicated that normality assumption was not met. Therefore, non-parametric method using the Spearman rank correlation coefficient was employed in current analysis. All of the results showed that there were significant associations ($p < 0.01$) between subscale scores and total score. In the EFA sample, low to moderate correlations were found ranging from 0.29 to 0.70, and low correlations were found for factor 6 *'perceived seriousness of CHD'* with a correlation coefficient of 0.29 and factor 7 *'chest pain appraisal / perception'* with a correlation coefficient of 0.30. In the CFA sample, low to moderate correlations were found ranging from 0.25 to 0.78, and low correlations were found in factor 4, 6 and 7 ranging from 0.25 to 0.39. Since a minimum of 85 subjects with a 0.30 medium effect size, for power of 0.80 at the level of 5% significance (Cohen, 1988) for correlational study was not met, subgroups subscale-to-total correlations were not performed.

Table 7.14 Subscale-to-total correlation of the EFA sample (n=232) and the CFA sample (n=225)

Subscales	subscale-to-total correlation coefficients (rho*)	
	EFA sample (n=232)	CFA sample (n=225
Factor 1: CHD knowledge	0.60	0.68
Factor 2: Planning to health actions	0.70	0.78
Factor 3: Perceived ability to monitor health-related behaviour	0.48	0.67
Factor 4: Perception of risk	0.49	0.34
Factor 5: Perceived opportunities to understand CHD	0.59	0.55
Factor 6: Perceived seriousness of CHD	0.29	0.39
Factor 7: Chest pain appraisal / perception	0.30	0.25

All correlations are at 0.01 significant level
*rho= the Spearman rank correlation coefficient

The subscales correlations of EFA sample (n=232) and CFA sample (n=225), as presented in Table 7.15 and Table 7.16, were used to assess the degree of homogeneity of ACRFR. Since a minimum of 85 subjects with a 0.30 medium effect size, for power of 0.80 at the level of 5% significance (Cohen, 1988) for correlational study was not met, subgroups subscales correlations were not performed. Normality checks on subscales scores were performed using descriptive statistics. The Kolmogorov-Simirnov test showed significant results ($p < 0.005$) for the subscales scores of the two samples which indicated that normality assumption was not met. Therefore, non-parametric method using the Spearman rank correlation coefficient was employed in the analysis.

In EFA sample (Table 7.15), moderate and significant correlations were found between factor 1 *'CHD knowledge'* and factor 2 *'planning to health actions'* (0.44, $p < 0.001$), as well as factor 2 *'planning to health actions'* and factor 3 *'perceived ability to monitor health-related behaviour'* (0.40, $p < 0.001$), indicating that factors were moderately related. Other factor correlations were found with low correlations in magnitude, indicating a low or no association between these factors.

In CFA sample (Table 7.16), moderate and significant correlations were found between factor 1 *'CHD knowledge'* and factor 2 *'planning to health actions'* (0.55, $p < 0.001$), factor 1 *'CHD knowledge'* and factor 5 *'perceived opportunities to understand CHD'* (0.40, $p < 0.001$), factor 2 *'planning to health actions'* and factor 3 *'perceived ability to monitor health-related behaviour'* (0.56, $p < 0.001$), as well as factor 2 *'planning to health actions'* and factor 5 *'perceived opportunities to understand CHD'* (0.43, $p < 0.001$), indicating that factors were moderately related. Other factor correlations were found with low correlations in magnitude, indicating a low or no association between these factors.

Table 7.15 Subscales correlations of EFA sample (n=232) using Spearman rank correlation (rho)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Factor 1	1.00						
Factor 2	0.44**	1.00					
Factor 3	0.10	0.40**	1.00				
Factor 4	0.16*	0.18**	-0.05	1.00			
Factor 5	0.26**	0.34**	0.14*	0.23**	1.00		
Factor 6	-0.03	-0.01	-0.12	0.24**	0.19**	1.00	
Factor 7	0.01	0.17**	0.19**	0.03	0.00	-0.05	1.00

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

Table 7.16 Subscales correlations of CFA sample (n=225) using Spearman rank correlation (rho)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Factor 1	1.00						
Factor 2	0.55**	1.00					
Factor 3	0.28**	0.56**	1.00				
Factor 4	0.09	0.09	0.04	1.00			
Factor 5	0.40**	0.43**	0.20**	0.12	1.00		
Factor 6	0.07	0.09	0.10	0.21**	0.06	1.00	
Factor 7	0.10	0.05	0.14*	-0.03	0.19	0.11	1.00

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

Test-retest Reliability

As for the test-retest using intraclass correlation (ICC) method (Table 7.17), the high value of the overall scale (0.89) indicated that the stability of the instrument was satisfactory. Each value of the subscales, except factor 3 *'perceived ability to monitor health-related behaviour'* (0.68) with moderate reliability, was >0.70 as suggested by Kline (2000a).

Table 7.17 Test-retest reliability (n=106) using intraclass correlation coefficient

Overall scale / subscales	Initial scores (M ± SD)	Re-test scores (M ± SD)	Intraclass correlation coefficients
Overall scale (43 items)	110.29 ± 20.34	107.06 ± 19.31	.89
Factor 1: CHD knowledge (15 items)	45.75 ± 7.18	43.81 ± 8.84	.80
Factor 2: Planning to health actions (7 items)	17.43 ± 6.62	16.35 ± 6.68	.82
Factor 3: Perceived ability to monitor health-related behaviour (6 items)	9.34 ± 6.37	9.53 ± 5.35	.68
Factor 4: Perception of risk (5 items)	14.99 ± 4.13	14.94 ± 4.37	.77
Factor 5: Perceived opportunities to understand CHD (3 items)	5.96 ± 3.61	6.08 ± 3.44	.84
Factor 6: Perceived seriousness of CHD (4 items)	9.80 ± 4.41	9.57 ± 4.19	.85
Factor 7: Chest pain appraisal / perception (3 items)	7.02 ± 3.26	6.77 ± 2.98	.81

Result of Construct Validity: Using Confirmatory Factor Analysis

The results of confirmatory factor analysis consisted of four parts. The first part describes the sample demographical characteristics. The second part reports the findings on missing data, statistical assumptions of normality, linearity, absence of outliers, absence of multicollinearity and singularity as well as the factorability of data. The third part reports the

CFA model specification, model identification, parameter estimation. Then its fit to the data was assessed and modification was evaluated.

Sample Demographical Characteristics

With the exclusion of 6 outlying cases, the sample consisted of 225 subjects including 51.6% (n =116) of low risk public (LRP) subjects, 24% (n = 54) of subjects with multiple risk factors (MRF), and 24.4% (n = 55) of subjects with MI. The whole sample included 56% (n=126) males and 44% (n=99) females. The mean age of the whole sample was 47.8 (standard deviation = 17.2, age range = 18 - 88). There was no subject with a history of CHD in the LRP group (≤ 3 CHD risk factors). Of the MRF group (≥ 4 CHD risk factors), there were 77.8% (n = 42) subjects with a history of CHD. There were significant different in numbers between male and female participants among the three groups. In the LRP group, there were 39% male and 77% female participants, whereas in the MRF and the MI groups, there were 75.9% and 83.6% male participants, and 24.1% and 16.4% female participants, respectively. The mean ages of the LRP, MRF and MI groups were 37.8, 59.4, and 60.6. There were significant differences in mean age between the LRP and the MRF / MI groups. However, there was no difference in mean age between the MRF and MI participants. Over half of the sample possessed a post secondary educational level. Seventy-five percentage participants of LRP and 46.3% participants of the MRF groups were currently employed. Forty-nine percentage participants of the MI group were retired. The total ACRFR mean scores across the LRP, MRF and MI groups were 110.87 (SD=19.46), 119.59 (SD=19.46), 137.22 (SD=13.69). There were significant differences among the three groups in total ACRFR mean scores and subscales mean scores, except factor 4 *'perception of risk'* and factor 6 *'perceived seriousness of CHD'*. Details of sample demographical characteristics, ACRFR total and subscale mean scores are summarized in Table 7.18.

Table 7.18 CFA sample demographic characteristics (n = 225)

Demographic characteristics	Low risk public (LRP) group (n=116)	Multiple risk factors (MRF) group (n=54)	MI group (n=55)	P-value
Sex *f* (%)				<0.001 [a]
Male	39 (%)	41 (75.9%)	46 (83.6%)	
Female	77 (%)	13 (24.1%)	9 (16.4%)	
Age				<0.001 [b]
Mean ± SD	37.8 ± 14.6	59.4 ± 11.7	60.6 ± 11.2	
(range)	(18-84)	(22-78)	(41-88)	
Education *f* (%)				<0.001 [c]
≤ Primary level	14 (12.1%)	20 (37.0%)	19 (34.5%)	
≤ Post secondary level	76 (65.5%)	30 (55.6%)	32 (58.2%)	
≤ Doctoral level	26 (22.4%)	4 (7.4%)	4 (7.3%)	
Employment *f* (%)				<0.001 [a]
Currently working	75 (64.7%)	25 (46.3%)	25 (45.5%)	
Retired	12 (10.3%)	18 (33.3%)	27 (49.1%)	
Others: Housewife / students / unemployed	29 (25.0%)	11 (20.4%)	3 (5.5%)	
ACRFR total and subscales scores Mean ± SD				
Total scale	110.87 ± 19.46	119.59 ±19.46	137.22 ±13.69	<0.001 [b]
Factor 1	46.25 ± 6.53	49.43 ± 5.51	54.31 ± 4.76	<0.001 [b]
Factor 2	17.87 ± 6.69	20.94 ± 5.93	25.98 ± 3.09	<0.001 [b]
Factor 3	9.45 ± 6.48	12.67 ± 6.87	16.05 ± 5.67	<0.001 [b]
Factor 4	14.66 ± 4.35	14.31 ± 5.04	14.38 ± 5.77	0.894 [b ns]
Factor 5	6.03 ± 3.62	4.70 ± 4.40	9.25 ± 3.98	<0.001 [b]
Factor 6	9.91 ± 4.35	9.11 ± 4.84	10.04 ± 4.94	0.500 [b ns]
Factor 7	6.71 ± 3.36	8.43 ± 4.08	7.20 ± 4.39	0.025 [b]

Significant level = 0.05; ns = not significant
a=Cross-tabulation using chi-square statistic
b=Analysis of variance
c= Kruskal Wallis test

Missing Data

Descriptive statistics were used to examine missing data. Data obtained from a sample of 231 subjects revealed four missing values regarding age among the LRP population.

Outliers

A total of 231 cases were screened for multivariate outliers using the method of Mahalanobis distance. The criterion for multivariate outliers is Mahalanobis distance at $p<.001$. Mahalanobis distance was evaluated as χ^2 with degrees of freedom equal to the number of item variables (Tabachnick & Fidell, 2001). The present analysis consisted of 43 item variables. With the analysis generated in SPSS regression, any case with a Mahalanobis distance greater than critical χ^2 (43) = 77.42 was identified as an outlier. In this tudy, six cases exceeded the critical value of 77.42.

The outlying cases were examined for incorrect data entries. The data entries of the outlying cases were correct and accurate. For these six outlying cases, three participants were LRP participants, two were MRF participants and one MI participant when demographical data were examined. They were the participants aged 23-75 years and the majority was with health problems including anxiety, diabetes, hypertension, as well as gastrointestinal, gynecological and coronary diseases. Since no apparent pattern was observed from the data entries including demographical information for the outlying cases, a possibility of random errors might be suggested for the outlying cases. Portney and Watkins (2000) indicate that random errors of measurement are due to chance and can affect a subject's score in an unpredictable way. A trial run of the analyses with and without outliers was performed as suggested by Tabachnick and Fidell (2001), and Thompson (2004). Differences in statistics values were found. In view of the outlying cases which may be due to a possibility of random errors, and which may affect the factor solution, the six outlying cases identified in this study were deleted, leaving 225 non-outlying cases for subsequent analysis.

Normality

Skewness and kurtosis obtained from the descriptive statistics were assessed for normality. Some variables (items) were found negatively skewed (ranging from -1.105 to -2.318) and distributed positively for kurtosis (ranging from 4.709 to 5.826). The negatively skewed items included: 19, 8, 20, 21, 33, 30, 9, 29, 4, 31, 34, 44, 45, 42, 43, 46, and 26. The items with a positive distributed kurtosis included: 20, 33, 30, 9 and 4. Details about item score distributions, skewness and kurtosis regarding the 43 items are shown in Table 7.19. A negatively skewed distribution of variables indicated the respondents' scores clustered at the higher end (i.e. correct response), suggesting a possibility of a ceiling effect. Some authors suggest that in practice, both exploratory and confirmatory factor analysis appear to be relatively robust in a nonnormal variable distribution (Gorsuch, 1983, Floyd & Widaman, 1995). It is indicated that some variables are not expected to be normally distributed in the population, e.g. in clinical samples, and/or often variables are still highly skewed or highly kurtosis even after transformation (Floyd & Widaman, 1995; Tabachnick and Fidell, 2001). Nunnally, & Bernstein (1994) add that parametric tests are generally considered robust enough to withstand even major violations of the assumptions without seriously affecting the validity of statistical outcomes. Skewness and kurtosis may not make a substantive difference to the results of the analyses if a reasonable sample size (>200 cases) is achieved (Tabachnick and Fidell, 2001). No transformation of data was performed also based on the aforesaid accounts.

Table 7.19 Item score distributions, skewness and kurtosis of the 43 items.

Items	Mean ± SD (range)	Skewness	Kurtosis
19	3.63 ± 0.576 (1-4)	-1.445	1.847
8	3.13 ± 0.996 (0-4)	-1.175	0.953
20	3.51 ± 0.897 (0-4)	-2.318	5.491
21	3.22 ± 1.058 (0-4)	-1.367	1.181
33	3.53 ± 0.701 (0-4)	-1.948	5.577
32	2.81 ± 1.134 (0-4)	-0.738	-0.156
40	3.08 ± 1.008 (0-4)	-0.970	0.420
1	3.22 ± 0.851 (0-4)	-.0959	0.738
41	2.70 ± 1.054 (0-4)	-0.325	-0.466
30	3.58 ± 0.752 (0-4)	-2.252	5.826
9	3.63 ± 0.696 (1-4)	-2.165	4.709
29	3.05 ± 1.084 (0-4)	-1.251	1.096
4	3.61 ± 0.699 (0-4)	-2.053	4.742
31	2.90 ± 1.290 (0-4)	-1.105	0.028
34	3.37 ± 0.873 (0-4)	-1.333	1.138
44	3.04 ± 1.235 (0-4)	-1.172	0.106
45	3.12 ± 1.233 (0-4)	-1.393	0.723
42	3.30 ± 1.071 (0-4)	-1.695	1.993
43	3.27 ± 1.094 (0-4)	-1.599	1.586
46	3.30 ± 1.043 (0-4)	-1.681	2.053
51	2.57 ± 1.715 (0-4)	-0.584	-1.475
52	2.00 ± 1.613 (0-4)	-0.057	-1.656
54	1.80 ± 1.455 (0-4)	0.423	-1.369
55	1.87 ± 1.508 (0-4)	0.363	-1.482
56	1.71 ± 1.440 (0-4)	0.554	-1.220
57	2.10 ± 1.541 (0-4)	0.064	-1.642
58	2.37 ± 1.573 (0-4)	0.238	-1.639
3	1.99 ± 1.665 (0-4)	0.115	-1.722
24	2.86 ± 1.372 (0-4)	-0.861	-0.727
23	2.96 ± 1.286 (0-4)	-0.966	-0.457
22	2.75 ± 1.480 (0-4)	-0.765	-0.989
27	2.67 ± 1.479 (0-4)	-0.597	-1.249
26	3.28 ± 1.219 (0-4)	-1.556	1.092
37	2.24 ± 1.636 (0-4)	-0.208	-1.654
38	2.31 ± 1.629 (0-4)	-0.275	-1.620
7	1.94 ± 1.518 (0-4)	0.083	-1.575
10	2.82 ± 1.546 (0-4)	-0.905	-0.834
11	2.70 ± 1.537 (0-4)	-0.755	-1.050
12	2.19 ± 1.683 (0-4)	-0.207	-1.681
13	2.04 ± 1.690 (0-4)	-0.003	-1.740
15	2.52 ± 1.601 (0-4)	-0.519	-1.404
14	2.12 ± 1.672 (0-4)	-0.077	-1.718
17	2.60 ± 1.592 (0-4)	-0.556	-1.397

Linearity

Linearity among pairs of item variables was assessed through inspection of scatterplots. Tabachnick and Fidell (2001) suggested a spot check on few plots on those items with strong skewness rather than perform examinations of all pairwise scatterplots which are impractical. Five item variables with strong skewness values ranging from -1.948 to -2.318 (as shown in Table 7.19), suggesting a clustering of scores at the higher end were found in the descriptive statistics. The items used to assess for linearity included: 4, 9, 20, 30 and 33, and were found to have no evidence of curvilinearity after the inspection of pairwise scatterplots.

Multicollinearity and Singularity

The assumption of multicollinearity and singularity was checked by examining the values of the standard multiple correlations (SMC). No SMC values greater than 0.99 (Tabachnick & Fidell, 2001) was evaluated using the Linear Structural RELation (LISREL) software, and thus the assumption was met.

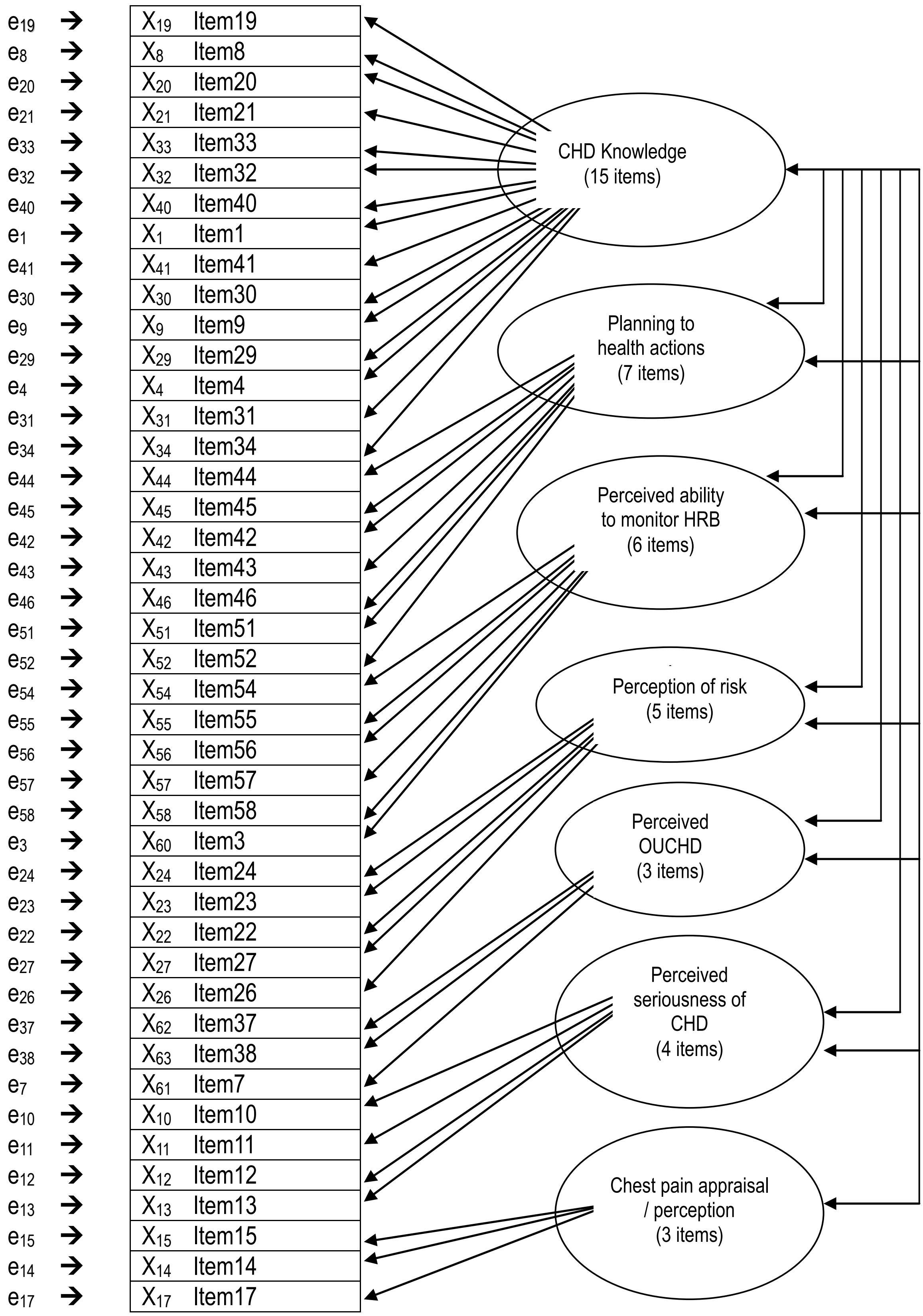
The Factorability of Data

Barlett's test indicated a significant finding ($p < 0.001$) to reject the null hypothesis that all correlations of variables were zero. The value of the KMO measure of sampling was 0.799, greater than the cut-off value 0.6, indicating that the data was factorable.

Model Specification

There were seven factors: *(1) CHD knowledge*, *(2) planning to health actions*, *(3) perceived ability to monitor health-related behaviour (HRB)*, *(4) perception of risk*, *(5) perceived opportunities to understand CHD*, *(6) perceived seriousness of CHD,* and *(7) chest pain appraisal / perception*. They were measured by fifteen, seven, six, five, three, four and three items respectively. Figure 7.3 presented the proposed model specification indicating the relationship among the parameters.

Figure 7.3 The proposed model specification



e = measurement errors
X = observable variables
HRB = health-related behaviour
OUCHD = opportunities to understand CHD

Model Identification

The t-rule, the three-indicator rule and assigning latent variable scales are conditions for the identification of CFA model (Bollen, 1989; Byrne, 1998; Kelloway, 1998; Stevens, 2002). There were 43 observable variables. The available information was the number of elements in the covariance matrix from the 43 observable variables, which was 43(43+1)/2 = 946. There were unknown parameters (21 factor correlations, 43 factor loadings and 43 measurement error variances), which were elements to be estimated. As the number of the available information (i.e. 964) was greater than the number of unknown parameters (i.e.107), the t-rule was met. The three-indicator rule states that there should be at least three observable variables per factor. In the present CFA model, each factor has fifteen, seven, six, five, three, four and three observable variables respectively and therefore, the condition was met. Each of the factors was assigned to a scale in LISREL 8.54

Parameter Estimation

The model tests were based on the covariance matrix. Maximum likelihood estimation was performed using LISREL 8.54

Assessment of Model Fit

Inspection of the parameter estimates indicated that complete standardised parameter estimates values did not exceed 1.0 and all estimates of factor loadings were positive. As indicated by t-values, the parameter estimates, except item 31 (factor loading=0.07, t-value=1.00), were significant suggesting that the corresponding items were important to the model. For items 31, a detailed discussion of the result is in Chapter 8. The estimates of factor loadings and measurement error variances are presented in Table 7.20.

Table 7.20 Factor loadings and measurement error for the seven-factor model (t-value in parenthesis).

Factor Item	Factor loadings	(t-value)	Measurement error	(t-value)
Factor 1: CHD knowledge				
Item 19	0.64	(9.86)	0.59	(9.09)
Item 8	0.39	(5.55)	0.85	(10.20)
Item 20	0.41	(5.89)	0.83	(10.15)
Item 21	0.54	(7.96)	0.71	(9.71)
Item 33	0.56	(8.45)	0.68	(9.58)
Item 32	0.37	(5.28)	0.86	(10.24)
Item 40	0.49	(7.16)	0.76	(9.90)
Item 1	0.47	(6.76)	0.78	(9.99)
Item 41	0.34	(4.84)	0.88	(10.30)
Item 30	0.52	(7.64)	0.73	(9.79)
Item 9	0.51	(7.54)	0.74	(9.82)
Item 29	0.48	(7.00)	0.77	(9.94)
Item 4	0.47	(6.82)	0.78	(9.98)
Item 31	0.07	(1.00)	0.99	(10.57)
Item 34	0.42	(5.96)	0.83	(10.13)

Continued Table 7.20

Factor Item	Factor loadings	(t-value)	Measurement error	(t-value)
Factor 2: Planning to health actions				
Item 44	0.78	(13.90)	0.39	(9.87)
Item 45	0.79	(14.01)	0.38	(9.84)
Item 42	0.92	(17.96)	0.15	(7.58)
Item 43	0.97	(19.59)	0.07	(4.13)
Item 46	0.67	(11.18)	0.55	(10.23)
Item 51	0.37	(5.69)	0.86	(10.51)
Item 52	0.38	(5.85)	0.85	(10.51)
Factor 3: Perceived ability to monitor health-related behaviour				
Item 54	0.85	(15.33)	0.28	(7.86)
Item 55	0.89	(16.50)	0.21	(6.65)
Item 56	0.80	(14.09)	0.36	(8.70)
Item 57	0.75	(12.85)	0.43	(9.23)
Item 58	0.60	(9.46)	0.64	(10.02)
Item 3	0.33	(4.81)	0.89	(10.46)
Factor 4: Perception of risk				
Item 24	0.85	(14.32)	0.28	(5.39)
Item 23	0.90	(15.46)	0.19	(3.59)
Item 22	0.40	(5.84)	0.84	(10.32)
Item 27	0.46	(6.82)	0.79	(10.21)
Item 26	0.48	(7.13)	0.77	(10.17)
Factor 5: Perceived opportunities to understand CHD				
Item 37	0.94	(17.68)	0.12	(3.45)
Item 38	0.96	(18.43)	0.07	(2.09)
Item 7	0.58	(9.37)	0.66	(10.30)
Factor 6: Perceived seriousness of CHD				
Item 10	0.54	(7.40)	0.70	(8.85)
Item 11	0.76	(10.20)	0.43	(5.18)
Item 12	0.63	(8.63)	0.60	(7.68)
Item 13	0.45	(6.01)	0.80	(9.58)

Continued Table 7.20

Factor Item	Factor loadings	(t-value)	Measurement error	(t-value)
Factor 7: Chest pain appraisal / perception				
Item 15	0.76	(9.77)	0.43	(4.75)
Item 14	0.80	(10.15)	0.37	(3.83)
Item 17	0.46	(6.43)	0.78	(9.69)

For the 21 factor correlations (as shown in Table 7.21), there were 14 non-significant factor correlations and these included: factor 4 and 1, factor 4 and 2, factor 4 and 3, factor 5 and 3, factor 5 and 4, factor 6 and 1, factor 6 and 2, factor 6 and 3, and between factor 7 and other factors, respectively. Of the correlations among factor, the results showed a set of low to moderate correlations ranging from 0.04 - 0.56, with significantly and moderately correlations between factor 1 and 2 (correlation coefficient=0.56, t-value=10.05) and factor 2 and 3 (correlation coefficient=0.54, t-value=10.35). The estimates for factor correlations are shown in Table 7.21.

Table 7.21 Factor correlations

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Factor 1	1.00 [a]						
Factor 2	0.56 [b]	1.00 [a]					
	(0.06) [c]						
	10.05 [d]						
Factor 3	0.31 [b]	0.54 [b]	1.00 [a]				
	(0.07) [c]	(0.05) [c]					
	4.32 [d]	10.35 [d]					
Factor 4	0.14 [b]	0.11 [b]	0.13 [b]	1.00 [a]			
	(0.08) [c]	(0.07) [c]	(0.07) [c]				
	1.80 [d]	1.54 [d]	1.75 [d]				
Factor 5	0.39 [b]	0.27 [b]	0.11 [b]	0.12 [b]	1.00 [a]		
	(0.07) [c]	(0.07) [c]	(0.07) [c]	(0.07) [c]			
	5.83 [d]	4.12 [d]	1.62 [d]	1.65 [d]			
Factor 6	0.08 [b]	0.10 [b]	0.11 [b]	0.24 [b]	0.17 [b]	1.00 [a]	
	(0.09) [c]	(0.08) [c]	(0.08) [c]	(0.08) [c]	(0.08) [c]		
	0.90 [d]	1.30 [d]	1.33 [d]	3.01 [d]	2.20 [d]		
Factor 7	0.05 [b]	-0.04 [b]	0.09 [b]	-0.06 [b]	-0.12 [b]	0.11 [b]	1.00 [a]
	(0.08) [c]	(0.08) [c]	(0.08) [c]	(0.08) [c]	(0.08) [c]	(0.09) [c]	
	0.58 [d]	-0.45 [d]	1.1 [d]	-0.72 [d]	-1.58 [d]	1.27 [d]	

a = factor variances were set equal to 1.0 in order to give a metric to the factors
b = factor correlation
c = standard error
d = t-value

Regarding goodness-of-fit measures, the chi-square value of 1365.25 with 839 degree of freedom was statistically significant at the <0.01 level of significance. As the significant value of chi-square statistic is affected by sample size, the χ^2/df ratio was used as adjunct to the chi-square statistics (Byrne, 1998). The value of χ^2/df was 1.6. The root mean square error of approximation (RMSEA) was 0.053. As for incremental fit statistics, the non-normed fit index (NNFI), incremental fit index (IFI), and the comparative-fit index (CFI) were 0.92, 0.93, and 0.93 respectively. The fit statistics are shown in Table 7.22

Table 7.22 CFA goodness-of-fit statistics

Fit statistics	
Chi-square	1365.25
Degree of freedom	839
p-value	<0.01
χ^2/df	1.6
RMSEA	0.053
NNFI	0.92
IFI	0.93
CFI	0.93

Model Modification

The fit statistics (as shown in Table 7.22) were within acceptable limits and the majority of the estimated parameters had significant t-values, except items 31 (as shown in Table 7.20), and the 14 non-significant factor correlations (as shown in Table 7.21), therefore, the model fitness was considered satisfactory. The explanations for the model modification will be explained based on the several premises that explain why the data is a good fit to the factor model are included in Chapter 8.

Result of Construct Validity: Using Hypothesis Testing

Three hypotheses were evaluated in order to establish construct validity. A total of 106 cases were available in the correlational analysis. The hypotheses were:

- Hypothesis 1: There is a significant positive correlation between ACRFR total score and the Chinese version of General Self-efficacy Scale (GSES) total score;
- Hypothesis 2: There is a significant positive correlation between ACRFR total score and the Chinese version of Multidimensional scale of perceived social support (MSPSS) total score;
- Hypothesis 3: There is a significant negative correlation between ACRFR total score and the Hospital Anxiety and Depression Scale (HADS) total score

Prior to the analysis, normality checks on scores were performed using descriptive statistics. The ACRFR and GSES scores met the normality assumption as indicated by non-significant values (both with p=0.20) in the Kolmogoroy-Simimov test. Parametric method using Pearson correlation coefficient was employed to test hypothesis 1. The Kolmogorov-Simirnov test showed significant results ($p < 0.005$) for the MSPSS and HADS scores indicating normality assumption was not met. Therefore, non-parametric method using the Spearman rank correlation coefficient was employed to test hypothesis 2 and hypothesis 3. ACRFR score was significantly correlated with GSES, MSPSS and HADS scores (as shown in Table 7.23). Yet, there were only weak correlations between the target measure (ACRFR) and comparing measures (GSES, MSPSS and HADS). Detailed discussions of these findings are included in Chapter 8.

Table 7.23 Results of hypotheses testing (n=106)

Hypotheses (H)	Pearson correlation coefficients	Spearman rank correlation coefficients
H1 (ACRFR-GESE)	0.23*	---
H2 (ACRFR- MSPSS)	---	0.19*
H3 (ACRFR-HADS)	---	-0.23*

* Correlation is significant at the 0.05 level (2-tailed)

Result of Construct Validity: Using Known-groups Method

Known-groups method proposes that test scores are evaluated in terms of whether they can be used to discriminate groups of subjects who are known to be different on the measuring construct. Construct validity is achieved if there are significant differences in scores across groups of subjects. In the present study, the overall scale and subscales mean scores were compared among three groups of participants: (1) MI participants (n=113) whom with cardiac rehabilitation training, (2) participants with CHD (n=92), and (3) subjects without CHD (n=262), who did not receive training.

Prior to the analysis, normality checks on scores were performed using descriptive statistics. The Kolmogorov-Simirnov test showed significant results ($p < 0.005$) for the subscale mean scores indicating normality assumption was not met. Therefore, a non-parametric statistic using Kruskal-Wallis test and Mann-Whitney U method were employed in the analysis of subscale mean scores comparisons among groups. As overall scale scores were normally distributed as indicated by a non-significant result ($p = 0.2$) in the Kolmogorov-Simirnov test, oneway analysis of variance and post hoc tests were used in the analysis of scores among the three groups.

As shown in Table 7.24, the results showed that MI subjects with cardiac rehabilitation training had the highest mean scores in overall scale and subscales, except subscale *'chest pain appraisal and perception'*, whereas the subjects without CHD had the lowest in all mean scores. For the subscale *'chest pain appraisal and perception'*, the CHD subjects had the highest subscale mean score among the three groups

Oneway analysis of variance and Kruskal-Wallis test were used to compare the overall scale mean scores and the subscale mean scores across the three groups. With the exception of subscale *'perceived seriousness of CHD'*, there were significant differences in overall scale and subscales mean scores ($p<0.05$) among groups, indicating significant differences in levels of awareness across the three groups.

In the analysis using post hoc test, the overall scale mean scores showed significant differences when comparing the MI and non-CHD groups ($p<0.001$), the MI and CHD groups ($p<0.001$), as well as non-CHD and CHD groups ($p<0.001$), indicating that MI subjects who had received cardiac rehabilitation training had a significant higher level of awareness for CHD risk reduction when compared with the other two groups of subjects who did not receive cardiac rahabilitation training.

In the analysis using Mann-Whitney test with Bonferroni adjustment of significant level at 0.017, the MI subjects had a significantly higher mean score in all subscales when compared with the non-CHD subjects, except for the factor *'perceived seriousness of CHD'* ($p=0.028$). In the comparing MI group with CHD group, there were significant differences in factors *'CHD knowledge'* ($p<0.001$), *'planning of health actions'* ($p<0.001$), and *'perceived opportunities to understand CHD'* ($p<0.001$), indicating MI subjects had a significant higher mean scores in these domains. However, there were no significant difference found in factors *'perceived ability to monitor health-related behaviour'* ($p=0.046$), *'perception of risk'* ($p=0.131$), *'perceived seriousness of CHD'* ($p=0.173$), and *'chest pain appraisal / perception'* ($p=0.056$) between the MI and CHD groups. The discussion of results using known-groups method is included in Chapter 8.

Table 7.24 Result of known-groups method

Overall scale / subscales	Mean score ± SD			P-value*
	MI subjects with CRP (n = 113)	Non-CHD subjects (n = 262)	CHD subjects (n = 92)	
Overall scale	136.84±13.44	111.33±19.19	123.74±17.85	<0.001*[a]
Factor 1	53.85±5.05	47.08±7.56	50.88±5.95	<0.001*[b]
Factor 2	26.09±2.68	19.16±6.65	22.05±5.84	<0.001*[b]
Factor 3	15.04±6.04	10.63±6.64	13.17±6.50	<0.001*[b]
Factor 4	14.97±5.47	13.40±5.49	14.17±4.98	0.011*[b]
Factor 5	9.00±4.33	5.50±3.93	5.26±4.80	<0.001*[b]
Factor 6	9.94±4.97	8.90±4.56	9.02±4.76	0.089[b]
Factor 7	7.96±4.26	6.67± 3.42	9.17±3.29	<0.001*[b]

Overall scale / subscales	Disease groups		Post Hoc Tests *	Mann-Whitney U **
Overall scale	MI with CPR	Non-CHD	<0.001*	---
	MI with CPR	CHD	<0.001*	---
	Non-CHD	CHD	<0.001*	---
Factor 1	MI with CPR	Non-CHD	---	<0.001**
	MI with CPR	CHD	---	<0.001**
	Non-CHD	CHD		<0.001**
Factor 2	MI with CPR	Non-CHD	---	<0.001**
	MI with CPR	CHD		<0.001**
	Non-CHD	CHD		<0.001**
Factor 3	MI with CPR	Non-CHD	---	<0.001**
	MI with CPR	CHD	---	0.046
	Non-CHD	CHD	---	0.001**
Factor 4	MI with CPR	Non-CHD	---	0.003**
	MI with CPR	CHD	---	0.131
	Non-CHD	CHD	---	0.269
Factor 5	MI with CPR	Non-CHD	---	<0.001**
	MI with CPR	CHD	---	<0.001**
	Non-CHD	CHD	---	0.543
Factor 6	MI with CPR	Non-CHD	---	0.028
	MI with CPR	CHD	---	0.173
	Non-CHD	CHD	---	0.671

Continued Table 7.24

Overall scale / subscales	Disease groups		Post Hoc Tests *	Mann-Whitney U **
Factor 7	MI with CPR	Non-CHD	---	0.001**
	MI with CPR	CHD	---	0.056
	Non-CHD	CHD	---	<0.001**

* Significant at 0.05; ** With bonferroni adjustment significant at 0.017
a = Oneway ANOVA; b = Kruskal-Wallis Test
MI = myocardial infarction; CRP = cardiac rehabilitation program
CHD = coronary heart disease
Factor 1: CHD knowledge
Factor 2: Planning to health actions
Factor 3: Perceived ability to health-related behaviour
Factor 4: Perception of risk
Factor 5: Perceived opportunities to understand CHD
Factor 6: Perceived seriousness of CHD
Factor 7: Chest pain appraisal / perception

Summary of the Results for Phase II Study

Content validity was established with a satisfactory CVI of 0.84 (59 out of 70 items). Each of the items that was rated as content valid (a rating of 3 or 4) achieved at least 86% of expert agreement.

EFA using principal axis factoring as an extraction method and varimax rotation yielded a 43-item, 7-factor structure model accounting 49.5% of the total explained variance. The factors included: factor 1 *CHD knowledge* (15 items), factor 2 *planning to health actions* (7 items), factor 3 *perceived ability to monitor health-related behaviour* (6 items), factor 4 *perception of risk* (5 items), factor 5 *perceived opportunities to understand CHD* (3 items), factor 6 *perceived seriousness of CHD* (4 items) and factor 7 *chest pain appraisal / perception* (3 items). Each factor accounted for 15.5%, 9.4%, 7.1%, 5.5%, 4.4%, 4.1% and 3.5% of the explained variance respectively. The model achieving 49.5% of the total explained variance was considered acceptable.

The internal consistency of the overall and subscales demonstrated acceptable Cronbach's alphas values, ranging from 0.60 to 0.82. For corrected item-to-subscale correlations, all items correlated greater than 0.2. The degree of association between subscales (factors) and the overall scale showed a Spearman rank correlation coefficients for each factor as 0.60 (for factor 1), 0.70 (factor 2), 0.48 (factor 3), 0.49 (factor 4), 0.59 (factor 5), 0.29 (factor 6) and 0.30 (factor 7). For subscales correlations, factor 1 and 2, as well as factor 2 and 3 were significantly and moderately correlated in magnitudes. The test-retest reliability for the overall scale and subscales was satisfactory, with Intraclass Correlation Coefficients (ICC) ranging from 0.68 to 0.89

In CFA, chi-squared test produced a value of 1365.25 with 839 degree of freedom, which was statistically significant at $p < 0.01$. The value of χ^2/df was 1.6 and RMSEA was 0.053. Values of the NNFI, IFI and CFI were 0.92, 0.93 and 0.93 respectively. Inspection of the parameter estimates indicated that complete standardised parameter estimates values did not exceed 1.0. All estimates of factor loadings were in positive signs and were significant by t-values, with the exception that item 31 (t=1.00) had a non-significant t-value. Factor 1 and 2, as well as factor 2 and 3 were significantly and moderately correlated in magnitudes. The results of CFA demonstrated that the data was a good fit to the factor model.

Regarding hypothesis testing, the results demonstrated significant correlations between ACRFR and GSES, MSPSS, HADS at 0.05 level of significance. However, the magnitudes of correlations were weak.

In known-groups comparison, analyses were performed across three groups for overall scale mean scores and subscale mean scores. MI subjects showed a significantly higher mean overall score and most of the subscales mean scores than subjects with CHD and those without CHD.

The results of phase II study are further discussed in Chapter 8.

CHAPTER 8

DISCUSSION: PHASE TWO RESULTS

Introduction

This chapter discusses the results of phase II study regarding the psychometric analysis of ACRFR. Reliability and validity, the two major components in any instrumentation, are the center of the discussion. The results of content validity, identification of the internal factor structure of ACRFR using exploratory factor analysis (EFA), and reliability will be discussed first. In the latter part, the discussions of the results of scale validations using confirmatory factor analysis (CFA), hypothesis testing and known-groups method will follow. The factors (domains) of ACRFR finalised from the psychometric evaluations will be highlighted in light of the theoretical framework used in this study.

Content Validity

A panel of seven experts was employed to determine if individual items and the entire instrument were relevant and adequate to measure the concept of 'awareness of CHD risk factors reduction'. Through a two-stage expert review, instrument items and content were evaluated, resulting in a 59-item scale from the original pool of 70 items. Regarding each item-content relevancy and the entire-content adequacy, the results achieved an acceptable level of CVI of 0.84 in respect to the set criterion as suggested by Polit, & Hungler (1999), and each of the 59 items achieved content validity of at least 86% of expert agreement as proposed by Lynn (1986).

Lynn (1986) delineates that content validity is established through a two-stage process: a developmental stage and a judgment-quantification stage. In the development stage, the dimensions and items of ACRFR were explored by a review of literature, and then identified, clarified and generated from the target sample population through an exploratory qualitative study. Then the subsequent stage of judgment-quantification using a panel of expert review, the constructed instrument was further content validated. The vigorous manner of the judgment-quantification process coupled with the development stage of content validating in this study adequately provided a solid basis to establish and preserve a comprehensive scale content that represented ACRFR being measured. Therefore, the results confirmed the instrument with satisfactory content validity.

To develop an instrument measuring the ACRFR, it is significant to obtain opinions from experts. For instance, items of *'knowledge of CHD prevention'* (i.e. items 24-29, and 31-32) were commented by the expert that they could reduce the likelihood of developing CHD events but not actually prevent CHD events. As such, inappropriate sentence wordings and/or the conceptual meanings of the items were carefully scrutinised and the issue of redundancy was found as items overlapped in meanings with other scale items on knowledge about CHD risk factors after changes were made. As a result, deletions of redundant items were made. This resulted in a scale that could avoid causing fatigue on the subjects when completing the questionnaire and thus, increase the scale efficiency from a practical point of view.

Another reason to support the worth of obtaining expert opinions was that the final consensus by expert reviews in subsequent stages helped to minimise possible bias made subjectively, in particular in item deletions and selections. This study, therefore, added evidence to echo the usefulness of expert review in instrumentation, particularly important for developing a new instrument with little or loose conceptual information that existed in the literature.

Identification of ACRFR Internal Structure

Exploratory factor analysis (EFA) was used to identify the internal structure of ACRFR. As clearly indicated and addressed in Chapter 7, the results of exploratory factor analysis led to the elimination of sixteen items from the 59-item instrument during series of analyses as these items had less congruence with content when compared with other items in their loaded factors (including items 2, 35, 18, 47, and 53) and also demonstrated weak correlation values (factor loading < 0.3 including items 28, 59, 39, 48, 6, 49, 25, 5, 50, 36 and 16). As a result, the final factor analysis yielded a 43-item instrument in a model of seven factors.

For items 2, 35, 18, 47, 53 with less congruence with the factor content, there was a possibility that these items might not reflect the factor of interest. If items would not measure the factor of interest, they might be removed in order to improve the factor content validity as suggested in the literature (Lynn, 1993; Polit-O'Hara, 1996; Tabacknick, & Fidell, 2001). Therefore, these items: 2, 35, 18, 47, and 53 were deleted. Items with weak correlation values (i.e. items 28, 59, 39, 48, 6, 49, 25, 5, 50, 36, and 16) were deleted in the current study based on the following explanations.

First, the measurement of a factor is determined by correlations between items. An item with inter-item correlation <0.3 is less likely to contribute to measurement of a factor (Ferketich, 1991). While reviewing the content of these 11 items, they were found to correlate with only few items (ranging only from 0 item up to 3 items at the most) with an inter-item correlation value of >0.3 in the 59-item pool. That is, they might be less related to most of the items in the item pool. Analysing further into the results of item-to-total correlations of these items, they were all with a low item-to-total correlation value of <0.3, ranging from -0.06 to 0.2, indicating again that they might be less consistent and less reliable to reflect the construct when compared with other items in the 59-item pool. A low item-to-total correlation (<0.3) is less likely to correlate with other items to form factors in factor analysis (Ferketich, 1991). Regarding items of weak factor loadings (loading values < 0.3), Floyd and Widaman (1995), Kline (1997), and Polit-O'Hara (1996) suggest that on practical grounds, weakly correlated items are generally considered to be less meaningful to represent the factors and they may be deleted from the analysis. Therefore, item deletions were decided.

Second, another perspective to explain for the weak correlations of the items might be related to the participants' responses to the items. Factor analysis is a sample-dependent (that is, not sample free) analytic procedure (Kline, 1998), despite these 11 items were rated content valid in the early analystic stage of this study. In test construction based on the classical test theory, item analysis uses the criteria of item difficulty value (that is, p value – the proportion of participants who rated the items correctly and / or positively), and the item-to-total correlations (Aiken, 2003; Hambleton, Swaminathan, Rogers, 1991; Kline, 2000a; Murphy & Davidshofer, 2005). When examining items: 28 "Increased alcohol consumption decreases the chance of CHD", 50 "I try to avoid drinking too much alcohol", 49 "I try to avoid smoking", they were the items with more that 0.8 in proportion of participants (i.e.>80% participants) who rated the items correctly and / or positively. However, for item 39 "CHD causes discomfort in the jaw", there was only 0.18 in proportion of participants (i.e.18% participants) who rated the item correctly. Items 28, 50, and 49 might be regarded as 'too easy items', whereas, item 39 as a' too difficult item' for this sample of participants (Kline, 1986). As a result, they were less likely to differentiate differences for the construct being measured in one hand, and in the other the relatively extreme characteristics of these four items (items of too easy and too difficult) might account for a low correlation with other items with less extreme characteristics in the item pool. Items 28 and 39 were found correlated with no other item in the 59-item pool with an inter-item correlation value of >0.3, whereas for items 50 and 49, they correlated with only two items and one item respectively in the 59-item pool with an inter-item correlation value of >0.3, that is, they were less related to most of the items in the item pool. They only corresponded to the low item-to-total correlations ranging only from 0.1 - 0.2. As such, an item with a low item-to-total correlation of <0.3 is less likely to correlate with other items to form factors in factor analysis as suggested by Ferketich (1991).

Third, the findings in Phase I qualitative study to some extent might offer insights on the high percentages of participants responding correctly or positively on the alcohol- and smoking-items (item 28 “Increased alcohol consumption decreases the chance of CHD”, item 50 “I try to avoid drinking too much alcohol”, and item 49 “I try to avoid smoking”), in that an increased cigarette hazards awareness in the society might account for the high percentage of not smoking or stop smoking among the present sample of participants. It might also be related to the Chinese cultural view of alcohol as not a beneficial factor to health and hence, led participants to respond correctly to item 50 “Increased alcohol consumption decreases the chance of CHD”. For item 39 “CHD causes discomfort in the jaw” as a difficult item, might imply that this symptom might be recognised by only few participants who had experienced this symptom and might rarely to be known and less likely to be experienced by most participants of this sample.

To develop an instrument, Kline (2000a) suggests that factor analysis and item analysis can be informative to each other. It has been indicated that the results of factor and item analyses are correlated (Barrett & Kline, 1982 cited in Kline, 2000b; Kline & Lapham, 1990 cited in Kline, 2000a), and these two analytic procedures share the basic rationale with the classical test theory for test construction (Kline, 2000a), in that test variance is conceptualised as true score and error variance (in respect to factor analytic terms common and unique variance), and that the higher the reliability of the test, the lower the error or unique variance.

Similar to other items, that is items: 16 “chest discomfort will make me immediately think of a stomach problem”, 48 “I try to relax”, 6 “CHD has no symptoms”, 25 “I am too young to have CHD”, 5 “women are more likely than men to be affected by CHD”, 36 “CHD causes chest discomfort”, and 59 “sometimes I find it difficult to maintain a relaxed life”, were all with a low item-to-total correlation of <0.3 (ranging from -0.06 to 0.2). An item with a low item-to-total correlation of <0.3 is less likely to correlate with other items to form factors in factor analysis (Ferketich, 1991) and they did have a low factor loading of <0.3 in the factor analysis. However, the exact explanations or mechanisms why participants respond in such ways rendering a low item-to-total correlation perhaps might not be clearly identified at this stage or from the explorative qualitive phase of this research. Nonetheless this might render a need to be explored in future research among the Hong Kong Chinese people.

In comparisons with the five-factor and six-factor models, the seven-factor model was chosen to represent the best internal structure of ACRFR in terms of a wider coverage of factors, more well-defined patterns of loading items on factors, more items achieving relevant content in respect to factors, and greater total accounting variance. This seven-factor model accounted for 49.5 % of the explained variance, which in fact could be seen as an acceptable variance for a newly developed instrument as about or greater than 50% is generally considered satisfactory (Streiner, 1994 cited in Floyd, & Widaman, 1995).

In terms of the accounting variance of each factor as shown in Table 7.9, factor 5 *'perceived opportunities to understand CHD'* containing 3 items, factor 6 *'perceived seriousness of CHD'* containing 4 items and factor 7 *'chest pain appraisal / perceptions'* containing 3 items accounted for 4.4%, 4.1% and 3.5% variances, respectively. While comparing with factor 1 to factor 4, that is, *'CHD knowledge'* containing 15 items, *'planning of health actions'* containing 7 items, *'perceived ability to monitor health-related behaviour'* containing 6 items, and *'perception of risk'* containing 5 items, these factors were measured by a wider range of content-relevant items. The broad range of items rendered an increased complexity and numbers of items that emerged in these factors being measured, while compared with factors 5, 6 and 7. The explained variance of a factor is a function of the number of the items within a factor. The larger variances accounting for factors 1 to 4 and the smaller variances accounting for factors 5 to 7 might be therefore, conferred on the complexity and the number of items of a factor under measured. While in terms of conceptual significances, the phenomena arising from these factors: having chance to understand the disease CHD, estimating the severity of CHD, and recognising chest pain symptom, were in fact influencing a person's personalisation to CHD risk, which in turn underpinned the concept of the 'awareness of CHD risk factors reduction'. As such, perhaps at this stage of early ACRFR scale development, factor 5 *'perceived opportunities to understand CHD'*, factor 6 *'perceived seriousness of CHD'* and factor 7 *'chest pain appraisal / perceptions'* should not be concluded of less importance solely based on the accounting variances and should not be made to compromise, but rather should be retained to preserve the scale content validity. More importantly, factors 5, 6 and 7 will be further evaluated and discussed in terms of reliability and validity in the following sections.

Despite the fact that factor analysis has a unique role in scale development, the subjective and judgmental nature of decisions made during the factor-analytic process is often the basis for serious criticism, and prior knowledge about the research area is crucial in the analytic process (Portney, & Watkins, 2000). As a result, the approaches of the present research employed literature review about the classical and contemporary issues on this research area and the findings of the qualitative study as the basis to guide item selections and interpretations of factors. Trying to avoid inappropriate dropping of items and / or factors in the early stage of scale development using EFA was preferable, especially if literature review and qualitative findings support the decisions during the factor-analytic procedures. Coupled with vigorous follow-up psychometric analysis, the model structure of ACRFR will be further examined and validated in terms of reliability, confirmatory factor analysis, hypothesis testing, and known-groups comparisons in a manner to develop a valid scale that best represents ACRFR.

Reliability

The reliability includes Cronbach's alphae statistics of the overall scale and subscales, the item-to-subscales correlations, the subscale-to-total correlations, the subscales correlations, as well as the test-retest reliability.

Internal Consistency of the Overall Scale and Subscales

For the entire EFA and CFA sample analyses (as shown in Table 7.11 and Table 7.12), the values of the internal consistency of the overall scale and subscales were acceptable as the values were >0.6 as proposed. Boyle (1991), Clark and Watson (1995) suggest that an overly high consistency (alpha values of 0.90 or above) represents essentially similar items in a psychometric scale and implies item redundancy. While examining and comparing the results in the EFA and CFA samples, factor (subscale) 5 *'perceived opportunities to understand CHD'* was only found in the EFA sample as having a high subscale alpha value of 0.90 but not in CFA sample. Thus, it might not be a due effect of item redundancy, as this has not consistently occurred across samples. The heterogeneous responses of the EFA sample might be one plausible reason to account for the high alpha value. The subscale alpha is a property of sample heterogeneity and/or score variance, and a high subscale alpha would result when respondents rated a subscale with a higher variance of score (Aiken, 2003; Crocker & Algina, 1986; Kline, 1998; Nunnally & Berstein, 1994). As shown in Appendix 8.1, it is possibly related to the subjects in the EFA sample who exhibited a more diversified pattern resulting a higher variance of score (mean score [M]=6.11, standard deviation [SD]=4.68) in this subscale containing items: *"I find it difficult to understand CHD"*, *"I find it difficult to search for CHD information"* and *"I find it difficult to find someone to ask about CHD"*. This resulted in a higher subscale alpha value when compared with that of the subjects in the CFA sample (M=6.50, SD=4.23), whose responses were relatively less diversified.

Similarly, for the subgroups analyses (as shown in Table 7.11 and Table 7.12), the low score variances of the subscales rendered the low subscale alpha values and these low subscale alphas (<0.6) included: (1) factor 6 *'perceived seriousness of CHD'* and factor 7 *'chest pain appraisal / perception'* of the LRP subgroup, factor 7 *'chest pain appraisal / perception'* of the MRF subgroup, factor 1 *'CHD knowledge'* and factor 2 *'planning to health actions'* of the MI subgroups in the EFA sample; (2) factor 1 *'knowledge of CHD'* of the MRF and MI subgroups in the CFA sample. Sample differences in terms of homogeneous responses to subscale as an account might render the results of different low subscale alpha values across the two samples. However, particular attention could be drawn to the MI subgroup(s), which had a consistent low alpha values in *'CHD knowledge'* across both samples when compared with other subgroups, and a relatively quite low alpha value of 0.24 in *'planning to health actions'* in the EFA sample when compared with the alpha value of 0.64 in CFA sample.

As shown in Appendix 8.2 , regarding *'CHD knowledge'*, the lowest score variances were found in the MI subjects (M=53.63, SD=5.09 in EFA sample; M=54.31, SD=4.76 in CFA sample), indicating that they appeared to be the most knowledgeable subjects for CHD and responded relatively invariable to the subscale items when compared with other subjects in LRP subgroups (M=48.95, SD=7.63 in the EFA sample; M=46.25, SD=6.53 in the CFA sample), and MRF subgroups (M=49.55, SD=8.13 in the EFA sample; M=49.43, SD=5.52 in the CFA sample). The reason might be due to the fact that the MI subjects received the cardiac rehabilitation training, and therefore, they might have responded positively and invariably to subscale items regarding *'CHD knowledge'*. It has been evidenced that the role of cardiac rehabilitation training increases knowledge of CHD (Aoun & Rosenberg, 2004; Merz, et al., 1996; Papageorgiou, et al., 2004; Warrington, et al., 2003). In other words, some of the items in the subscale might be easy items for the MI subjects thus, rendering a low score variance.

Similarly, for the subscale 2 *'planning to health actions'*, the MI subjects who were in particular, more likely to plan and attempt health action, had a much lower score variance

(M=26.28, SD=2.15 in EFA sample, M=25.98, SD=3.09 in CFA sample) when compared with those in the LRP subgroups (M=21.39, SD=5.48 in EFA sample, M=17.87, SD=6.69 in CFA sample) and MRF subgroups (M=19.93, SD=7.55 in EFA sample, M=20.94, SD=5.93 in CFA sample), and again could be a due effect of the cardiac rehabilitation training. This could be possible that the MI subjects might plan to initiate health-relation actions for promoting health and preventing CHD if they gained in knowledge about CHD and the preventive measures for lifestyle factors as a result of the cardiac training, especially knowing the health benefits and harm of an action (Aoun & Rosenberg, 2004; Glanz, Lewis, Rimer, 1990; Merz, et al., 1996; Nourjah, Wagener, Eberhardt, Horowitz, 1994; Papageorgiou, et al., 2004; Warrington, et al., 2003). In addition, the lower subscale alpha value of MI subgroup in EFA sample (alpha=0.24) as compared with those in the CFA sample (alpha=0.64) could relate to the EFA subjects responding more deliberately to give a positive homogeneous response to *'planning to health actions'* than that of CFA subjects resulting in differences in score variances between samples, as shown in Appendix 8.3 (SD=2.15 in EFA sample versus SD=3.09 in CFA sample). In reality, an initiation to perform health actions is a complex issue and it could be influenced by factors such as whether the health act is difficult or easy to perform (Blanchard, et al., 2003; Johnston, Johnston, Pollard, 2004). Therefore, it might not be an unusual phenomenon of having variations regarding *'planning of health actions'* among the MI population across the two samples of EFA and CFA, even though both samples of MI participants had received cardiac training and increased their readiness to perform health actions. Parenthetically, the results of the subscale *'planning to health actions'* to a certain extent might reveal the fact that the items of the subscale were less unlikely to differentiate the health performance among the MI subjects.

The Internal Consistency Regarding Corrected Item-to-subscales

Internal consistency as a sample-dependent statistical procedure is affected by the issue of sample homogeneity (Aiken, 2003; Clark & Watson, 1995; Crocker & Algina, 1986; Kline, 1998, Nunnally & Bernstein, 1994; Hambleton et al., 1991). Since the ACRFR was developed using a more heterogeneous sample, a reduction in item score variance (and so as test reliability) will result when the scale was used on a more homogeneous sample (Crocker & Algina, 1986). Likewise, it should be noted that some of the items might be regarded as too easy or too hard for the homogeneous sample and thus, restriction of score item range and consequently the association(s) between item(s) and subscale(s) might likely to differ (Crocker & Algina, 1986). As shown in Table 7.13, the items with corrected item-to-subscale coefficient values less than the 0.2 (the set criterion) might be a due effect of the issue of group homogeneity on the item response distribution. The sub-samples of LRP, MRF and MI were likely more homogeneous when compared with the entire EFA or CFA samples.

As the MI participants received cardiac knowledge and advices on lifestyle modifications from the cardiac rehabilitation program, they might respond differently in some of the items (in terms of familiarity or levels of difficulty) in the subscales *'CHD knowledge'* and *'planning to health actions'*. This might lead to the fact that some of the items might be dissonant with other items in the subscales due to a narrow response range, giving a low item-to-subscale value of <0.2 of these items. Moreover, of the MI population, heterogeneous characteristics between the two MI sub-samples might be one possible explanation for the differences in low item-to-subscale items (<0.2) among the subscales: *'CHD knowledge'* and *'planning to health actions'*. Similarly, as the MRF participants might have received input of CHD-related knowledge while contacting healthcare personnel during hospitalisation, they might respond to some 'knowledge' items differently. This might result in a dissonance of some items in the subscale *'CHD knowledge'* accounting for these items to have low item-to-subscale values. However, the exact mechanisms why some items had a narrow response range rendering a dissonance in association between item(s) and subscale(s) are not fully understood at this stage as varieties of confounding factors such as one's attentional span, morbidity state, and/or the modes of knowledge delivery by the healthcare personnel could have been involved. Further research is suggested to identify the underlying issues that may have affected this result.

For item 31 "old age increases the chance of CHD" with a low item-to-subscale value in the entire MRF and MI subgroups of the CFA sample, respondents might have varied perceptions for this item. They might rate the item positively when perceiving that aging increases health problems including CHD. But on the other hand, might also think that CHD as a disease is increasing in the young population and thus, the item was rated negatively. As a result, item 31 was responded in such a way rendering the possibilities of affecting its congruency within a given factor as well as its stability across samples and sub-samples. Nonetheless, further studies to validate this item are suggested.

In conclusion, the ACRFR scale was developed using a heterogeneous sample. The results of the more homogeneous subgroups analyses are to some extent expected to vary which might be due to the issue of sample variant. However, it was considered to be acceptable to have at least 79% to 100% of the items with a corrected item-to-subscale value of >0.2 (Streiner & Norman, 1995) in the early stage of instrument development. Despite some items not meeting the criterion of >0.2, these items did not particularly affect the internal consistency of the overall scale. Boyle (1991) and Cattell (1978 & 1982) have suggested that a moderate to low item homogeneity is actually preferred because it ensures a broad coverage of a particular construct(s) being measured. However, future validation studies are required to evaluate items with low item-to-subscale values as the result was based only on the sample of this early stage of the ACRFR scale development.

The Relationships Between ACRFR Subscales and the Overall Scale

The seven subscales (factors) in the EFA sample (n=232) and CFA sample (n=225) were significantly correlated with the overall scale in a range of low to moderate correlation values (as shown in Table 7.14). These significant values might suggest that the concept of ACRFR is a function of these seven factors. Anastasi and Urbina (1997), and LoBiondo-Wood and Haber (1994) suggest that subscale-to-total correlations are expected in range of not too high and not too low correlation coefficients to represent different functional dimensions. A range of various correlation coefficients increases the dimensionality and maximises the breadth of measurement of a given construct being measured (Anastasi & Urbina, 1997; LoBiondo-Wood & Haber, 1994). However, the authors did not indicate what the values are in regards to too high and too low correlation coefficients (Anastasi & Urbina, 1997; LoBiondo-Wood & Haber, 1994). Portney and Watkins (2000) indicate that interpretations of correlation coefficients must be based on the current knowledge of the literature regarding the research topic and the nature of the data. These suggestions were taken into considerations in the interpretation of the present findings.

In the EFA sample, lower but significant correlations were found in factor 6 *'perceived seriousness of CHD'* and factor 7 *'chest pain appraisal / perception'*. In the CFA sample, lower but significant correlations were found in factor 4 *'perception of risk'*, factor 6 *'perceived seriousness of CHD'* and factor 7 *'chest pain appraisal / perception'*. Factor 6 *'perceived* *seriousness of CHD'*, which reflected the extent of one's attention to CHD as a serious disease. Factor 7 *'chest pain appraisal / perception'* reflected one' ability to detect error in the course of risk reduction. Factor 4 *'perception of risk'* reflected one's perceived risk for CHD. The extent of attention to CHD, ability to detect error in CHD risk reduction and self perception of CHD risk were the concerns in respect to the awareness of CHD risk factors reduction as described in the Chapter three. Furthermore, these factors were suggested as content valid to ACRFR as supported by the results of qualitative study and expert review of the present research, in which when taking together represent the developmental stage and judgment-quantification stage of achieving content validity of the instrument. Thus, based on the current knowledge of literature and empirical results, the correlation coefficients of these factors might be possibly interpreted as significantly related to the overall scale, despite the low correlation coefficients. In addition, the concept of ACRFR as a phenomenon involves multidimensional aspects that indicate the complexity of the phenomenon. Portney and Watkins (2000) suggest that in sociological and behavioral disciplines of interpreting correlation coefficients, lower correlations may be the evidence of functionally useful relationships to indicate complex and abstract phenomena. Therefore, this might add justification that the low correlation coefficients of the factors: *'perception of risk'*, *'perceived seriousness of CHD'*, and *'chest pain appraisal / perception'* might be interpreted as significantly related to the overall scale.

The low subscale-to-total correlations, in particular for subscales *'perception of risk'* and *'perceived seriousness of CHD'* might be a due effect of sample variant. *'Perception of risk'* was significantly and moderately correlated with the total scale in EFA sample (correlation coefficient=0.49) but not in CFA sample (correlation coefficient=0.34). For the subscale *'perceived seriousness of CHD'*, the correlation coefficient was lower in EFA sample (correlation coefficient=0.29) than that in CFA sample (correlation coefficient=0.39). Again these results could be explained by sample variant and thus, future validation of these subscales and further qualitative research are suggested to explore the underlying mechanisms and phenomena.

Another plausible reason could be that the subscales were not representative and sensitive enough to measure the concept of ACRFR, in particular for the subscale *'chest pain appraisal / perception'* which showed consistently low subscale-to-total correlations in both the EFA and CFA samples. If this was the case, future subscale evaluations and/or critically revising the subscale items may be required in future validation of the instrument.

The Relationships Between ACRFR Subscales (Factors)

For the subscale (factor) correlations, as shown in Table 7.15 and Table 7.16, moderate correlations indicating that subscales were related and low correlations indicating that subscales were not associated were found in the EFA and CFA samples. In a multidimensional measure, Bubela and colleagues (1990) indicate that the subscales of a test tend to be relatively uncorrelated with each other but will correlate with the total score of the test regarding homogeneity. In addition, Bubela and colleagues (1990) pointed out that in the clinical situation the subscales of a test may commonly correlate moderately in magnitudes (around 0.40 to 0.70 in correlation values). This manner of interpretation for the subscales that may moderately correlate has been echoed by a number of authors in regard to scale development (Barrett et al., 2005; Nystedt, & Ljungberg, 2002; Wang et al., 2003). As a result, the subscales of a test will be specific, unique, and homogeneous individually in the representation of the overall construct if they are either uncorrelated or moderately correlated, providing that these individual subscales also correlated with the overall construct being measured. Therefore, the results of the present study could be considered not an unusual finding.

For the subscale (factor) correlations, both EFA and CFA samples showed moderate and significant correlations between factor 1 *'CHD knowledge'* and factor 2 *'planning of health actions'*, as well as factor 2 *'planning of health actions'* and factor 3 *'perceived ability to monitor the health-related behaviour'*. It may not be unusual that people plan to initiate health-related actions for promoting health and preventing CHD if they have gained some knowledge about CHD. The role of knowledge in the process of performing conducive practices to improved health has gained recognition since the past decade (Glanz et al., 1990).

The association of knowledge about CHD risk and health practices has been further demonstrated. For example, knowledgeable individuals were significantly more likely to try to quit cigarette smoking, to lose weight and to change their diet to lower blood cholesterol than their non-knowledgeable counterparts (Nourjah et al., 1994).

The initiation of the planned health action could have been affected if people found it difficult to carry out. On the other hand, the planned health action could be facilitated if people found the action easy to perform or easy to control in a way to promote health and prevent CHD. This could reasonably explain the finding on factor 2 *'planning to health actions'* correlating significantly with factor 3 *'perceived ability to monitor health-related behaviour'*. The current finding was consistent with previous studies, in that CHD patients' perceived control over health behaviour was highly related to their intention to health behaviour (Blanchard, et al., 2003; Johnston et al., 2004).

While examining the results of the EFA sample and CFA sample, moderate and significant subscale correlations of factor 5 *'perceived opportunities to understand CHD'* with factor 1 *'CHD knowledge'* and factor 2 *'planning of health actions'* were found in the CFA sample. This could be a due effect of sample differences on the results of the subscale correlations. Similarly, it could be possible that having opportunities to understand CHD increases CHD knowledge, and that having opportunities to understand the disease could possibly facilitate people in ways to conceptualise how the conducive practices improve health that leads the individual to plan and initiate health actions. The phenomena was supported by the qualitative findings of the current research project, in which focus group participants highlighted that the importance of having opportunities to understand CHD had increased their CHD knowledge and mediated them to plan their health actions.

The Stability of ACRFR

The test-retest using intraclass correlation estimated for the ACRFR total score and the subscale scores suggested that the total scale and most subscales of ACRFR met the criterion of >0.7 (Kline, 2000a), indicating that they were acceptably stable over time.

Discussions of the Results of Scale Validations

As far as scale validations for ACRFR is concerned, the methods employed were: (1) confirmatory factor analysis (CFA), (2) hypothesis testing in terms of correlational analyses with other measures including GSES, MSPSS and HADS, and (3) known-groups comparison. Discussions of these results are as follows.

Confirmatory Factor Analysis (CFA)

The results of the overall goodness-of-fit assessment and most of the parameter estimates were acceptable that confirmed the data fit of the factor model. A non-significant path - item 31 “old age increases the chance of CHD” as a meaningful parameter, and the 14 non-significant factor correlations as theoretical sensible phenomena are discussed in the following sections.

Joreskog (1993) suggests that the evaluation of a model and the assessment of fit are not entirely based on a statistical point of view, but also that the parameters of the model can be given a substantively meaningful interpretation. While examining item 31 “old age increases the chance of CHD” as part of knowledge of CHD risk factor - an indicator of factor 1 representing *‘CHD knowledge’*, the item is content relevant from both clinical and practical points of view. Advanced age as a CHD risk factor has been widely indicated in the literature (Grundy, 1999; Grundy, et al., 2000; Grundy, Pasternak, Greenland, Smith, Fuster, 1999; Smith et al., 2000; Wilson et al., 1998), and knowledge of CHD risk factor is crucial in relation to CHD knowledge that emerged from Phase 1 qualitative study. Furthermore, in EFA, item 31 “old age increases the chance of CHD” correlated significantly with the factor *‘CHD knowledge’* which to some extent offered the evidence that item 31 is a relevant and meaningful parameter in respect to *‘CHD knowledge’*.

In addition, the factor analytic method is a sample-dependent procedure. It might be less likely to recruit samples with exactly same characteristics and attributions. Rendering a possibility to this non-significant parameter, one possible explanation might be a due effect of sample differences in responding to the item which could affect an item to factor correlation.

This non-significant path was reported merely by one sample of the present study. Therefore, under the aforementioned circumstances, the item was not deleted in this study but future research across diverse populations to evaluate its importance to the model structure is suggested.

Regarding the non-significant factor correlations in CFA, the conditions were not unusual phenomena. Based on the earlier discussions of the results of reliability, the subscales of a test will be specific and unique individually in the representation of the overall construct if they are either uncorrelated or moderately correlated, provided that these individual subscales also correlate well with the overall construct being measured. Moreover, such configuration of subscale (factor) correlations was supported by other authors in the literature (Barrett, et al., 2005; Bubela et al., 1990; Nystedt & Ljungberg, 2002; Wang, et al., 2003).

When interpreting the model fit, the primary goal was to validate a theoretically sensible model with acceptable fit. Kline (2005) indicates that one should be careful not to modify the model solely for the sake of improving fit and obtaining a theoretically nonsensical model modifications based on output statistics, e.g. modification indices, which may not likely lead to the correct model, but instead utilising knowledge of relevant theory and relevant research results to inform the use of statistics is of higher empirical significance. In the present CFA results, the model reached acceptable fit indices and values. It might not be wise to strike for the best statistical figures unnecessarily.

Furthermore, Bollen (1989), Kelloway (1998), and Stevens (2002) have indicated that any model modification has to be carefully examined. The principle danger in post hoc model modification is that this procedure becomes exploratory and involves considerable capitalisation on chance (Bollen, 1989; Kelloway, 1998; Stevens, 2002). This suggests that the analysed findings on the basis of such modification are not reliable. The objective of CFA in the present study was to validate the internal structure of ACRFR identified from EFA. Substantial analyses of the findings were utilized to support the validation.

Lastly, the correlation matrix of CFA was consistent with the results of subscale (factor) correlations in scale reliability, indicating a significantly moderate correlation between factor 1 and 2, and between factor 2 and 3, as well as a low to no correlations among other factors. As such, despite the CFA model demonstrating 14 non-significant factor correlations, factor correlations of the CFA model actually confirmed the factor relationships of ACRFR scale.

Hypothesis Testing

Statistically, the results indicated that ACRFR score was significantly correlated with GSES, MSPSS and HADS scores in the expected directions as shown in Table 7.23. Yet, the correlations were weak and the statistical significances could be due to the effect of sample size. There were at least two plausible reasons to explain the weak correlations between

ACRFR and the comparing measures. One possible account might be a methodological concern about the specificity of the general measures of GSES and MSPSS to examine the awareness of risk factors reduction of CHD. The underlying domains of these general measures and the dimensions of ACRFR being measured might be less likely in congruence and therefore, resulted in weak correlations.

Another possible reason might be related to the validity of the suggested hypotheses. Participants of low risk public (LRP) were recruited for the hypothesis testing. The participants in the LRP group were likely to be the healthy adults who might not necessarily be interested in risk factor reduction of CHD. It is likely that people will not increase their disease awareness until health problem surfaced. As such, the construct of awareness in this regard surrounding one's knowledge about, attention to, and personalisation of, as well as perception of self-regulatory functions over CHD risk factors reduction might not be as predictable in ways strongly associated with the underlying constructs of GSES, MSPSS and HADS being measured.

Known-groups Comparison

The ACRFR total score and subscales mean scores of the MI participants were significantly higher than that of the non-CHD participants, except the subscale *'perceived seriousness of CHD'* as shown in Table 7.24, indicating that the MI participants who had received cardiac rehabilitation training had a significant higher level of awareness regarding CHD risk reduction.

The ACRFR overall scale of the MI participants score was significantly higher when compared with that of the CHD participants, suggesting that ACRFR scale was able to discriminate between the MI subjects who received cardiac rehabilitation training and those with no training. With the exception for four subscales (factors): *'perceived ability to monitor health-related behaviour'*, *'perception of risk', 'perceived seriousness of CHD'* and *'chest pain appraisal / perception'*, the overall scale and subscale mean scores of MI subjects were significantly higher when compared with that of the CHD participants. These indicated that the MI group, in which the participants had received the cardiac rehabilitation training, had a higher level of awareness regarding CHD risk reduction in terms of certain perspectives: *'CHD knowledge'*, *'planning to health actions'*, and *'perceived opportunities to understand CHD'*, when compared with the CHD group. The present study findings concurred with the previous studies, documenting that a cardiac rehabilitation program increases cardiac knowledge, enhances awareness of lifestyle factors and effects on health behaviours to reduce CHD risk (Merz, et al., 1996; Papageorgiou, et al., 2004; Aoun & Rosenberg, 2004; Warrington, et al., 2003). As such, the present finding served to add information about the Hong Kong Chinese people in respect to the awareness of risk factors reduction for CHD in a local scene.

Although the MI group had the highest and the non-CHD group had the lowest subscale mean scores, no significant difference was found among groups regarding *'perceived seriousness of CHD'*. For *'perception of risk'*, no significant differences found between the MI and CHD groups, and CHD and non-CHD groups. One plausible explanation might be due to the effect of optimistic bias, especially when the participants used the illness coping strategy of making downward comparisons with others who were worst than themselves. Being deemed fortunate to survive, it might be possible for the MI and CHD participants to view CHD with optimistic attitudes in the course of illness and recovery. This might possibly attenuate the MI and CHD participants' perceptions of risk and seriousness for CHD to a lesser extent, giving the non-significant findings for *'perceived seriousness of CHD'* and the only significant finding between participants of the MI and non-CHD groups in respect to *'perception of risk'*.

Another plausible explanation that attenuated the perceptions of disease risk and severity might be due to a positive acceptance of their illness based on the Chinese cultural beliefs in accepting the nature of the universe that guides the principles of how things work including the occurrence of a disease (Bond, 1996; Chan & Twinn, 2007; Mok et al., 2004; Phillips & Pearson, 1996). Such active (and positive) acceptance instead of fatalistic acceptance of the chronicity of an illness condition is essential for adaptation that causes people to reprioritise their lives, to realistically revise, and to use time they have left in constructive and optimal ways. Participants with CHD and MI therefore, might tend to have a generally positive outlook towards their illness. They might strive to create value and worth in their daily existence as a result of facilitating illness coping and minimises disease threats.

In addition, being diagnosed with CHD and experienced chest discomfort might be a plausible explanation in that both the MI and CHD participants might be more similar in appraising CHD symptom and perceiving similar degree of difficulties in sustaining healthy lifestyle modifications in their daily encounters. Thus, this might be the reasons for the non-significant results for the subscales *'chest pain appraisal / perceptions'* and *'perceived ability to monitor health-related behaviour'* mean scores between these two groups of participants.

Addressing the Factors of ACRFR

in Light with the Theoretical Framework Used in This Study

In the present study, exploratory factor analysis (EFA) has identified seven underlying factors surrounding the concept of 'awareness of CHD risk factors reduction'. Confirmatory factor analysis (CFA) further supported that the concept was structurally made up of the identified seven factors. Concomittently, the concept "awareness" in this regard is defined as the state when a person cognitively attends to, and personalises to CHD risk, possesses CHD knowledge, and executes control to reduce risk factors with participating actions. Operationally, it consists of seven conceptual factors: (1) CHD knowledge, (2) planning to health actions, (3) perceived ability to monitor health-related behaviour, (4) perception of risk, (5) perceived opportunities to understand CHD, (6) perceived seriousness of CHD, and (7) chest pain appraisal / perceptions. As such, the concept 'awareness of CHD risk factors reduction' appears as the awareness to lifestyle health behaviour in respect to CHD risk factors reduction, in which a person requires health behaviour changes in achieving its goal. The conceptual elements are the determinants which influence people's awareness of health behaviour to CHD risk reduction.

The framework of PAPM correlates to a stage of health behaviour change in which people may go from a state of unawareness to awareness to action (Weinstein, 1988; Weinstein & Sandman, 1992; Weinstein et al., 1998). It is a model that delineates the dynamic cognitive processes on a continuum with many deteminants that influence health behaviour (Weinstein, 1988; Weinstein et al., 1998). Therefore, PAPM links up the domains governing the concept 'awareness of CHD risk factors reduction' and explains them in terms of the movement along a continuum of cognitive stages and actions - from the state of unawareness to awareness as a result of gaining knowledge about CHD; from the awareness of heart health issues to personalising of CHD risk, to initiating health actions; and/or situational obstacle(s) such as failure to recognise chest pain and lacking of opportunities to understand CHD health issues rendering barriers to initiate and maintain health acts, within the context of awareness of CHD risk factors reduction. These give people different points of view to gain knowledge, come to attend to the gained information, to personalise to issues and to construct their personal judgments that motivate and regulate their behaviour for CHD prevention and promotion, which reflect different cognitive levels of information-processing representing people's levels of awareness of CHD for risk reduction.

CHAPTER 9

CONCLUSION

Introduction

This final chapter summarises the main findings of the study and addresses the strengths and limitations of the study. Recommendations for future research to improve the ACRFR scale will be highlighted. Implications for nursing practice will be discussed. Lastly, conclusion arising from this research study will be drawn.

Summary of Main Study Findings

This study aimed to answer two questions: (1) What are the dimensions of 'awareness of CHD risk factors reduction'? (2) What is the reliability and validity of the developed instrument (ACRFR scale)? Phase I qualitative study was designed to answer research question one. Both findings of the qualitative and psychometric phases of the study answered the second research question. In the following section, the key findings of these phases that support the ACRFR scale as a valid instrument are highlighted.

1. The domains surrounding the 'awareness of CHD risk factors reduction' were clearly supported by the identified categories and subcategories of the qualitative study and the related literature and theoretical framework. The qualitative study helped clarify and

develop a better understanding of the concept of ACRFR. The concept consisted of three main categories comprising twelve subcategories. The three main categories of ACRFR included: (1) CHD knowledge, (2) perceptions of CHD, and (3) risk control efficacy. The twelve subcategories were: (a) pathological causes of CHD, (b) external forces causing CHD, (c) modifiable and non-modifiable risk factors, (d) CHD trends, (e) symptoms of CHD, (f) knowledge of CHD prevention, (g) perceived seriousness of CHD, (h) perceived risk, (i) planning of health actions, (j) control over risk reducing behaviour, (k) perceived opportunities to understand CHD, and (l) chest pain appraisal/perceptions.

2. In respect to reliability, results of scale homogeneity and test-retest reliability suggested acceptable instrument reliability.
3. The validity of ACRFR was identified and established satisfactorily in terms of the following aspects:

   3.1. Content validity using a panel of expert reviews was established satisfactorily.

   3.2. EFA identifies a seven-factor model with acceptable total variance. The factor model structure corresponded to the dimensions identified in the qualitative study, with the seven factors including: (1) CHD knowledge, (2) planning to health actions, (3) perceived ability to monitor health-related behaviour, (4) perception of risk, (5) perceived opportunities to understand CHD, (6) perceived seriousness of CHD, and (7) chest pain appraisal / perceptions, respectively.

3.3. Satisfactory findings from CFA supported that the ACRFR scale were structurally made of the identified seven factors.

3.4. Statistically, the results of hypothesis testing indicated that ACRFR score was significantly correlated with GSES, MSPSS and HADS scores in the expected directions.

3.5. Findings of known-groups comparison supported ACRFR as a valid instrument in terms of differentiative function.

Strengths and Methodological Limitations of the Current Study

This section comprises of two parts focusing on the strengths and the limitations of the present research study. The strengths are firstly discussed focusing on what this study adds to nursing knowledge.

Strengths of the Current Research Study

1. There has been worldwide attempt to raise awareness of CHD risk factors reduction. As no objectively devised conceptual definition of 'awareness of CHD risk factor reduction' (ACRFR) was found in the literature, one contribution of this study was to take a step to define this concept. The study systematically identified and clarified a broader coverage of the dimensions of ACRFR in contrast with a less comprehensive and ambiguous domains surrounding ACRFR that were reported in the past literature. The present study identified ACRFR as a multidimensional concept including the assessments of cognitive, emotional,

behavioural and social aspects, which entails the complexity of the day-to-day human expressions embracing awareness for CHD risk factors reduction.

2. As far as health-related instrument is concerned, no instruments of this type supported with psychometric data have been published. The outcome of this study contributed to the development of the instrument measuring awareness of CHD risk factors reduction. Methodologically, both qualitative and quantitative research methods were employed to provide solid evidences to the underlying constructs regarding ACRFR. For instrument validation, content validity using expert reviews, scale homogeneity and scale stability, and construct validity were examined. For psychometric analysis of data, exploratory and confirmatory factor analyses were conducted with independent samples to identify and confirm the model. The manner of instrumentation rendered the development of a valid scale. It is envisaged that this developed instrument could be used to collect reliable and valid data to reflect the concept being measured. From a practical viewpoint, this valid measure not only adds to a method of evaluating individuals' awareness for CHD risk factors reduction but also allowing healthcare professionals to understand and estimate individual's commitment in reducing CHD risk. Such assessment also gives healthcare professionals insight to design public health education and healthcare remedies to contain the disease by using the instrument to collect informational data.

3. The ACRFR scale could be used for all members of the society including general public,

patients at high risk or with CHD and those with a MI. Thus, wide scale applicability across different populations in assessing awareness of CHD risk factors reduction facilitates the goals of primary and secondary prevention for CHD. In this study, different target populations were invited to participate during test construction. As such, a broad coverage of domains and diversity of items was likely to be sampled to provide a wide spectrum of expressions pertaining to the concept of ACRFR. In return, such the maximising breadth of the scale could enable individuals of different target populations to respond to the items in the ACRFR scale.

For instance, in the primary setting, general public may not have the sufficient exposure to CHD knowledge and the personalisation of heart risk could be suboptimal. The ACRFR subscales including CHD knowledge, perception of risk, perceived opportunities to understand CHD, and perceived seriousness of CHD could be used to assess clients and provide primary health care professionals useful information to develop effective public health promotion for CHD prevention. In the secondary and/or tertiary settings, the ACRFR could also be used to expand patients' awareness to reduce CHD risk in the course of regaining health and/or to prevent disease recurrence. Patients may perceive difficulties to monitor health-related behaviour or they may not have accurate appraisal of chest pain because of emotional reactions to illness such as denial. The subscales of ACRFR could serve the purpose for tracking different coping responses and behaviours. As such, the ACRFR instrument could assist healthcare professionals to design various cognitive and behavioural interventions to meet clients' needs.

4. The qualitative phase of this study involving a total of 100 participants divided into 18 focus groups ensured that the items were generated for the ACRFR across different population subgroups with various heterogeneities and demographic backgrounds. Although some authors have proposed to limit the number of participants to a manageable number ranging from 25 to 50 (Polit & Hungler, 1999; Sandelowski, 1995) or until saturation was achieved, this study found that the number of different population subgroups and the heterogeneity of the group determined the number of focus groups recruited to achieve saturation (Morgan, 1997).

5. With respect to focus group dynamics, attention will be drawn to discuss the number of participants per each focus group interview. Indeed, the complexity involved in this process of data collection via focus group interviews existed. Despite the proposed 6 to 10 subjects per group as recommended in literature (Morgan, 1997), focus group of 3 to 8 participants per group were conducted in the present study. Krueger (1995) and Morgan (1997) allege the important role group dynamics play in focus group interviews. In order to promote a high level of participants' involvement within each focus group with unanticipated constraints and prevent possible compromise in group dynamics throughout the process of running small-size focus group interviews, many factors to ensure optimal group dynamics were deliberately adopted in the present study. Rather than abiding to the recommended number of participants in each group, this study conducted focus groups with 3 to 8 participants. Using a minimum of

three participants in a focus group without compromising the group dynamics was noted in several recent research studies which adopted focus group as a means of data collection (Augustus, 2002; Corlett, 2000; Tiwari, et al., 2005; Whilhelmsson & Foldevi, 2003). While no report of major methodological flaw regarding the size of the focus group was documented, it should not undermine the value of group dynamics in a group of three. In fact, this study proved that the number of participants in each focus group of the present study did not affect the level of interaction that occurred during the interview. Morgan (1997) argues that a researcher should not be imprisoned to any lower or upper limits regarding the number of participants in each focus.

6. Regarding research about the Chinese people's awareness of CHD risk factors reduction, this study provided cultural information to fill in the gaps in the literature. Reducing coronary risk has been a global concern, especially among populations of developing countries, such as Asian including the Chinese populations (Beaglehole, 2001). However, few studies have examined the awareness of CHD risk factors reduction among the Chinese people. The literature lack cultural diversity in this regard. In respect to awareness of CHD risk factors reduction, the present study adds to this knowledge in terms of diversity regarding cultural concepts of fate, family and sick role, and the Chinese eating culture, as well as similarity regarding the phenomenon of optimistic bias among the Hong Kong Chinese people, and cognitive and emotional appraisals in response to health threat.

7. Lastly, as far as awareness of lifestyle risk factors is concerned, difficulties in controlling eating habits, in particular the dietary cholesterol and fat intake, regular exercise and stress were highlighted among the sample of Hong Kong Chinese people during focus group interviews. The data collected may serve as information to inform preventive measures and to formulate appropriate health education based on the local health beliefs and practices.

Limitations of the Current Study

This section addresses the commentaries on the present study and the weaknesses are discussed within different focal points as follows:

1. The present study used convenience sampling and with this method, subjects were chosen on the basis of availability and volunteering. The issues of availability and difficulty to recruit subjects in considerable sample sizes could not possibly and adequately represent other public sample particularly those with angina pectoris or unstable angina (coronary insufficiency), as well as those with recognised or unrecognised MI subjects who were not in the cardiac rehabilitation program. Furthermore, one limitation in sampling is the potential bias of self-selection (Portney, & Watkins, 2000). Those who volunteered may be quite different from the representative population in terms of age, gender, motivation and other correlates of health consciousness. In addition, it is not likely to know what confounding factors were present in those who did not volunteer as subjects

compared with those who did. Therefore, these might affect the ability to generalise the study outcomes.

2. Undertaking qualitative data analysis not in the language of the focus group interviews might have compromised the quality of data. Twinn (1998) highlighted the importance of undertaking data analysis in the language of the interview is a way to avoid compromising the qualitative data. Due to the complexity of transcriptions and translation of the Chinese data into English scripts, data translated to English might possibly render errors in the accurate use of words to articulate the specific ideas and cultural meanings that are customary in the Chinese language, despite a forward and backward translation having been conducted.

3. Weaknesses in sentence wordings and phrasing during item construction as another drawback was found in the present study. Posing a challenge to the scale validity should be noted. One example was in factor 5 *'perceived opportunities to understand CHD'* containing items 37 "I find it difficult to search for CHD information" and item 38 "I find it difficult to find someone to ask about CHD". Participants might have had an impression that the two items carried almost the same meaning and they might less likely to differentiate between the 'place' (item 37) and 'person' (item 38) in locating and seeking for CHD information. This might possibly lead to a factor containing items with overly high item homogeneity running a risk of producing a bloated specific factor, which means over

inclusion of particular (very similar) items pertaining to a specific dimension (Boyle, 1991; Cattell, 1978). Therefore, the factor validity might have compromised the quality of the entire scale.

4. In this study, non-normal item response distribution was acknowledged to likely affect the statistical test results to be positively biased (type I error rate inflated) (Kline, 2005). However, a number of authors suggest that exploratory and confirmatory factor analyses appear to be relatively robust in a nonnormal variable distribution and the normality assumptions of variables are not in force in factor analysis (Gorsuch, 1983, Floyd, & Widaman, 1995; Tabacknick, & Fidell, 2001). In addition, there has been mounting evidences indicating that the maximum likelihood method is reasonably robust to modest violations of the normality assumption (Hoyle, 1995; Chou, & Bentler, 1995; West, Finch, Curran, 1995).

   The nonnormal variable distribution may have affected subsequent factor-analytic procedures. Taking one of the examples, it is likely that only participants with CHD in the heterogeneous sample who experienced CHD symptoms might be more likely to give positive response to item 39 ‘CHD causes discomfort in the jaw’ when compared with those who did not experience the symptom. This item could be a difficult item for the remaining majority of participants thus, the item response distribution departed from those items in the domain *‘CHD knowledge’*. It has been indicated that if the item in relation to other item correlations was low, it is less likely for that item to be significantly loaded on a factor (Ferketich, 1991). Subsequently, in this case, this item might be relevant to the construct in a theoretical sense but not statistically and therefore, did not correlate significantly to the respective factor *'CHD knowledge'* (i.e. factor loading <0.3) and was removed in the factor analytic procedure. This might have limited the diversity or breadth of the measurement and threatened the representativeness of the construct being measured.

5. The lack of solid and substantial evidence to include item 18 "CHD is often associated with fate or bad luck" in the instrument of ACRFR might limit the cultural diversity of the measurement, although this item was included in the initial 70-item generation based on the qualitative results in Phase I study. Item 18 was considered incongruent with the marker variables that define the nature of a factor, and was deleted (Polit-O'Hara, 1996) during factor and item sampling procedures in the exploratory factor analysis. Plausible explanations might contribute to the exclusion of the item from the instrument. Firstly, only one item concerning the concept of fate and luck was generated. Secondly, different research methodologies contributed to the respondents' responses regarding fate, luck or supernatural causes in illness attribution has been highlighted in previous literature (French, Senior, Weinman, Marteau, 2001; Landrine Klonoff, 1994). In the present study, the respondents' responses in Phase 1 qualitative study regarding to this item was

differed from the Phase 2 quantitative psychometric study. Furthermore, item 18 was a negatively skewed item during psychometric evaluation, indicating that respondents' scores clustered to the "false" response, thereby rendering the possibility of its incongruence with other items in one hand, and on the other hand, this item might be viewed as not an effective item to differentiate respondents' knowledge of CHD.

Recommendations for Future Research Regarding ACRFR Scale

This research identified seven underlying dimensions (factors) and the scale items were developed under each of these seven dimensions to measure the 'awareness of CHD risk factors reduction'. A number of recommendations are highlighted to improve and refine the newly developed ACRFR scale.

1. Future sampling of scale items in each of the identified dimensions (factors) is suggested. This could ensure the breadth and stability of measurement in each of the factors in one hand and on the other hand, improve the total explained variance of each of the factors. The small explained variance of factors: *'perceived opportunities to understand CHD'*, *'perceived seriousness of CHD'* and *'chest pain appraisal / perceptions'* could be less represented for the constructs under measured. The item validity could be carefully securitized by critically revising the item wordings and thoroughly performing preliminary item tryouts. Increasing the number of valid items in each of these respective factors with

small explained variance could be an option to improve factor validity. In addition, it could be worth sampling of more items relating to the cultural concept of fate and luck concerning CHD awareness in order to further explore the breadth and depth of the awareness instrument.

2. As the ACRFR scale is targeting all members of the Hong Kong Chinese population, in future using stratified sampling instead of convenience sampling to obtain a large population-based sample is recommended. The sample can be stratified by age, gender, geographical area and/or health status to increase the likelihood of collecting a representative sample that mirrors the whole population. In addition, the large population could reduce the likelihood of obtaining a non-normal sample. In subsequent instrument refinement, where scale items possess a narrow variance in item response distribution and/or highly skewed and therefore, less likely to represent the interest of the measuring construct among the Hong Kong Chinese population, such items could be considered for deletion. Furthermore, coupled with the first recommendation, accurate identification of valid scale items could facilitate the exclusion of faulty and under-represented items that could result in a shorter version of the scale. This makes the instrument more user-friendly and more suitable for deployment in routine health screening and clinical assessment. Likewise, to ensure ACRFR as a sensitive measure for the Hong Kong and other Chinese populations, the newly developed instrument needs to undergo several testings and

validations in the future.

3. A large sample size to obtain a more stable interpretation on factor model structure is recommended. A sample size of subjects-to-item ratio of 10:1 and 10 subjects per each estimated parameter for exploratory and confirmatory factor analysis is recommended.
4. Repeated scale refinement across other Chinese samples (Taiwanese, mainland Chinese) is recommended. Perrforming confirmatory factor analysis with sufficient independent sample size using various population including the general public, population at high risk, and the diseased population to confirm whether the model structure represents different population groups. Furthermore, this also could provide information of any particular item(s) and/or factor(s), which are in fact, common (or dominant) attributes for the group(s). This could add more solid evidence to the psychometric evaluation of ACRFR
5. Other appropriate measures for instrument validations in terms of convergent and divergent validations are recommended. As the underlying dimensions of ACRFR were initially established and validated in this study, it may be possible to use other appropriate measures to test the construct regarding convergent and divergent validities. This would further add solid evidence to the psychometric evaluation of ACRFR.

Implications for Nursing Practice

The first implication for nursing practice from the course of this instrument development is that healthcare professionals should be aware that CHD risk factors reduction requires an integrative approach. Awareness in this regard involves with a multidimensional aspects – cognitive, emotional, behavioural and social contexts of an individual embracing many attributes, e.g. knowledge, attention, personal risk perception, immediate emotional reactions, when facing CHD risk, as well as one's intention to act, ability to adhere with lifestyle changes and the presence of facilitating social environment to establish awareness in the course of risk reduction. Therefore, in carrying out coronary health care and disease prevention, these aspects should be acknowledged and use the essential information gathered to assure the efficacy of risk reduction interventions is recommended.

Raising awareness of CHD risk factors reduction has been widely emphasised at individual-level, population-level, and national-level. Under these circumstances, the momentum for undertaking this research study is that no instrument about awareness in this regard has been published with supporting psychometric data. In the course of scale development, the fact that the lack of relevant local population informational data concerning people's knowledge, perceptions of lifestyle factors, lifestyle habits and/or the course of health acts in relation to CHD has posed challenges, even though an exploratory qualitative study has been conducted in the present research. Furthermore, caution should be considered about the existing information received from the developed countries as this is likely to vary across different ethnic groups and geographic regions.

The second implication arising from this research is that the Hong Kong Chinese people's knowledge, perceptions of CHD, lifestyle factors, their lifestyle habits and health acts regarding CHD should be explored to gather relevant knowledge and population data within the local and cultural context. Likewise, it is hoped that with the use of a culturally sensitive instrument, professionals could conduct more research to inform the healthcare approaches to contain CHD risks among the Hong Kong Chinese population.

Third, the results of the qualitative study offered insights into Chinese people's views, such as optimistic bias, fate, family and sick role, cognitive and emotional appraisals in response to chest pain, eating practices, and a lack of social facilitating environment to establish disease awareness. Understanding these cultural views from the Chinese perspective are essential in acknowledging the course of the Chinese people's personalisation to CHD risk and their process from the personalization of risk to perceived control over the disease risk.

To increase public awareness in this area, a number of recommendations for coronary healthcare include:

1. Consider the patho-physiological mechanism of CHD as part of the health education program of the public as this adverse process is likely to begin in the early years of life. In particular, for the young population, the education should focus on highlighting that an early engagement of healthy lifestyle can prevent lifetime risk, and to emphasise

translation of health knowledge into lifestyle changes. The objective is to prevent an unrealistic underestimation of disease severity in young age;

2. Emphasise symptom recognition and remind people how emotional factors such as denial and fear in response to chest pain can decrease people's awareness of being at risk for CHD and can defer actions to aggregate severe CHD risk;
3. Promote healthy eating attitudes and enhance cholesterol and dietary awareness by providing dietary advices regarding food choices to reduce CHD risk;
4. Advice on time management to incorporate leisure time physical activity as habit-forming activity;
5. Provide regular public campaigns about CHD prevention and to emphasise active participation into health actions in the course of risk reduction. A provision of information in respect to the access for enquiry on CHD-related issues should be included; and
6. Provide counseling to manage stress and to tackle misconceptions, barriers and difficulties in risk factors reduction. Ultimately, the qualitative findings regarding fear of disease recurrence, increase awareness of symptom re-occurrence, frustration in following healthy lifestyle regimes as well as the lack of resources for dietary modifications were identified among CHD clients from the present study. Healthcare professionals should be able to screen and readily track clients' coping behaviour, and

where appropriate, referrals should be made for psycho-cognitive counselling and dietary care. CHD-related knowledge and information should be regularly updated and reinforced in the follow-up appointments without the assumption that patients have already learned well about the disease. Emergency enquiry and queries of day-to-day modification problems should be made readily accessible, which are especially important for the elderly living alone as well as for those CHD clients with inadequate social support.

Fourth, this disease-specific instrument could be used for community screening. It possesses discriminative functions for utilisation across various homogeneities and serves the purpose of tracking individuals' awareness of CHD in risk factors reduction. Furthermore, the instrument could facilitate healthcare professionals to compare and evaluate individuals' awareness levels in assessing the effectiveness of different intervention studies. With the use of the ACRFR instrument, data collected could be used to design appropriate public health education and effective behavioural interventions to facilitate a translation of CHD knowledge into lifestyle changes among the Hong Kong Chinese population. This could improve the population's coronary health outcomes and well beings. In addition, it is hoped that with the use of the ACRFR instrument, nursing research in this area could be promoted and hence, nursing education for coronary care could be provided with up to date population data.

The last implication is related to the increasing use of instruments into clinical practice by nurses and healthcare professionals to assess and quantify client's health status, health outcomes and/or attributes of a particular concept. This means firstly, that nurses should have knowledge about psychometric analysis and interpreting results in order to evaluate appropriate measurements to use in clinical practice. Secondly, it also important for nurses to have the knowledge and skill in instrument development. Since operationalisations of topics related to perception, knowledge, lifestyle habits and behaviour could be foreign to the lay traditions of some cultures. Scale items often have built-in attributional, causal and other relational assumptions that are not customary and recognisable in some languages and cultures. There may not be any accurate translation in one or another society for words to articulate specific ideas. Furthermore, the problems posed by some items are not a sole problem of translation but maybe a connection of different domains of meanings. The literature may point out the need to recognise and identify cross-cultural problems in applying an instrument in a particular culture, but they may overlook the fact that the solution to the problems lies in finding new operationalisations. To base on research, such as disease awareness, disease knowledge, perceptions and attitudes, healthy lifestyle performance and/or coping regarding coronary disease or its risk reduction, on local situation, it may possibly require the use of locally sensitive instruments to facilitate the explorations and evaluations. Although research in instrument development achieves its aims at a price, continuous validation of instruments developed for other cultures and failures to adopt appropriate instruments derived from other cultures in studies investigating a particular ethnic group are possibly no less pricey when compared with developing a new instrument that requires iterative refinements to fulfill important cultural applicability. In addition, no instrument is prefect, despite how many years of its development and/or use. To measure an abstract concept, there may have problems, for instance, in terms of different users and time frames. As a result of aforesaid facts, future research regarding the development and refinement of culturally sensitive instruments in the areas about the awareness of CHD for the disease prevention is recommended.

Conclusion

CHD has been a major disease in the past, and continues to be one at present and in the near future. Awareness of CHD risk factors reduction helps to decrease lifetime risk for CHD. An ability to understand and evaluate the awareness in this regard needs a valid measuring instrument. However, there is a lack of published instrument in this area. This study has taken a step towards finding out and operationalising the concept of awareness, from which a new instrument measuring ACRFR was developed to produce an outcome that serves the purpose. This is a multidimensional scale addressing cognitive, emotional, behavioural and social aspects. Although this study had demonstrated rigorous processes in the development and validation of a scale that attempts to measure the Hong Kong Chinese people's awareness of CHD risk factors reduction, this research was the first stage of evaluating the instrument and the results are only established in the current samples. To be regarded as valid and reliable, it is undoubtedly necessary to repeat validation and evaluation of the ACRFR. However, ACRFR is a promising instrument for the community and its clinical utilisations. The instrument will enable the population to understand and estimate commitment to risk reduction, and able to offer reliable data to design healthcare measures to contain CHD.

APPENDICES

Appendix 4.1 Letter of ethics approval

香港中文大學醫學院
Faculty Of Medicine
The Chinese University Of Hong Kong

醫院管理局
新界東醫院聯網
Hospital Authority
New Territories East Cluster

Joint The Chinese University of Hong Kong – New Territories East Cluster
Clinical Research Ethics Committee
香港中文大學–新界東醫院聯網 臨床研究倫理 聯席委員會

Secretary of the Clinical Research Ethics Committee c/o Centre for Epidemiology and Biostatistics,
Faculty of Medicine, The Chinese University of Hong Kong, 5th Floor, Postgraduate Education Centre, Prince of Wales Hospital.
Tel : (852) 2252 8717 Fax : (852) 2645 3098

To: Ms. Choi Wan Chan (Principal Investigator)
(P.h.D. Student, The Nethersole School of Nursing)
CUHK

2 October 2003

Ethics Approval of Research Protocol

CREC Ref. No.:	**CRE-2003.310**
Date of Approval:	**02 October 2003***
Protocol Title:	**The Development and Testing of An Instrument for Measuring Awareness of Cornoary Heart Disease in a Chinese Population**
Investigator(s):	**Choi Wan CHAN**

I write to inform you that ethics approval has been given to you to conduct the captioned study in accordance with the following document(s) submitted:

- Research Protocol
- Patient Informed Consent form in English and Chinese version

This ethics approval* will be valid for 12 months. Application for further renewal can be made by submitting the Renewal and Research Progress Report Form to the CREC. It will be much appreciated if the completion of the project will be reported to the Committee in due course.

The Joint CUHK-NTEC Clinical Research Ethics Committee serves to ensure that research complies with the Declaration of Helsinki, ICH GCP Guidelines, local regulations, HA and University policies.

(Prof. Joseph Lau)
Secretary, Joint CUHK-NTEC
Clinical Research Ethics Committee

JL/ci

Appendix 4.2 Letter of ethics approval

香港大學
University of Hong Kong

醫院管理局
HOSPITAL AUTHORITY

香港大學及醫管局香港西醫院聯網研究倫理委員會
Institutional Review Board of the University of Hong Kong / Hospital Authority Hong Kong West Cluster (HKU / HA HKW IRB)

Address: Rm 504, Administration Block, QMH Tel 2855 3351 2855 4086 Fax 2855 4005

Ms CW Chan (PhD student)
~~Dept. of~~ The Nethersole School of Nursing
Faculty of Medicine, CUHK
05-Nov-03

Dear Ms Chan (PhD student),

IRB Reference Number: **UW 03-253 T/253**

The HKU/HA HKW IRB is authorized by the Cluster Chief Executive [and the University of Hong Kong, Faculty of Medicine] to review and monitor clinical research. It serves to ensure that research complies with the Declaration of Helsinki and acts in accordance to ICH GCP gudielines, local regulations and HA [and the University] policy. It has the authority to approve, require modifications in (to secure approval), or disapprove research. This Committee has power to terminate/suspend a research at any time if there is evidence to indicate that the above principles and requirements have been violated.

Professor C L Lai, Chairman of the HKU/HA HKW IRB has reviewed/approved, as appropriate, your submission on the date shown below by an expedited process. You are required to adhere to the conditions listed.

Date of expedited review (Date/Month/Year) : 31-10-2003

Protocol title : The development and testing of an instrument for measuring awareness of coronary heart disease in a Chinese population

Document(s) approved : 01. Clinical research ethics approval application form
: 02. Demographic form - English
: 03. Client informed consent - English and Chinese
: 04. Research protocol

Document(s) reviewed : 05. Principal Investigator's short CV

Conditions : 1. Do not deviate from, or make changes to the study protocol without prior written IRB approval, except when it is necessary to eliminate immediate hazards to research subjects or when the change involves only logistical or administrative issues.

2. Report the following to HKU/HA HKW IRB: (i) study protocol or consent document change (use 'HKU/HA HKW IRB RE001F7'), (ii) serious adverse event (use 'HKU/HA HKW IRB RE001F8'). (iii) study progress (use 'HKU/HA HKW IRB RE001F9a')* (iv) new information that may be relevant to a subject's willingness to continue participation in the study.

3. Report first study progress to HKU/HA HKW IRB at a 12-monthly interval until study closure.

(Mr. Chris Yip)
Secretary
HKU/HA HKW IRB

c.c. Dr. Matthew Ng, COS, Dept. of Medicine, TWH

UW 03-253 T/253 05-Nov-03 Page 1 of 1

Appendix 4.3 Consent form – English version

Client Informed Consent

You are being invited to participate in a research study, The development and testing of an instrument for measuring awareness of coronary heart disease in a Chinese population, conducted by a Ph.D. student Chan Choi Wan of the Nethersole School of Nursing at The Chinese University of Hong Kong. The study aims to develop a valid and reliable instrument to measure awareness of coronary heart disease in Hong Kong Chinese people. The study will facilitate better understanding about public awareness of coronary heart disease.

Procedures

With your permission, you will be involved in one or more of the following activities (* delete as appropriate):

*(1) the research nurse will ask you questions about your health and personal questions such as marital status, education, employment.

*(2) you are invited to an audio taped discussion on some questions about coronary heart disease in a group and it will take about 60 to 90 minutes.

*(3) you are invited to complete a questionnaire *twice.

Your name and all written information will be kept confidential. No drugs or medical devices will be used for this study. After the group discussion, knowledge about coronary heart disease will be given and clarified by a health care professional.

Discomfort / Study withdrawal

There are no known discomforts or risks for you in this study. You may decline to answer any questions if those questions cause you discomfort. Your participation is entirely voluntary. You may choose not to enter or to withdraw from the study at any time without any adverse consequences. You may ask questions about the study at any time. You may also direct your questions to Chan Choi Wan at 9282 5093.

Confidentially

The research will treat your identity with professional standards of confidentially. All written information and questionnaires will be stored in a locked file cabinet. No names of participants will be used. The information from this research study may be published in international nursing journals but your name will not be revealed.

Authorization:

I have read this paper or the research nurse read it to me and I understood the purpose and nature of the study. I know that being in the study is voluntary and that I can withdraw from this study at any time without any adverse consequences. I hereby give my consent to participate in this study.

Print Name____________________________ Signature____________________________

Date_______________

Consent form explained by:

Print Name___________________________ Signature_____________________________

Date_______________

Principal Investigator______________________________Date______________________

Appendix 4.4 Consent form – Chinese version

參與研究同意書

現在邀請你參與一項研究名為"設定及測試一種測量制以用作評估香港人對冠心病的意識認知"，上述事項是由香港中文大學那打素護理學院博士研究生陳彩雲負責研究，研究目的是設定一有效、可信的測量制來衡量港人對冠心病的意識認知情況。

研究程序

如你同意，你需要參與以下一項或多項程序 (*刪除不適用之事項)：

- *第一項：研究護理員將會詢問關於你的健康情況及個人資料包括婚姻狀況、學歷、職業；
- *第二項：你將與其他參與者討論冠心病，討論過程將會錄音，討論時間約六十至九十分鐘；
- *第三項：填寫有關冠心病問卷*一次或兩次。

你的名字及有關你的一切資料將會保密。在這項研究中，是不會有服用藥物或任何醫學檢查的需要。在程序完成後，護理員可給參與者提供關於冠心病的知識或講解此病之疑問。

研究引起不安/退出研究

這項研究不會引致任何不安或風險，你可選擇不作答任何令你感到不安的問題，你可自由參與或保留隨時退出這項研究的權利，退出後並不會受到不良的後果。如有任何疑問，可致電92825093，研究員陳彩雲樂意解答。

保密

參與者姓名將會絕對保密，所有有關填寫的資料和問卷將會安全地存放及關鎖。研究結果可能會刊登於國際性護理刊物，但參與者的姓名絕對不被刊登。

受權同意參與研究

本人經已閱讀或研究護理員已閱讀給本人關於這項研究，本人明白這項研究之目的及一切有關研究的事項。本人可自由選擇參與及保留隨時退出這項研究的權利，並且不會受到不良的後果。我謹此簽署同意參與這項研究。

參與者姓名____________________　　簽署________________________

日期　　______________________

講解參與研究同意書，講解者姓名__________________簽署_____________

日期　　______________________

研究負責人姓名________________　　日期　______________________

Appendix 4.5 Demographical form

Participant's identity Code: _______

Date: __________________________

Interviewer: ____________________

Demographic Form

General information

Sex: __________ Age: _________ Religion: ____________

Marital Status: Single / Married / Divorced / Widow

Education Level:

Primary / Secondary /Diploma / Degree / Postgraduate Diploma / Master / Doctor

Occupation: _____________ Salary: ____________

Living area: ______________________________________

Living condition (Self-report): Poor / Below average / Average / Above average / Good

Who are you living with: ____

Clinical demographics

Past health history:

____

____

____

Current health history:

____

____

____

Hospitalisations(s):

____

____

____

Appendix 4.6 A screening form of CHD risk factors

Information about risk factors

Have you or has anyone in your family ever had any of the following illnesses. By family, mean your spouse or close relative such as parents, siblings, aunt or uncle?

(1) Self**: CHD/DM/HT/**None

(2) Family**: CHD/**None

(Any bolded item ➔ classified as presence with a risk factor)

(3) Do you smoke**? Yes /** NO

Smoking history **Yes** / NO

(4) How often do you exercise (30 mins/day) so that you perspire?

- At least once a day
- A few times a week
- At least once a week
- A few times a month
- At least once a month
- **A few times a year**
- **At least one a year**
- **Never**

Exercise for how long each time? __________________.

(5) Do you drink alcohol? **Yes. /** NO

If Yes, on average, how many units of alcohol do you drink each day?

- ______Units **(≥ 3 units)**

How often do you have alcoholic drinks?

- **Daily / most days (4 to 7 days a week)**
- **1 to 3 days a week**
- 1 to 3 days a month
- Less than once a month (e.g., on special occasions such as Christmas, New Year, social gatherings, etc)

(6) Do you monitor the amount of the following items (A, B, C and D) in your diet? Please answer by circling the extent as indicated?

A. Fat
B. Cholesterol
C. Calories
D. Salt

	A	**B**	**C**	**D**
Yes, monitor carefully	1	1	1	1
Yes, monitor somewhat	2	2	2	2
NO, do not monitor	**3**	**3**	**3**	**3**

(Any two with "No Monitor" plus item 4 in attitude ➔ classified as presence with a risk factor)

Which of the following four statements most closely describe your attitude about the foods that you eat?

1. I am very concerned about my diet. I only eat foods that are good for me, and always avoid items high in fat and calories.
2. I am fairly concerned about my diet. I try to eat foods that are food for me whenever possibly, but indulge myself every once in a while.
3. I am somewhat concerned about my diet, but do not pay as much attention to it as I probably should. I eat healthily when I can, but my food choices tend to be based on taste preferences, rather than health and nutrition considerations.
4. **I am not really concerned about my diet. I eat what I like, regardless of health or nutritional value**

(7) Which of the following four statements most closely describe your attitude about the lifestyle you lead?

1. I live a very healthy lifestyle so that I can reduce the risk of illness and live longer. I enjoy my lifestyle, and do not feel I have had to make any sacrifices in order to live healthily.
2. I live a very healthy lifestyle. However, I feel I have had to make a number of sacrifices in order to live this way. I am willing to do so, though, so that I can reduce the risk of illness and live longer
3. I live a fairly healthy lifestyle, although I could be living healthier than I am. I am willing to make some sacrifices for my health, but generally tend to live life as I please
4. **I am not willing to make sacrifices in order to live a healthy lifestyle. It is my belief that everyone is going to die sometime, so we should just enjoy life while we have the chance**

(8) Do you know high cholesterol level is a risk factor? Yes / **No**

Do you know your own cholesterol level (in term of higher / lower than normal range)? Yes/**No**

(Total cholesterol level ≥ 5.3 mmol/l, or with "NO" response in both questions ➔ classified as presence with risk factor)

Total risk factors: _______(out of 8)

(Remarks: Bolded items are classified as presence with a risk factor.)

Appendix 4.7 Focus group interview schedule: questions and probes

Focus group interview schedule: questions and probes

1. Could you tell me what you understand about CHD?

Probes: causes or risk factors

symptoms of CHD

prevention of CHD

2. In your opinion, do you think CHD posed a threat to you health? If so, why?

Probes: perceived seriousness of CHD

perceived risk factors / symptoms in relation to risk perception

3. What do you think can be done to reduce CHD risk?

Probes: any planning for preventive measures

4. What do you think are the barriers (difficulties) to reduce CHD risk?

Probes: control over their current health practice to reduce risk or CHD prevention

any difficulties in obtaining CHD information

Appendix 5.1 Relevant quotations for categories and subcategories

Categories and *subcategories*	***Quotations***
Category 1: CHD knowledge	
Pathological causes of CHD	*"The blood vessels are blocked. You eat well … Atherosclosis. You have too much…cholesterol… The blood vessels become harden. The blood vessels become narrower. The blood cannot flow well." (LRP7M: 65-71)*
External forces in causing CHD	*"I think I am not afraid of [CHD]. It is because it [CHD] comes any times and you can't avoid it." (LRP2M: 178-179)* *"… Sometimes, if you were with illness, no matter how, you would have the illness eventually. There is nothing to do with the prevention…" (LRP2M: 181-183)* *"… I felt there was pressure in my heart. Then I vomited… I felt numb in hands from here to another hand… I thought of supernatural in origin and believed I was unlucky… I also thought that I might have eaten something wrong…" (MI4F: 83-90)*
Modifiable / non-modifiable risk factors	*"I think sex is a factor, age is a factor, whether having exercise is a factor, whether a person having hypertension and diabetes also are all factors." (LRP2M:107-109)*

	"Smoking and drinking alcohol are as well." (LRP2M:110-111)
	"…stress from working... Stress is also a cause." (LRP8F: 257-257)
	"I think fat people, people with no enough exercise. Maybe smoke or drink and which could be closely linked to the disease." (LRP4F: 32-34)
	"I have heard a health talk about heart issues before. I know from the talk that if your parents have heart disease, then you have a high chance to have it. If so, you need to prevent it by doing exercise or eat healthy, for example, eat less fatty food. Although my parents have it, I know earlier and thus I can prevent it by myself." (LRP4F: 108-113)
CHD trends	*"I only heard of coronary heart disease is the first killer or the second… I remember that it is one of the top killers even it is not in the first slot." (LRP10F: 451-455)*
	"In the past at old age we will have heart disease. But now it is not. Many children [young adult] have heart disease, even with sudden death. Newspaper also reports these. … Now it is getting young…" (LRP1F: 295-299)

Symptoms of CHD	*"I think signs and symptoms cannot be seen. As you can read from the newspaper that an inspector suddenly had the [heart] attack while he was having the physical training… It is acute and you cannot see them [signs and symptoms]. If they [signs and symptoms] could be seen, he would not do the vigorous exercise." (LRP7M: 140-147)* *"…pain on that area [hand to mouth area] plus the back and chest. It was so painful that I found muscle weakness on my limbs." (MI2F: 122-123)* *"…had shortness of breath, tightness in jaw and shoulder pain." (MRF1M:55-56)*
Knowledge of CHD prevention	*"You need to be cautious about diet and do not eat fatty food. You need to do exercise. You should not smoke. You should be relaxed as well..." (MRF2F: 937-939)* *"Not to smoke… Ah, do not drink." (MRF4F: 950-951)* *"People always say to be cautious about high blood pressure and high cholesterol…" (MRF2F: 472-473)* *"I think it is not [solely a] preventive measure, but to control… For example, you may need to take antihypertensive*

	medication to keep your blood pressure to normal if you have high blood pressure... But at least you can control it...” (LRP10F: 211-215)
	“Regular body check, I have it yearly.” (LRP4F: 271)
Category 2: Perceptions of CHD	
Perceived seriousness of CHD	*“I am afraid of the recurrence of stroke. I am really afraid of it as I did not know why I had a stroke. I saw stroke patients with paralysis in the arms and legs and they couldn’t walk well. If I had it, then I will suffer much. … Coronary heart disease has been already existing [laughed]. Now I am afraid of stroke the most.” (MRF3M: 1412-1425)*
	“Perhaps, I think the impact of CHD when compared with SARS… ah… CHD I think is [a disease] with gradual progression and we are not aware of it immediately. We may think we are healthy. We don’t know that some stuff is accumulating causing CHD. But SARS is an acute condition and happens immediately. Basically, two are different. CHD to me the degree of danger is small… This disease, not fear… However, when compared SARS with CHD, I am afraid of SARS more than [that of] CHD.” (LRP3M: 179-185, 201-205)

	"… I think I need to have it [exercise] after I know that I have high blood pressure." (MRF2F: 663-664)
	"For diabetes, I had heard many things about it. I heard many had to ampute limbs and legs; eyes couldn't see; and many of them died. Diabetes is a big issue…. Not heard about CHD is a big issue."(MI1M: 1051-1053)
Perceived risk	*"Up to now, I do not feel worried that I may have coronary heart disease till now." (LRP9M: 278-279)*
	"By now, I don't feel it [as a threat] because I am young. I think the chance that CHD happening to me is small. May be getting older, I will be more aware of it." (LRP3M:176-178)
	"I am also not worried about [heart disease]… [It is] because I have exercise." (LRP1F: 233-235)
	"I am also not worried. From now on, be careful. I am not worry. If you worry, it then will affect emotion. And also I am optimistic. Therefore not too worry about." (LRP1F: 236-239)
	"Why I did not do it [cardiac catheterisation] as I thought that I did not have any problem. I thought that it was psychological problem. I did not have pain here [pointing to the chest]. I did

not get any problem all over the body." (MRF3M: 224-227)

"… I am overweight. I did not exercise much. I know my risk – less exercise, overweight. For eating, I try, for now on, too sweet, too greasy, too salty [food], I do my best to take less… Therefore, I still worry about I will have that problem [having heart disease]." (LRP1F: 134-143)

"I worry a bit [about heart disease]… However, I think [die of] heart disease as good. Do not suffer." (LRP1F: 254-256)

"They [medical and health professionals] said nothing. It was because my diabetes control was good, that was what they said. Then I have my pills and have myself to control [the diabetes condition]. They did warn me about my high level of fatty acid. But they didn't say anything [further for the high level of fatty acid]. [They] said my blood pressure was very high and gave me some pills for hypertension. They [medical and health professionals] said that diabetic people generally had high blood pressure. Therefore, I didn't [think of this]. I thought that I always have the doctor [to follow with] and should not be scared! ..." (MI1M: 215-224)

Category 3: Risk control efficacy	
Planning of health actions	*"Now I do not have this illness. But when I hear about any preventive measures, any prevention from the newspapers, for example, exercise to do, I will quickly go for it." (LRP1F: 144-146)*
	"I avoid smoke and drink. For diet, I am cautious." (MRF3M: 864-865)
	"I have changes on my diet. I am on diet now… I cannot eat too much sugar as I have diabetes. I do not have fatty food, also. … I do not have too salty food…It [diet] is regular as possible as for me… I sometimes have walking exercise… I usually have aerobic exercise twice a week with one hour each time, including the stretching exercise and aerobic exercise." (MI3M: 623-626, 652-664)
	"… [I] couldn't be as before, eating pork liver, coconut, egg custard as well as eating them for many pieces. That is [I] couldn't do that as in before." (MI1M: 1288-1289)
	"… Do not over eating is the most important in the daily eating habits" (MI1M: 2062-2063)

	"I had many changes after I knew that I had the disease. I get up and go to bed early, have exercise and do Tai Chi. … I keep myself relaxed. I try to get on well with my family members and avoid conflicts with them. I am now having a peaceful life. Aware of the diet." (MRF3M:918-924) *"I feel my heart is not good. Therefore, I go to [a medical] check…I go to the hospital by myself… Not a problem, just a body check…certainly I have the medical check periodically" (LRP1F: 262-273)* *"We need to know more about this disease. We should ask the professionals and then [we] will become clearer [about the disease]… more understanding and then could do more prevention." (LP1F: 353-357)*
Control over risk reducing behaviour	*"My problem is I cannot restrict on my diet… It is much better now as I am trying to reduce it. I try to have restriction on one meal but not the next… If I have meal without the suitable food, then I eat less. Other people cannot sacrifice to have the same light meal with me. I have lunch alone. I usually prepare it for myself and I can restrict on it as much as I can. I have less salt and oil in lunch. But for dinner, I usually prepare for my family members. So, I eat less in dinner. But the next morning, I eat more to compensate for the loss. I have a big*

stomach. I feel hungry all the time, I eat a lot. So, I eat again." (MI3M: 777-739)

"… My wife only serves me as all my sons grew up. I cannot eat too much sugar as I have DM. I do not have fatty food, also… I do not have too salty food… I do not feel bored [for the diet]. I have diet restriction for my diet. I usually have a piece of fish or a piece of meat… I have a slice of bread and a glass of slimmed milk in breakfast. It [diet] is regular as possible as for me. I have kept this diet plan for about half the year. I have made some progress shown in the blood tests." (MI3M: 623-633)

"I think that the most difficult part is one's will. Most of the time always saying that, I do not have time. But the truth is that I am only lazy. I am lazy to do exercise. Eventually, I do not have exercise." (LRP9M: 560-563)

"Yes, of course have difficulties. Let's say, you have to control your eating…[sighed and laughed]" (MRF2F: 721-722)

"For instance, I am not rich and I have two sons. Both of them are better off. I am not relying on them. I am still working and earn a living for myself. I do not need to pay rent. I earn living

	for myself. According to these circumstances, I should have a happy family. There is no stress. There are no others [troubles]. But in some circumstances, that is, the human brain such as when something happen, I stress out. I don't want to stress out sometimes. But, that is, when you get it out of your mind, it is still thinking and coming out. That is, sometimes, you have stress in your work. I don't want to think of it but my brain always think [of] it. There is no way to take it easy." (MI1M:1919-1931)
Perceived opportunities to understand CHD	*"… In fact, putting simply, from a general public and from a layman perspective, that means my heart has problem, I do think of….is not thinking to the extent of these words 'heart disease'. Because when you mention these words" heart disease", those words I hold a feeling of being severe…You will collapse. …or die [some participants agreed and laughed]. Or like watching movie, and then afterwards, immediately appear with many relatives and the doctor… However, I still got a feeling that my problem might be in the heart… I did think. But [I] didn't think that it was a heart disease. It was because our knowledge of heart disease was inadequate. Heart diseases have many kinds such as CHD, myocardial infarction, heart failure. By now you know. At that time, you had no idea what they were and what were their symptoms. If you are not always reading them, you do not know. You only*

	know the heart may have problem." (MI1M: 1016-1038) *"… those pamphlets are not detailed enough. They are only 1-2 pages of some issues and preventive methods, and not very detailed. For internet, ah … sometimes … ah … not sure they are right or not and may be not updated. So, if you want to find a means to know exactly what CHD is, for me I feel it is difficult." (LRP2M: 372-377)* *"… For the dietary issues, aspects relating to eating and nutrition were difficult to find. You asked the nurses; the nurses would say, would say that they didn't know; or would say some [other] things, or couldn't book an appointment [for dietitian]. My queries [about dietary issues] were not answered. See ! …" (MI1M:1547-1555)* *"It is not easy [to ask others for information]. All I knew I heard from old ladies. They don't have much knowledge. [Laugher]" (LRP6F: 228-229)*
Chest pain appraisal or perceptions	*"…think that it is nerve or bone pain." (MRF3M: 412-413)* *"The pain disappeared very quickly… I did not know what caused the pain. But I thought that it was related to muscle." (MRF3M: 154-157)*

"… At that time, I thought of the respiratory problem or pain in the lung." (MRF3M: 169-171)

"… I was always misled myself as I always thought that it [the pain] was gastric distention..." (MRF3M: 481-182)

Appendix 6.1 ACRFR instrument items for expert review regarding content validity

This questionnaire asks for your views about coronary heart disease (CHD) and how you feel about CHD related to your health
Please tick one best answer for each question and answer all questions.
Do not spend too much thinking about your answer, your immediate response is likely to be the most accurate

	Definite false	Mostly false	Unsure or don't know	Mostly true	Definite true	**Expert rating**
CHD knowledge *Pathological causes of CHD* 1. CHD is a disease due to the narrowing or blockage of blood vessels supplying the heart	O	O	O	O	O	
External forces in causing CHD 2. CHD is often associated with fate or bad luck ®	O	O	O	O	O	
Modifiable and non-modifiable risk factors 3. Smoking increases the chance of CHD	O	O	O	O	O	
4. Increased alcohol consumption decreases the chance of CHD®	O	O	O	O	O	
5. Bad eating habits increase the chance of CHD	O	O	O	O	O	
6. Stress increases the chance of CHD	O	O	O	O	O	
7. CHD is often associated with a lack of exercise	O	O	O	O	O	
8. Diabetes increases the chance of CHD	O	O	O	O	O	
9. CHD is often associated with an increased blood pressure	O	O	O	O	O	
10. CHD is often associated with a raised blood cholesterol	O	O	O	O	O	
11. Obesity increases the chance of CHD	O	O	O	O	O	
12. Family history of CHD increases the chance of CHD	O	O	O	O	O	
13. Old age increases the chance of CHD	O	O	O	O	O	
14. Women are more likely than men to be affected by CHD ®	O	O	O	O	O	
CHD trends 15. CHD is a major cause of death	O	O	O	O	O	
16. The incidence of CHD is increasing in young people	O	O	O	O	O	
17. CHD is a disease of old-people ®	O	O	O	O	O	
Symptoms of CHD 18 CHD has no symptoms	O	O	O	O	O	
19. CHD causes chest discomfort	O	O	O	O	O	
20. CHD causes discomfort in the jaw	O	O	O	O	O	
21. CHD causes shortness of breath	O	O	O	O	O	
22. CHD causes back pain	O	O	O	O	O	
23. CHD causes pain or numbness in the arms or shoulders	O	O	O	O	O	
Knowledge of CHD prevention 24. Healthy eating habits can prevent CHD	O	O	O	O	O	
25. A relaxed life can prevent CHD	O	O	O	O	O	
26. A good exercise habit can prevent CHD	O	O	O	O	O	
27. Regular medical checks can prevent CHD	O	O	O	O	O	
28. Paying attention to blood pressure can prevent CHD	O	O	O	O	O	
29. Paying attention to blood cholesterol level	O	O	O	O	O	

can prevent CHD						
30. CHD requires long-term medication	O	O	O	O	O	
31. Not smoking can prevent CHD	O	O	O	O	O	
32. Avoiding alcohol can prevent CHD	O	O	O	O	O	
Perceptions of CHD *Perceived seriousness of CHD* 33. I am more likely to concern about diabetes than CHD ®	O	O	O	O	O	
34. I am more likely to concern about high blood pressure than CHD ®	O	O	O	O	O	
35. I am more likely to concern about stroke than CHD ®	O	O	O	O	O	
36. I am more likely to concern about an infectious disease than CHD ®	O	O	O	O	O	
Perceived risk 37. I don't bother about CHD ®	O	O	O	O	O	
38. I don't bother about CHD because I have no risk factors for CHD ®	O	O	O	O	O	
39. I don't bother about CHD because I have no signs and symptoms of CHD®	O	O	O	O	O	
40. I am too young to have CHD ®	O	O	O	O	O	
41. I don't bother about CHD because I am optimistic®	O	O	O	O	O	
42. I don't bother about CHD because the doctor looks after my health ®	O	O	O	O	O	
43. I don't bother about CHD because it causes little suffering®	O	O	O	O	O	
Risk control efficacy *Chest pain appraisal or perceptions* 44. Chest discomfort will make me immediately think of a muscle or bone problem®	O	O	O	O	O	
45. Chest discomfort will make me immediately think of a nerve problem ®	O	O	O	O	O	
46. Chest discomfort will make me immediately think of stomach problem ®	O	O	O	O	O	
47. Chest discomfort will make me immediately think of breathing problem ®	O	O	O	O	O	
Planning of health actions 48. I try to take CHD preventive measures	O	O	O	O	O	
49. I try to eat regular meals	O	O	O	O	O	
50. I try to avoid fatty food	O	O	O	O	O	
51. I try to avoid food high in bad cholesterol	O	O	O	O	O	
52. I try to avoid food high in calories	O	O	O	O	O	
53. I try to avoid food high in salt	O	O	O	O	O	
54. I try to avoid over eating	O	O	O	O	O	
55. I try to do exercise at least 30mins everyday	O	O	O	O	O	
56. I try to relax	O	O	O	O	O	
57. I try to avoid smoking	O	O	O	O	O	
58. I try to avoid drinking too much alcohol	O	O	O	O	O	
59. I try to have a regular body check	O	O	O	O	O	
60. I try to learn more about CHD	O	O	O	O	O	
Control over risk reducing behaviour 61. Sometimes, I find it difficult to avoid fatty food ®	O	O	O	O	O	
62. Sometimes, I find it difficult to avoid food high in bad cholesterol ®	O	O	O	O	O	
63. Sometimes, I find it difficult to avoid food	O	O	O	O	O	

high in calories ®						
64. Sometimes, I find it difficult to avoid food high in salt ®	O	O	O	O	O	
65. Sometimes, I find it difficult to avoid over eat ®	O	O	O	O	O	
66. Sometimes, I find it difficult to maintain a relaxed life®	O	O	O	O	O	
67. Sometimes, I find it difficult to maintain regular exercise®	O	O	O	O	O	
Perceived opportunities to understand CHD 68. I find it difficult to understand CHD ®	O	O	O	O	O	
69. I find it difficult to locate resources for CHD information ®	O	O	O	O	O	
70. I find it difficult to find someone to ask about CHD ®	O	O	O	O	O	

® Indicates reverse item

Appendix 6.2 Expert review form regarding content validity

Evaluation the entire instrument as a whole

Please “tick” the options as appropriate and suggest revision(s) in the space(s) provided

1. The entire instrument adequately measures the awareness of CHD risk factor reduction.
   4 = very adequate and succinct ______
   3 = adequate, but needs minor alternation ______
   2 = unable to assess adequacy without item(s) revision ______
   1= not adequate ______
   For ratings of 3 or below, please suggest the necessary revision(s) to improve the instrument ____
   ____
   ____
   ____
   ____

2. The words in each item are clear and understandable
Yes _______
No ________, please indicate the number of the items and provide suggestion for revisions ____
____

3. The format is acceptable
Yes _______
No ________, please suggest changes in format ___________________________
____
____

4. The instructions for using the instrument are clear
Yes _______
No ________, please suggest changes to make instructions more clear
____
____

Appendix 6.3 Items for semantic equivalence

Please consider the semantic equivalence for the following items according to a 4-point rating scale shown as below:
1 = inappropriate
2 = Needs major alternation
3 = appropriate, but needs minor alternation
4 = very appropriate
For item rated “3”, please give suggestions for improvement

	Rating	Suggestions
1. Coronary heart disease (CHD) is a major cause of death. 冠心病是主要致命疾病.		
2. CHD is a disease due to the narrowing or blockage of blood vessels supplying the heart. 冠心病是由於供應心臟的血管收窄或阻塞所致.		
3. Sometimes I find it difficult to maintain regular exercise. 我有時候感到困難去保持定時運動.		
4. The incidence of CHD is increasing in young people. 現時冠心病發病率於年輕人有所增加.		
5. Women are more likely than men to be affected by CHD. 女性比男性較多可能患有冠心病.		
6. CHD has no symptoms. 冠心病是沒有病徵的.		
7. I find it difficult to understand CHD. 我感到困難去明白冠心病.		
8. Stress increases the chance of CHD. 壓力會增加患冠心病的機會.		
9. Smoking increases the chance of CHD. 吸煙會增加患冠心病的機會.		
10. I am more likely to concern about diabetes than CHD. 我關注糖尿病多於冠心病.		
11. I am more likely to concern about high blood pressure than CHD. 我關注高血壓多於冠心病.		
12. I am more likely to concern about stroke than CHD.		

我關注中風多於冠心病.		
13. I am more likely to concern about an infectious disease than CHD. 我關注傳染病多於冠心病.		
14. Chest discomfort will make me immediately think of a muscle / bone problem. 心胸範圍不適，我會立即想起肌肉或骨痛問題.		
15. Chest discomfort will make me immediately think of a nerve problem. 心胸範圍不適，我會立即想起神經痛問題.		
16. Chest discomfort will make me immediately think of a stomach problem. 心胸範圍不適，我會立即想起胃部問題.		
17. Chest discomfort will make me immediately think of a breathing problem. 心胸範圍不適，我會立即想起呼吸系統問題.		
18. CHD is often associated with fate or bad luck. 患冠心病與命運或運氣不好有關.		
19. CHD is often associated with a raised blood cholesterol. 冠心病與高膽固醇有關聯的.		
20. CHD is often associated with a lack of exercise. 冠心病與缺乏運動有關聯的.		
21. CHD is often associated with an increased blood pressure. 冠心病與高血壓有關聯的.		
22. I don't bother about CHD because the doctor looks after my health. 我不會操心患有冠心病因為醫生會照顧我的健康.		
23. I don't bother about CHD because I have no risk factors. 我不會操心患有冠心病因為我沒有冠心病的高危因素.		
24. I don't bother about CHD because I have no signs and symptoms. 我不會操心患有冠心病因為我沒有冠心病的病徵.		

25. I am too young to have CHD. 我不會有冠心病因為我年輕.		
26. I don't bother about CHD because it causes little suffering. 我不會操心患有冠心病因為冠心病是很少痛苦的疾病.		
27. I don't bother about CHD because I am an optimistic. 我不會操心患有冠心病因為我為人樂觀.		
28. Increased alcohol consumption decreases the chance of CHD. 多飲酒能減少患冠心病的機會.		
29. Family history of CHD increases the chance of CHD. 家族遺傳冠心病會增加患冠心病的機會.		
30. Poor eating habits increase the chance of CHD. 不良飲食習慣會增加患冠心病的機會.		
31. Old age increases the chance of CHD. 年老會增加患冠心病的機會.		
32. Diabetes increases the chance of CHD. 糖尿病會增加患冠心病的機會.		
33. Obesity increases the chance of CHD. 肥胖會增加患冠心病的機會.		
34. CHD requires long-term medications. 冠心病需要長期服用心臟藥.		
35. CHD is a disease of old-people. 冠心病是老人疾病.		
36. CHD causes chest discomfort. 冠心病導致有心胸不適.		
37. I find it difficult to search for CHD information. 我感到困難去搜尋冠心病的資料.		
38. I find it difficult to find someone to ask about CHD. 我感到困難去找人詢問冠心病.		
39. CHD causes discomfort in the jaw. 冠心病導致有顎骨不適.		
40. CHD causes shortness of breath. 冠心病導致有氣速.		
41. CHD causes pain / numbness in the arms / shoulders.		

冠心病導致有手膊痛或麻痺.		
42. I try to avoid fatty food. 我嘗試避免吃肥膩食物.		
43. I try to avoid food high in bad cholesterol. 我嘗試避免吃壞膽固醇高的食物.		
44. I try to avoid food high in calories. 我嘗試避免吃高卡路里的食物.		
45. I try to avoid food high in salt. 我嘗試避免吃高鹽份的食物.		
46. I try to avoid over-eating. 我嘗試避免飲食過量.		
47. I try to exercise at least 30 minutes everyday. 我嘗試每日運動最少三十分鐘.		
48. I try to relax. 我嘗試放鬆.		
49. I try to avoid smoking. 我嘗試避免吸煙.		
50. I try to avoid drinking too much alcohol. 我嘗試避免飲酒過量.		
51. I try to have regular body check. 我嘗試去定期身體檢查.		
52. I try to learn more about CHD. 我盡量學習關於冠心病的知識.		
53. I try to eat regular meals. 我嘗試定時飲食.		
54. Sometimes, I find it difficult to avoid fatty food. 我有時候感到困難去避免吃肥膩食物.		
55. Sometimes, I find it difficult to avoid food high in bad cholesterol. 我有時候感到困難去避免吃含有壞膽固醇高的食物.		
56. Sometimes, I find it difficult to avoid food high in calories. 我有時候感到困難去避免吃含有高卡路里的食物.		
57. Sometimes, I find it difficult to avoid food high in salt. 我有時候感到困難去避免吃含有高鹽份的食物.		

58. Sometimes, I find it difficult to avoid over eat. 我有時候感到困難去避免飲食過量.		
59. Sometimes I find it difficult to maintain a relaxed life. 我有時候感到困難去保持輕鬆的生活.		

Thank you

Appendix 6.4 The ACRFR instrument – Chinese version

檔案編號:________________

這是一份有關冠心病的問卷, 請在每條問題裡選擇其中一個答案, 並且回答所有問題.

請勿用太多時間回答問題, 因為往往即時的選擇會是你最準確的答案.

	肯定對	大致對	不知道	大致不對	肯定不對
1.冠心病是主要致命疾病.	○	○	○	○	○
2.冠心病是由於供應心臟的血管收窄或阻塞所致.	○	○	○	○	○
3.我有時候感到困難去保持定時運動	○	○	○	○	○
4.現時冠心病發病率於年輕人有所增加.	○	○	○	○	○
5.女性比男性較多可能患有冠心病.	○	○	○	○	○
6.冠心病是沒有病徵的.	○	○	○	○	○
7.我感到困難去明白冠心病	○	○	○	○	○
8.壓力會增加患冠心病的機會	○	○	○	○	○
9.吸煙會增加患冠心病的機會	○	○	○	○	○
10.我關注糖尿病多於冠心病	○	○	○	○	○
11.我關注高血壓多於冠心病	○	○	○	○	○
12.我關注中風多於冠心病	○	○	○	○	○
13.我關注傳染病多於冠心病	○	○	○	○	○
14.心胸範圍不適, 我會立即想起肌肉 / 骨痛問題	○	○	○	○	○
15.心胸範圍不適, 我會立即想起神經痛問題.	○	○	○	○	○
16.心胸範圍不適, 我會立即想起胃部問題	○	○	○	○	○
17.心胸範圍不適, 我會立即想起呼吸系統問題	○	○	○	○	○
18.患冠心病與命運或運氣不好有關	○	○	○	○	○
19.冠心病與高膽固醇有關聯的	○	○	○	○	○
20.冠心病與缺乏運動有關聯的	○	○	○	○	○
21.冠心病與高血壓有關聯的	○	○	○	○	○
22.我不會操心患有冠心病因為醫生會照顧我的健康	○	○	○	○	○
23.我不會操心患有冠心病因為我沒有冠心病的高危因素	○	○	○	○	○
24.我不會操心患有冠心病因為我沒有冠心病的病徵	○	○	○	○	○
25.我不會有冠心病因為我年輕	○	○	○	○	○

	肯定對	大致對	不知道	大致不對	肯定不對
26.我不會操心患有冠心病因為冠心病是很少痛苦的疾病	○	○	○	○	○
27.我不會操心患有冠心病因為我為人樂觀	○	○	○	○	○
28.多飲酒能減少患冠心病的機會	○	○	○	○	○
29.家族遺傳冠心病會增加患冠心病的機會	○	○	○	○	○
30.不良飲食習慣會增加患冠心病的機會	○	○	○	○	○
31.年老會增加患冠心病的機會	○	○	○	○	○
32.糖尿病會增加患冠心病的機會	○	○	○	○	○
33.肥胖會增加患冠心病的機會	○	○	○	○	○
34.冠心病需要長期服用心臟藥	○	○	○	○	○
35.冠心病是老人疾病	○	○	○	○	○
36.冠心病導致有心胸不適	○	○	○	○	○
37.我感到困難去搜尋冠心病的資料	○	○	○	○	○
38.我感到困難去找人詢問冠心病	○	○	○	○	○
39.冠心病導致有顎骨不適	○	○	○	○	○
40.冠心病導致有氣速	○	○	○	○	○
41.冠心病導致有手膊痛或痳痺	○	○	○	○	○
42.我嘗試避免吃肥膩食物	○	○	○	○	○
43.我嘗試避免吃壞膽固醇高的食物	○	○	○	○	○
44.我嘗試避免吃高卡路里的食物	○	○	○	○	○
45.我嘗試避免吃高鹽份的食物	○	○	○	○	○
46.我嘗試避免飲食過量	○	○	○	○	○
47.我嘗試每日運動最少三十分鐘	○	○	○	○	○
48.我嘗試放鬆	○	○	○	○	○
49.我嘗試避免吸煙	○	○	○	○	○
50.我嘗試避免飲酒過量	○	○	○	○	○
51.我嘗試去定期身體檢查	○	○	○	○	○
52.我盡量學習關於冠心病的知識	○	○	○	○	○
53.我嘗試定時飲食	○	○	○	○	○
54.我有時候感到困難去避免吃肥膩食物	○	○	○	○	○

	肯定對	大致對	不知道	大致不對	肯定不對
55.我有時候感到困難去避免吃含有壞膽固醇高的食物	○	○	○	○	○
56.我有時候感到困難去避免吃含有高卡路里的食物	○	○	○	○	○
57.我有時候感到困難去避免吃含有高鹽份的食物	○	○	○	○	○
58.我有時候感到困難去避免飲食過量	○	○	○	○	○
59.我有時候感到困難去保持輕鬆的生活	○	○	○	○	○

Appendix 6.5 The Chinese version of General Self-Efficacy Scale (GSES)

	完全正確	多數正確	尚算正確	完全不正確
1. 如果我盡力去做的話，我總是能夠解決難題的.	○	○	○	○
2. 即使別人反對我，我仍有辦法取得我所要的.	○	○	○	○
3. 對我來說，堅持理想和達成目標是輕而易舉的.	○	○	○	○
4. 我自信能有效地應付任何突如其來的事情.	○	○	○	○
5. 以我的才智，我定能應付意料之外的情況.	○	○	○	○
6. 如果我付出必要的努力，我一定能解決大多數的難題.	○	○	○	○
7. 我能冷靜地面對困難，因為我可信賴自己處理問題的能力.	○	○	○	○
8. 面對一個難題時，我通常能找到幾個解決方法.	○	○	○	○
9. 有麻煩的時候，我通常能想到一些應付的方法.	○	○	○	○
10. 無論什麼事在我身上發生，我都能夠應付自如.	○	○	○	○

The following are the items in English, which are not used in data collection:

1. I can always manage to solve difficult problem if I try hard enough.
2. If someone opposes me, I can find the means and ways to get what I want.
3. It is easy for me to stick to my aims and accomplish my goals.
4. I am confident that I could deal efficiently with unexpected events.
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.
6. I can solve most problems if I invest the necessary effort.
7. I can remain calm when facing difficulties because I can rely on my coping abilities.
8. When I am confronted with a problem, I can usually find several solutions.
9. If I am in trouble, I can usually think of a solution.
10. I can usually handle whatever comes my way.

Appendix 6.6 The Chinese version of Multidimensioal Scale of Perceived Social Support Scale (MSPSS)

十分不同意	1	2	3	4	5	6	7	十分同意

１．當你有需要的時候，總有一個好朋友在你身邊．	1	2	3	4	5	6	7
２．你有一個好朋友，無論開心或者不開心，你都可以同他／她分享．	1	2	3	4	5	6	7
３．你的家人真的十分願意幫助你．	1	2	3	4	5	6	7
４．你的家人可以給你情緒上需要的支持．	1	2	3	4	5	6	7
５．你有一個真的可以安慰你的朋友．	1	2	3	4	5	6	7
６．你的朋友真的願意嘗試幫助你．	1	2	3	4	5	6	7
７．如果有什麼事發生，你可以倚靠你的朋友．	1	2	3	4	5	6	7
８．你可以和家人訴說你自己的問題．	1	2	3	4	5	6	7
９．你有一些朋友，無論開心和不開心，你都可以同他們分享．	1	2	3	4	5	6	7
１０．你生命中有個好朋友，他／她會關心你的感受．	1	2	3	4	5	6	7
１１．你的家人願意和你一起做決定．	1	2	3	4	5	6	7
１２．你可以同你的朋友訴說你自己的問題．	1	2	3	4	5	6	7

The following are the items in English, which are not used in data collection:

1. There is a special person who is around when I am in need
2. There is a special person with whom I can share my joys and sorrows
3. My family really tries to help me
4. I get the emotional help and support I need form my family
5. I have a special person who is a real source of comfort to me
6. My friends really try to help me
7. I can count on my friends when things go wrong
8. I can talk about my problems with my family
9. I have friends with whom I can share my joys and sorrows
10. There is a special person in my life who cares about my feelings
11. My family is willing to help me make decisions
12. I can talk about my problems with my friends

Appendix 6.7 The Chinese-Cantonese version of the Hospital Anxiety and Depression Scale (HADS)

1. 我感到神經緊張:
   - ○ 大部份時候感到
   - ○ 很多時候感到
   - ○ 有時候, 間中感到
   - ○ 完全不感到
2. 我依然享受我以前享受的事物:
   - ○ 肯定和以前一樣
   - ○ 有點不及以前
   - ○ 只及以前小許
   - ○ 和以前差得極遠
3. 我有一種驚恐, 好像有些可怕的事情會發生:
   - ○ 很肯定有, 而且相當厲害
   - ○ 有, 但不太厲害
   - ○ 有少許, 但不令我擔心
   - ○ 完全沒有
4. 我能看到事物有趣的一面並且會心微笑:
   - ○ 和以前一樣
   - ○ 有點不如以前
   - ○ 肯定不如以前
   - ○ 完全不能
5. 煩惱的念頭在我腦海中浮現:
   - ○ 絕大部份時候
   - ○ 很多時候
   - ○ 有時候, 但不太常
   - ○ 只是間中
6. 我感到高興:
   - ○ 完全不感到
   - ○ 不時常感到
   - ○ 有時候感到
   - ○ 大部份時候感到
7. 我能安坐並感到鬆弛:
   - ○ 肯定能夠
   - ○ 通常能夠
   - ○ 不時常能夠
   - ○ 完全不能
8. 我感到缺乏衝勁, 整個人都慢了下來:
   - ○ 差不多全部時候
   - ○ 非常多時候
   - ○ 有時候
   - ○ 完全沒有
9. 我有一種忐忑不安的驚恐(十五, 十六的感覺):
   - ○ 完全沒有
   - ○ 間中有
   - ○ 相常多時候有
   - ○ 很常有
10. 我對自己的儀容已失去興趣:
    - ○ 肯定失去
    - ○ 比我應該關心的少
    - ○ 可能比我以前關心的少
    - ○ 我像以前一樣關心
11. 我感到不能安靜, 像要不停地走動:
    - ○ 很強烈
    - ○ 相當強烈
    - ○ 不太強烈
    - ○ 完全沒有
12. 我對未來的事抱有熱切期望:
    - ○ 和以前一樣
    - ○ 較為不如以前
    - ○ 肯定不如以前
    - ○ 絕無僅有
13. 我突然感到驚惶失措:
    - ○ 非常多時候
    - ○ 相當多時候
    - ○ 不太多時候
    - ○ 完全沒有
14. 我能享受喜歡的書, 電台或電視節目:
    - ○ 經常能夠
    - ○ 有時候能夠
    - ○ 不常能夠
    - ○ 絕少能夠

Continued Appendix 6.7

The following are the items in English, which are not used in data collection:

1. I feel tense or 'wound up'
   - O Most of the time
   - O A lot of the tiem
   - O From time to time, occasionally
   - O Not at all
2. I still enjoy the thing I usd to enjoy
   - O Definitely as much
   - O Not quite so much
   - O Only a little
   - O Hardly at all
3. I get a sort of frightened feeling as if something awful is about to happen
   - O Very definitely and quite badly
   - O Yes, but not too badly
   - O A little, but it doesn't worry me
   - O Not at all
4. I can laygh and see the funny side of things
   - O As much as I always could
   - O Not quite so much now
   - O Definitely not so much now
   - O Not at all
5. Worrying thoughts go through my mind
   - O A great deal of the time
   - O A lot of the time
   - O From time to time but not too often
   - O Only occasionally
6. I feel cheerful
   - O Not at all
   - O Not often
   - O Sometimes
   - O Most of the time
7. I can sit at ease and feel relaxed
   - O Definitely
   - O Usually
   - O Not often
   - O Not at all
8. I feel as if I am slowed down
   - O Nearly all the time
   - O Very often
   - O Sometimes
   - O Not at all
9. I get a sort of frightened feeling like 'butterflies' in the stomach
   - O Not at all
   - O Occasionally
   - O Quite often
   - O Very often
10. I have lost interest in my appearance
    - O Definitely
    - O I don't take so much care as I should
    - O I may not take quite as much care
    - O I take just as much care as ever
11. I feel restless as if I have to be on the move
    - O Very much indeed
    - O Quite a lot
    - O Not very much
    - O Not at all
12. I look forward with enjoyment to things
    - O As much as ever I did
    - O Rather less than I used to
    - O Definitely less than I used to
    - O Hardly at all
13. I get sudden feelings of panic
    - O Very often indeed
    - O Quite often
    - O Not very often
    - O Not at all
14. I can enjoy a good book or radio or TV programme
    - O Often
    - O Sometimes
    - O Not often
    - O Very seldom

Appendix 7.1 An instrument of 59 items after expert review

An instrument of 59 items after expert review

1.CHD is a disease due to the narrowing or blockage of blood vessels supplying the heart
2.CHD is often associated with fate or bad luck ®
3.Smoking increases the chance of CHD
4.Increased alcohol consumption decreases the chance of CHD ®
5.Bad eating habits increase the chance of CHD
6.Stress increases the chance of CHD
7.CHD is often associated with a lack of exercise
8.Diabetes increases the chance of CHD
9.CHD is often associated with an increased blood pressure
10.CHD is often associated with a raised blood cholesterol
11.Obesity increases the chance of CHD
12.Family history increases the chance of CHD
13.Old age increases the chance of CHD
14.Women are more likely than men to be affected by CHD®
15.CHD is a major cause of death
16.The incidence of CHD is increasing in young people
17.CHD is a disease of old-people ®
18.CHD has no symptoms
19.CHD causes chest discomfort
20.CHD causes discomfort in the jaw
21.CHD causes shortness of breath
23.CHD causes pain or numbness in the arms or shoulders
30. CHD requires long-term medication
33.I am more likely to concern about diabetes than CHD ®
34. I am more likely to concern about high blood pressure than CHD ®
35. I am more likely to concern about stroke than CHD ®
36. I am more likely to concern about an infectious disease than CHD ®
38.I don’t bother about CHD because I have no risk factors for CHD ®
39.I don’t bother about CHD because I have no signs and symptoms of CHD ®
40.I am too young to have CHD ®
41.I don’t bother about CHD because I am optimistic ®
42.I don’t bother about CHD because the doctor looks after my health ®
43.I don’t bother about CHD because it causes little suffering ®
44.Chest discomfort will make me immediately think of a muscle or bone problem®
45.Chest discomfort will make me immediately think of a nerve problem ®
46.Chest discomfort will make me immediately think of stomach problem ®
47.Chest discomfort will make immediately me think of breathing problem ®
49.I try to eat regular meals
50.I try to avoid fatty food
51.I try to avoid food high in bad cholesterol
52.I try to avoid food high in calories
53.I try to avoid food high in salt
54.I try to avoid over eating
55.I try to do exercise at least 30mins everyday

56.I try to relax
57.I try to avoid smoking
58.I try to avoid drinking too much alcohol
59.I try to have a regular body check
60 I try to learn more about CHD
61.Sometimes, I find it difficult to avoid fatty food ®
62.Sometimes, I find it difficult to avoid food high in bad cholesterol ®
63.Sometimes, I find it difficult to avoid food high in calories ®
64.Sometimes, I find it difficult to avoid food high in salt®
65.Sometimes, I find it difficult to avoid over eat ®
66.Sometimes, I find it difficult to maintain a relaxed life ®
67.Sometimes, I find it difficult to maintain regular exercise ®
68.I find it difficult to understand CHD ®
69.I find it difficult to locate resources for CHD information ®
70.I find it difficult to find someone to ask about CHD ®

Appendix 7.2 List of 43 items in 7-factor structure

F1: CHD knowledge (15.5% variance)
19. CHD is often associated with a raised blood cholesterol
8. Stress increases the chance of CHD
20. CHD is often associated with a lack of exercise
21 CHD is often associated with an increased blood pressure
33. Obesity increases the chance of CHD
32. Diabetes increases the chance of CHD
40. CHD causes shortness of breath
1. Coronary heart disease (CHD) is a major cause of death
41. CHD causes pain / numbness in the arms / shoulders
30. Poor eating habits increase the chance of CHD
9. Smoking increases the chance of CHD
29. Family history of CHD increases the chance of CHD
4. The incidence of CHD is increasing in young people
31. Old age increases the chance of CHD
34. CHD requires long-term medications

F2: Planning to health actions (9.4% variance)
44. I try to avoid food high in calories
45. I try to avoid food high in salt
42. I try to avoid fatty food
43. I try to avoid food high in bad cholesterol
46. I try to avoid over-eating
51. I try to have regular body check
52. I try to learn more about CHD

F3: Perceived ability to monitor health-related behaviour (7.1% variance)
54. Sometimes, I find it difficult to avoid fatty food
55. Sometimes, I find it difficult to avoid food high in bad cholesterol
56. Sometimes, I find it difficult to avoid food high in calories
57. Sometimes, I find it difficult to avoid food high in salt
58. Sometimes, I find it difficult to avoid over eat
3. Sometimes, I find it difficult to maintain regular exercise

F4: Perception of risk (5.5% variance)
24. I don’t bother about CHD because I have no signs and symptoms
23. I don’t bother about CHD because I have no risk factors
22. I don’t bother about CHD because the doctor looks after my health
27. I don’t bother about CHD because I am optimistic
26. I don’t bother about CHD because it causes little suffering

F5: Perceived opportunities to understand CHD (4.4% variance)
37. I find it difficult to search for CHD information
38. I find it difficult to find someone to ask about CHD
7. I find it difficult to understand CHD

F6: Perceived seriousness of CHD (4.1% variance)
10. I am more likely to concern about diabetes than CHD
11. I am more likely to concern about high blood pressure than CHD
12. I am more likely to concern about stroke than CHD
13. I am more likely to concern about an infectious disease than CHD

F7: Chest pain appraisal / perception (3.5% variance)
15. Chest discomfort will make me immediately think of a nerve problem
14. Chest discomfort will make me immediately think of a muscle / bone problem
17. Chest discomfort will make me immediately think of a breathing problem.

Appendix 7.2a 43-item English and Chinese versions of ACRFR

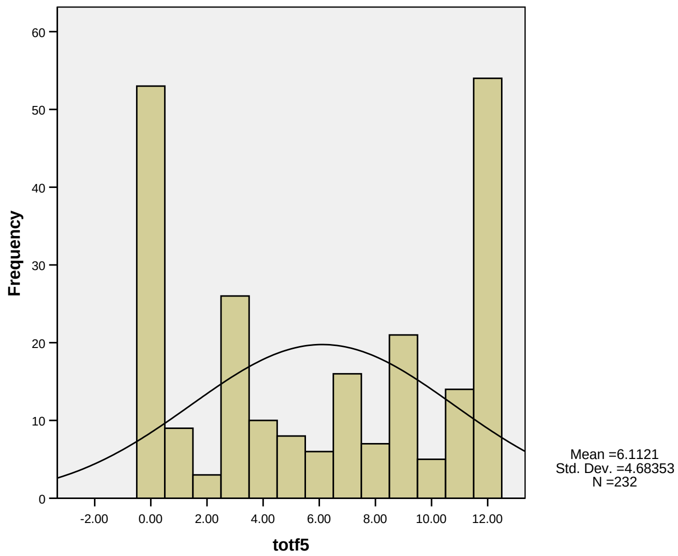
	Definite true 肯定對	Mostly true 大致對	Unsure or don't know 不肯定或不知道	Mostly false 大致不對	Definite false 肯定不對
19. CHD is often associated with a raised blood cholesterol. 冠心病與高膽固醇有關聯的.	O	O	O	O	O
8. Stress increases the chance of CHD. 壓力會增加患冠心病的機會.	O	O	O	O	O
20. CHD is often associated with a lack of exercise. 冠心病與缺乏運動有關聯的.	O	O	O	O	O
21. CHD is often associated with an increased blood pressure. 冠心病與高血壓有關聯的.	O	O	O	O	O
33. Obesity increases the chance of CHD. 肥胖會增加患冠心病的機會.	O	O	O	O	O
32. Diabetes increases the chance of CHD. 糖尿病會增加患冠心病的機會.	O	O	O	O	O
40. CHD causes shortness of breath. 冠心病導致有氣速.	O	O	O	O	O
1. Coronary heart disease (CHD) is a major cause of death. 冠心病是主要致命疾病.	O	O	O	O	O
41. CHD causes pain / numbness in the arms / shoulders. 冠心病導致有手膊痛或痳痺.	O	O	O	O	O
30. Poor eating habits increase the chance of CHD. 不良飲食習慣會增加患冠心病的機會.	O	O	O	O	O
9. Smoking increases the chance of CHD. 吸煙會增加患冠心病的機會.	O	O	O	O	O
29. Family history of CHD increases the chance of CHD. 家族遺傳冠心病會增加患冠心病的機會.	O	O	O	O	O
4. The incidence of CHD is increasing in young people. 現時冠心病發病率於年輕人有所增加.	O	O	O	O	O
31. Old age increases the chance of CHD. 年老會增加患冠心病的機會.	O	O	O	O	O
34. CHD requires long-term medications. 冠心病需要長期服用心臟藥.	O	O	O	O	O
44. I try to avoid food high in calories. 我嘗試避免吃高卡路里的食物.	O	O	O	O	O
45. I try to avoid food high in salt. 我嘗試避免吃高鹽份的食物.	O	O	O	O	O
42. I try to avoid fatty food. 我嘗試避免吃肥膩食物.	O	O	O	O	O
43. I try to avoid food high in bad cholesterol. 我嘗試避免吃壞膽固醇高的食物.	O	O	O	O	O
46. I try to avoid over-eating.	O	O	O	O	O

我嘗試避免飲食過量.					
51. I try to have regular body check. 我嘗試去定期身體檢查.	O	O	O	O	O
52. I try to learn more about CHD. 我盡量學習關於冠心病的知識.	O	O	O	O	O
54. Sometimes, I find it difficult to avoid fatty food. 我有時候感到困難去避免吃肥膩食物.	O	O	O	O	O
55. Sometimes, I find it difficult to avoid food high in bad cholesterol. 我有時候感到困難去避免吃含有壞膽固醇高的食物.	O	O	O	O	O
56. Sometimes, I find it difficult to avoid food high in calories. 我有時候感到困難去避免吃含有高卡路里的食物.	O	O	O	O	O
57. Sometimes, I find it difficult to avoid food high in salt. 我有時候感到困難去避免吃含有高鹽份的食物.	O	O	O	O	O
58. Sometimes, I find it difficult to avoid over eat. 我有時候感到困難去避免飲食過量.	O	O	O	O	O
3. Sometimes I find it difficult to maintain regular exercise. 我有時候感到困難去保持定時運動.	O	O	O	O	O
24. I don't bother about CHD because I have no signs and symptoms. 我不會操心患有冠心病因為我沒有冠心病的病徵.	O	O	O	O	O
23. I don't bother about CHD because I have no risk factors. 我不會操心患有冠心病因為我沒有冠心病的高危因素.	O	O	O	O	O
22. I don't bother about CHD because the doctor looks after my health. 我不會操心患有冠心病因為醫生會照顧我的健康.	O	O	O	O	O
27. I don't bother about CHD because I am an optimistic. 我不會操心患有冠心病因為我為人樂觀.	O	O	O	O	O
26. I don't bother about CHD because it causes little suffering. 我不會操心患有冠心病因為冠心病是很少痛苦的疾病.	O	O	O	O	O
37. I find it difficult to search for CHD information. 我感到困難去搜尋冠心病的資料.	O	O	O	O	O
38. I find it difficult to find someone to ask about CHD. 我感到困難去找人詢問冠心病.	O	O	O	O	O
7. I find it difficult to understand CHD. 我感到困難去明白冠心病.	O	O	O	O	O

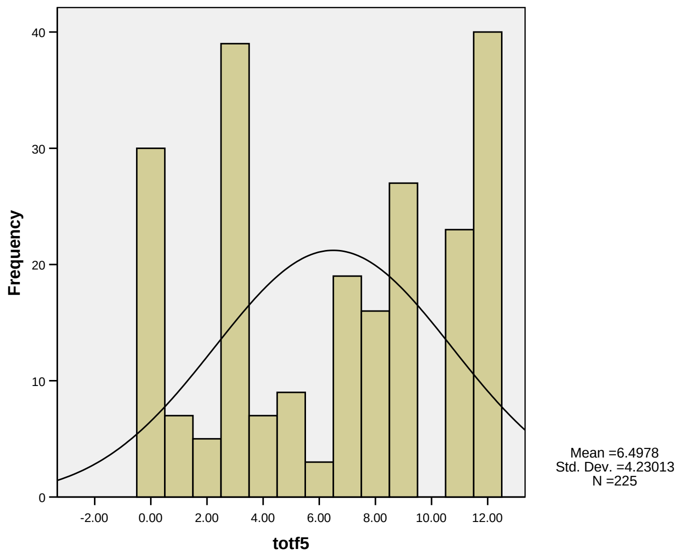
10. I am more likely to concern about diabetes than CHD. 我關注糖尿病多於冠心病.	O	O	O	O	O
11. I am more likely to concern about high blood pressure than CHD. 我關注高血壓多於冠心病.	O	O	O	O	O
12. I am more likely to concern about stroke than CHD. 我關注中風多於冠心病.	O	O	O	O	O
13. I am more likely to concern about an infectious disease than CHD. 我關注傳染病多於冠心病.	O	O	O	O	O
15. Chest discomfort will make me immediately think of a nerve problem. 心胸範圍不適，我會立即想起神經痛問題.	O	O	O	O	O
14. Chest discomfort will make me immediately think of a muscle / bone problem. 心胸範圍不適，我會立即想起肌肉或骨痛問題.	O	O	O	O	O
17. Chest discomfort will make me immediately think of a breathing problem. 心胸範圍不適，我會立即想起呼吸系統問題.	O	O	O	O	O

Appendix 8.1 Score distributions of subscale 5 *'perceived opportunities to understand CHD'* in the EFA and CFA samples

EFA sample



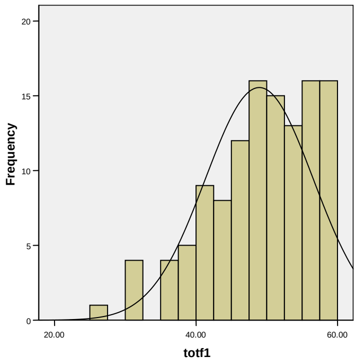
CFA sample



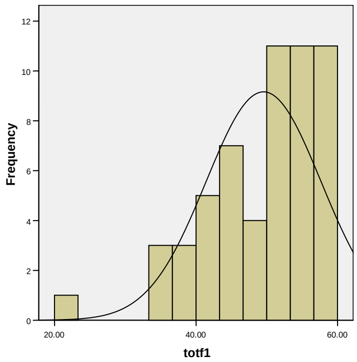
Appendix 8.2 Score distributions of subscale 1 *'CHD knowledge'* among the subgroups in the EFA and CFA samples

EFA sample

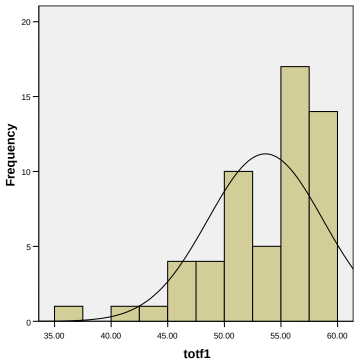
LRP subgroup: M=48.95, SD=7.63, N=119



MRF subgroup: M=49.55, SD=8.13, N=56

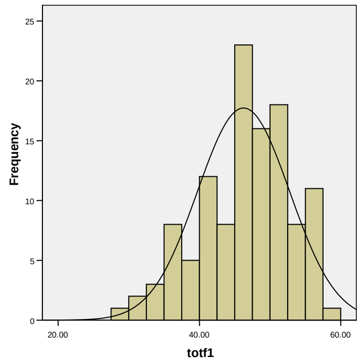


MI subgroup: M=53.63, SD=5.09, N=57

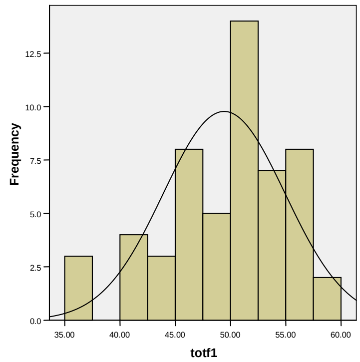


CFA sample

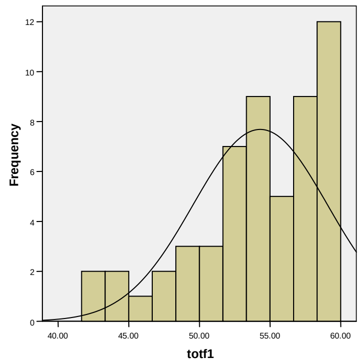
LRP subgroup: M=46.25, SD=6.53, N=116



MRF subgroup: M=49.43, SD=5.52, N=54



MI subgroup: m=54.31, SD=4.76, N=55

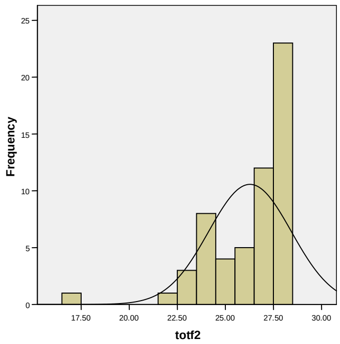


M=mean subscale score, SD= standard deviation, N=number of subjects

Appendix 8.3 Score distributions of subscale 2 *'planning to health actions'* among the MI subgroups in the EFA and CFA samples

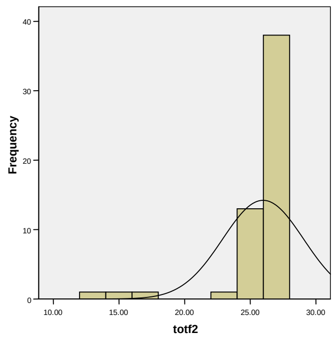
EFA sample

MI subgroup: M=26.28, SD=2.15, N=57



CFA sample

MI subgroup: M=25.98, SD=3.09, N=55



M=mean subscale score, SD= standard deviation, N=number of subjects

REFERENCES

Aiken, L. R. (2003). *Psychological testing and assessment*. Mass: Allyn and Bacon, Inc.

Ajani, U.A., Gaziano, J. M., Lotufo, P. A., Liu, S., Hennekens, C. H., Buring, J. E. et al. (2000). Alcohol consumption and risk of coronary heart disease by diabetes status. *Circulation*, *102*, 500-505.

Ajzen, I. (1988). *Attitude, personality, and behavior.* Chicago: Dorsey Press.

Ali, N. S. (2002). Prediction of coronary heart disease preventive behaviors in women: a test of the Health Belief Model. *Women & Health*, *35*(1), 83-96

Allender, S., Peto, V., Scarborough, P., Boxer, A., Rayner, M. (2006). *Coronary heart disease statistics*. London: British Heart Foundation

Allmark, P. & Tod, A. (2006). How should public health professionals engage with lay epidemiology? *Journal of Medical Ethics*, *32*(8), 460-463

Alonzo,A. A., & Reynolds, N. R. (1998). The structure of emotions during acute myocardial infarction: a model of coping. *Social Science and Medicine*, *46*(9), 1099-1110

American Heart Association (2007). *Heart disease and stroke statistics – 2007 update*. Dallas, Texas: American Heart Association

Anastasi, A. & Urbina, S. (1997). *Psychological testing.* New Jersey: Prentice Hall

Andersson P & Leppert J. (2001).Men of low socio-economic and educational level possess pronounced deficient knowledge about the risk factors related to coronary heart disease. *Journal of Cardiovascular Risk*, *8*(6), 371-377.

Angus, J., Evans, S., Lapum, J., Rukholm, E., Onge, R. S., Nolan, R., et al. (2005). "Sneaky disease": the body and health knowledge for people at risk for coronary heart disease in Ontario, Canada. *Social Science and Medicine, 60*(9), 2117-2127.

Anum, E. A. & Adera, T. (2004). Hypercholesterolemia and coronary heart disease in the elderly: a meta-analysis. *Annals of Epidemiology*, *14*, 705-721

Aoun, S. & Rosenberg, M. (2004). Are rural people getting Heartsmart? *Australian Journal of Rural Health, 12*, 81-88.

Armitage, C. J. (2005). Can the theory of planned behavior predict the maintenance of physical activity? *Health Psychology*, *24*(3), 235-245.

Ashaye, M. O. & Giles, W. H. (2003). Are heart disease patients more likely to have healthy lifestyle behaviors? Results from the 2000 Behavioral Risk Factor Surveillance Survey. *Journal of Cardiovascular Risk*, *10*, 207-212

Astin F & Jones K. (2004).Heart disease attributions of patients prior to elective percutaneous transluminal coronary angioplasty. *Journal of Cardiovascular Nursing*, 19(1), 41-47.

Augustus, C. E. (2002). Beliefs and perceptions of African American women who have had hysterectomy, *Journal of Transcultural Nursing*, *13*, 296-302

Australian Institute of Health and Welfare (2006). Retrieved August 28, 2007, from http://www.aihw.gov.au/cvd/majordiseases/coronary.cfm

Avis, N. E., Smith, K. W. & Mckinlay, J. B. (1989). Accuracy of perceptions of heart attack risk: what influences perceptions and can they be changed? *American Journal of Public Health, 79*(12), 1608-1612.

Bakx, J. C., Van den Hoogen, H. J. M., Van den Bosch, W. J. H. M., Thien, T., Van Wheel, C. (2002). Cardiovascular risk factors and disease in general practice: results of the Nijmegen Cohort Study. *British Journal of General Practice*, *52*, 135-137

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*(2), 122-147

Bandura, A. (1986). *Social foundations of thought and action: a social congnitive theory*. Englewood Cliffs: Prentice Hall

Bandura, A. (1997). *Self-efficacy: the exercise of control*. New York: W. H. Freeman and Company

Bandura, A. (2002). Social cognitive theory in cultural contest. *Journal of Applied Psychology: An International Review*, *51*, 269-290

Baraona, E. & Lieber, C. S. (1998). Alcohol and lipids. In: Galanter, M., ed. *Recent Developments in Alcoholism*, Vol. 14*: the Consequences of Alcoholism, pp.* 97–134. New York: Plenum Press.

Barco, P. P., Crosson, B., Bolesta, M. M., Werts, D., Stout, R. (1991). Training awareness and compensation on prostacute head injury rehabilitation. In S. j. Kreutzer & P. H. Wehman (Eds.), *Cognitive rehabilitation for persons with traumatic brain injury* (pp. 129-146). Baltimore: Paul H. Brooks.

Barrett, L., Plotnikoff, R. C., Raine, K., Anderson, D. (2005). Development of measures of organizational leadership for health promotion. *Health Education & behavior*, *32*(2), 195-207

Barrett-Connor, E., & Khaw, K. T. (1989). Cigarette smoking and increased central adiposity. Annals of Internal Medicine, 111, 783-787

Baxendale, L. M. (1992). Pathophsiology of coronary artery disease. *Nursing Clinics of North American*, *27*(2), 143-152

Beaglehole R. (2001) Global cardiovascular disease prevention: time to get serious. *Lancet*., *358*, 661-663.

Benjamin, E. J., Smith, S. C., Cooper, R. S., Hill, M. N., Luepker, R. V. (2002). Task force #1 –

magnitude of the prevention problem: opportunities and challenges. *Journal of the American College of Cardiology*, *40*(4), 588-603

Bentler, P. M. & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*(3), 588-606

Berg, B. L. (2007). *Qualitative research methods for the social sciences*. New York: Pearson

Biddle, S. J. H. (2000). Emotion, mood and physical activity. In S. J. H. Biddle, K. R. Fox, S. H. Boutcher (ED.), *Physical activity and psychological well-being* (pp. 63-88). London: Routledge

Bittner, V., Hardison, R., Kelsey, S. F., Weiner, B. H., Jacobs, A. K., Sopko, G. (2002). Non-high-density lipoprotein cholesterol levels predict five-year outcome in the Bypass Angioplasty Revascularization Investigation (BARI). *Circulation*, *106*, 2537-2542

Black,M. J., Hawks, J. H., Keene, A. M. (2001). Medical-surgical nursing. Philadelphia: W. B. Saunders Company

Blalock, S. J. (2007). Predictors of calcium intake patterns: a longitudinal analysis. *Health Psychology*, *26*(3), 251-258.

Blalock, S. J., DeVellis, R. F., Giorgino, K. B., DeVellis, B. M., Gold, D. T., Dooley, M. A., et al., (1996). *Health Psychology*, *15*(2), 84-93.

Blanchard, C. M., Courneya, K. S., Rodgers, W. M., Fraser, S. N., Murray, T. C., Daub, B., et al. (2003). Is the Theory of Planned Behavior a useful framework for understanding exercise adherence during phase II cardiac rehabilitation? *Journal of Cardiopulmonary Rehabilitation*, *23*, 29-39.

Block, L. G. & Keller, P. A. (1998). Beyond protection motivation: An integrative theory of health appeals. *Journal of Applied Social Psychology*, *28*(17), 1584-1608

Block, N. (1995). On a confusion about a function of consciousness. *Behavioral and Brain Sciences*, *18*, 227-320

Bollen, K. A. (1989). *Structural equations with latent variables.* New York: John Wiley & Sons

Bond, M. H. (1996). *The handbook of Chinese Psychology.* Hong Kong: Oxford University Press

Bonetti, D., Johnston, M., Rodriguez-Marin, J., Pastor, M., Martin-Aragon, M., Doherty, E., et al. (2001). Dimensions of perceived control: a factor analysis of three measures and an examination of their relation to activity level and mood in a student and cross-cultural patient sample. *Psychology and Health*, *16*, 655-674.

Boonpongmanee, C., Jittanoon, P. (2007). Predictors of Papanicolaou testing in working women in Bangkok, Thailand. *Cancer Nursing*, *30*(5), 384-389.

Boyatzis, R. E. (1998) *Transforming qualtitative information: the thematic analysis and code development.* Thousand Oaks: Sage Publications

Boyle, G. J. (1991). Does item homogeneity indicate internal consistency or item redundancy in psychometric scale? *Personality and Individual Differences*, *12*(3), 291-294.

Brehm, S. S., & Kassin, S. M. (1993). *Social psychology*. Boston: Houghton Mifflin Company

Brink, P. J., & Wood, M. J. (1998). *Advanced design in nursing research*. London: Sage Publications

Brislin, R. W. (1986). The wording and translation of research instruments. In W. J. Lonner & J. W. Berry (Eds.). *Field Methods in cross-cultural research* (pp. 137-164). Beverly Hills: Sage Publications

Brown, M. S., Kovanen, P. T., Goldstein, J. L. (1981). Regulation of plasma cholesterol by lipoprotein receptors. *Science*, *212*, 628-635.

Browne, M. W. & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.). *Testing structural equation models* (pp.136-162). Newbury Park: Sage Publications

Brownley, K. A., Hinderlitter, A. L., West, S. G., Girdler, S. S., Sherwood, A., Light, K. C. (2003). Sympathoadrenergic mechanisms in reduced hemodynamic stress responses after exercise. *Medicine and Science in Sports and Exercise*, *35*, 978-86.

Brydon, L., Magid, K., Steptoe, A. (2006). Platelets, coronary heart disease, and stress. *Brain Behavior Immunity*, *20*, 113-9.

Bubela, N., Galloway, S., McCay, E., McKibbon, A., Nagle, L., Pringle, D., et al. (1990). The patient learning need scale: reliability and validity. *Journal of Advanced Nursing*, *15*, 1181-1187

Bunker, S. J., Colquhoun, D. M., Esler, M. D., Hickie, I. B., Hunt, D., Jelinek, V. M. et al. (2003). “Stress” and coronary heart disease: psychosocial risk factors National Heart Foundation of Australia position statement update. *Medical Journal of Australia*, *178*, 272-276.

Burnett, R. E., Blumenthal, J. A., Mark, D. B., Leimberger, J. D., Califf, R. M. (1995). Distinguishing between early and late responders to symptoms of acute myocardial infarction. *American Journal of Cardiology*, *75*, 1019-1022

Byers, T., Anda, R., McQueen, D., Williamson, D., Mokdad, A., Casper, M. et al. (1998). The correspondence between coronary heart disease mortality and risk factor prevalence among states in the United States, 1991-1992. *Preventive Medicine*, *27*, 311-316

Byrne, B. M. (1998). *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: basic concepts, applications, and programming.* New Jersey: Lawrence Erlbaum Associates, Publishers

Calder, B. J. (1977). Focus groups and the nature of qualitative marketing research. *Journal of Marketing Research*, *14*, 353-364

Capewell, S., Beaglehole, R., Seddon, M., McMurray, J. (2000). Explanation for the decline in coronary heart disease mortality rates in Auckland, New Zealand, between 1982 and 1993. *Circulation*, *102*, 1511-1516

Carey, M. A. (1995). Comment: concerns in the analysis of focus group data. *Qualitative Health Research*, *5*(4), 487-495

Carney, T. F. (1972). *Content analysis: a technique for systematic inference from communications*. London: B. T. Batsford Ltd.

Cattell, R. B. (1978). *The scientific use of factor analysis in behavioral and life sciences*. New York: Plenum Press

Cattell, R. B. (1982). The psychometry of objective motivation measurement: a response to the critique of Cooper and Kline. *British Journal of Educational Psychology*, *52*, 234-241.

Chan, K. S. & Twinn, S. (2007). An analysis of the stressors and coping strategies of Chinese adults with a partner admitted to an intensive care unit in Hong Kong: an exploratory study. *Journal of Clinical Nursing*, *16*, 185-193

Chen, C. C., Lu, R. B., Chen, Y. C., Wang, M. F., Chang, Y. C., Li, T. K., et al. (1999). Interation between the functional polymorphisms of the alcohol-metabolism genes in protection against alcoholism. *American Journal of Human Genetics*, *65*(3), 795-807

Cheung, F. M. (1997). Gender role development. In S. Lau (Ed.), *Growing up the Chinese way.* Hong Kong: The Chinese University Press

Chou, C.P., & Bentler, P. M. (1995) Estimates and tests in structural equation modeling. In R. H. Hoyle (Eds.). *Structural equation modeling: concepts, issues, and applications* (pp.37-55). Thousand Oaks: Sage Publications

Chou, K. L. (2000). Assessing Chinese adolescents' social support: the multidimensional scale of perceived social support. *Personality and Individual Differences*, *28*, 299-307

Christian, A. H., Rosamond, W., White, A. R., Mosca, L. (2007). Nine-year trends and racial and ethnic disparities in women's awareness of heart disease and stroke: an American Heart Association National Study. *Journal of Womens's Health*, *16*(1), 68-81

Cimprich, B. (1992). A theoretical perspective on attention and patient education. *Advances in Nursing Science*, *14*(3), 39-51

Clark, L. A. & Watson, D. (1995). Constructing validity: basic issues in objective scale development. *Psychological Assessment*, *7*(3), 309-319

Clemow, L., Costanza, M. E., Haddad, W. P., Luckmann, R., White, M. J., Klaus, D., et al., (2000). Underutilizers of mammography screening today: characteristics of women planning, undecided about, and not planning a mammogram. *Annals of Behavioral Medicine*, *22*(1), 80-88.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* New Jersey: Lawrence Erlbaum Associates, Publishers

Collins K. M., Dantico, M., Shearer, N. B., Mossman, K. L. (2004). *Heart disease awareness among college students. Journal of Community Health*, *29*, 405-420

Conroy, M. B., Cook, N. R., Manson, J. E., Buring, J. E., Lee, I. M. (2005). Past physical activity, current physical activity, and risk of coronary heart disease. *Medicine & Science in Sports & Exercise*, *37*(8), 1251-1256.

Corlett, J. (2000). The perceptions of nurse teachers, student nurses and preceptors of the theory-practice gap in nurse education, *Nurse Education Today*, *20*, 499-505

Craig, W. Y., Palomaki, G. E. & Haddow, J. E. (1989). Cigarette smoking and serum lipid and lipoproprotein concentrations: an analysis of published data. *British Medical Journal*, *298*, 784-788

Critchley, J. & Capewell, S. (2003a). Smoking cessation for the secondary prevention of coronary heart disease (review). Cochrane Database of Systematic Reviews, Issue 4.

Critchley, J., Liu, J., Zhao, D., Wei, W., Capewell, S. (2004). Explaining the increase in coronary heart disease mortality in Beijing between 1984 and 1999. *Circulation*, *110*, 1236-1244.

Critchley, J.A. & Capewell, S. (2003). Substantial potential for reductions in coronary heart disease mortality in the UK through changes in risk factor levels. *Journal of Epidemiology Community and Health*, *57*, 243-247

Crocker, L. & Algina, J. (1986). *Introduction to classical and modern test theory*. New York: Holt, Rinehart & Winston

Culic, V., Eterovic, D., Miric, D., Silic, N. (2002). Symptom presentation of acute myocardial infarction: influence of sex, age, and risk factors. *American Heart Journal*, *144*, 1012-1017

Cunningham, S. (1992). The epidemiologic basis of coronary disease prevention. *Nurisng Clinics of North America*, *27*(1), 153-170

Danielsson, B., & Aberg, H. (1995). The public view on cardiovascular risk factors and changes in lifestyle, *Scandinavian Journal of Primary Health Care 13*, 74-80.

Denzin, N. K. & Lincoln, Y. S. (1994). *Handbook of Qualitative research*. Thousand Oaks: Sage Publications

De Nooijer, J., Van Assema, P., De Vet, E., Brug, J. (2005). How stable are stages of change for nutrition behaviors in the Netherlands? *Health Promotion International*, *20*, 27-32.

De Vet, E., De Nooijer, J., Oenema, A., De Vries, N. K., Brug, J. (2008). Predictors of stage transitions in the precaution adoption process model. *American Journal of Health Promotion*, *22*(4), 282-290.

DiClemente, R. J., Crosby, R. A., Kegler, M. (2002). *Emerging theories in health promotion practice and research*. San Francisco: Jossey-Bass A Wiley Compary

Dorn, J. M., Hovey, K., Muti, P., Freudenheim, J. L., Russell, M., Nochajski, T. H. et al. (2003). Alcohol Drinking Patterns Differentially Affect Central Adiposity as Measured by Abdominal Height in Women and Men. *The Journal of Nutrition*, *133*, 2655–2662.

Downs, J. R., Clearfield, M., Weis, S., Whitney, E., Shapiro, D. R., Beere, P. A., et al. (1998). Primary prevention of acute coronary events with Lovastatin in men and women with average cholesterol levels: results of AFCAPS/TexCAPS. *Journal of American Medical Association*, *279*(20), 1615-1622.

Dracup, K., Moser, D. K., Ekebergh, M., Meischke, H., Alonzo, A. A., Braslow, A. (1995). Causes of delay in seeking treatment for heart attacki symptoms. *Social Science & Medicine, 40*(3), 379-392.

Duclos, M., Gouarne, C., Bonnemaison, D. (2003). Acute and chronic effects of exercise on tissue sensitivity to glucocorticoids. *Journal of Applied Physiology*, *94*, 869-75.

Duffy, T., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In D. Jonassen (Ed.). *Handbook of research on educational communications and technology* (pp.170-198). New York: Macmillan.

Eckel, R. H., Barouch, W. W. & Ershow, A. G. (2002). Report of the National Heart, Lung, and Blood Institute-National Institute of Diabetes and Digestive and Kidney Diseases Working Group on the pathophysiology of obesity-associated cardiobascular disease. *Circulation*, *105*, 2923-2928

Eliasson, B. (2003). Cigarette smoking and diabetes. *Progress in Cardiovascular Diseases*, *45*, 405-414

Elliott, J. O., Seals, B. F., Jacobson, M. P. (2007). Use of Precaution Adoption Process Model to examine predictors of osteprotective behavior in epilepsy, *Seizure*, *16*(5), 424-437.

Farmer, D., Reddick, B., D'Agostino, R., Jackson, S. A. (2007). Psychosocial correlates of mammography screening in older African American women. *Oncology Nursing Forum*, *34*(1), 117-23.

Farooqi A, Nagra D, Edgar T, Khunti K. (2000).Attitudes to lifestyle risk factors for coronary heart disease amongst South Asians in Leicester: a focus group study. *Family Practice,* 17(4), 293-297.

Ferketich, S. (1991). Focus on psychometrics. Aspects of item analysis. *Research in Nursing & Health*, *14*, 165-168

Finnegan, J. R., Meischke, H., Zapka, J. G., Leviton, L., Meshack, A., Benjamin-Garner, R., et al. (2000). Patient delay in seeking care for heart attack symptoms: findings from focus groups conducted in five U. S. regions. *Preventive Medicine*, *31*, 205-213

Floyd, D. L., Prentice-Dunn, S., Rogers, R. W. (2000). A meta-analysis of research on Protection Motivation Theory. *Journal of Applied Social Psychology*, *30*(2), 107-429

Floyd, F. & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological assessment*, 7(3), 286-299

Franklin, S. S., Khan, S. A., Wong, N. D., Larson, M. G., Levy, D. (1999). Is pulse pressure useful in predicting risk for coronary heart disease? The Framingham Heart Study. *Circulation*, *100*, 354-360.

Franklin, S. S., Larson, M. G., Khan, S. A., Wong, N. D., Leip, E. P., Kannel, W. B. et al. (2001). Does the relation of blood pressure to coronary heart disease risk change with aging? The Framingham Heart Study. *Circulation*, *103*, 1245-1249.

French, D. P., Senior, V., Weinman, J., Marteau, T. M. (2001). Causal attributions for heart disease: a systematic review. *Psychology and Health*, *16*, 77-98.

Fromer, M. J. (1981). *Ethical issues in health care*. St. Louis: Mosby

Gabhainn, S. N., Kelleher, C. C., Naughton, F. C., Flanagan, M., McGrath, M. J. (1999).Socio-demographic variations in perspective on cardiovascular disease and associated risk factors. *Health Education Research,* 14(5), 619-628.

Gaito, J. (1980). Measurement scales and statistics: resurgence of an old misconception. *Psychological Bulletin*, *87*, 564-567

Gallo, L. C., Troxel, W. M., Kuller, L. H., Sutton-Tyrrell, K., Edmundowicz, D., Matthews, K. A. (2003). Marital status, marital quality, and atherosclerotic burden in postmenopausal women. *Psychosomatic Medicine*, *65*, 952-62.

Garza, M. A., Luan, J., Blinka, M., Farabee-Lewis, R. I., Neuhaus, C. E., Zabora, J. R. et al. (2005). A culturally targeted intervention to promote breast cancer screening among low-income women in East Baltimore, Maryland. *Cancer Control*, *12* Suppl 2, 34-41.

Ghiadoni, L., Donald, A. E., Cropley, M., Mullen, M. J., Oakley, G., Taylor, M. et al. (2000). Mental stress induces transient endothelial dysfunction in humans. *Circulation*, *102*, 2473-2478.

Gianaros, P. J., Salomon,K., Zhou, F., Owens, J. F., Edmundowicz, D., Kuller, L. H. et al. (2005). A greater reduction in Hhgh-frequency heart rate variability to a psychological stressor is associated with subclinical coronary and aortic calcification in postmenopausal women. *Psychosomatic Medicine, 67*, 553-560.

Gielen, S., & Hambrecht, R. (2001). Effects of exercise training on vascular function and myocardial perfusion. *Cardiology Clinics*, *19*, 357-368.

Girman, C. J., Rhodes, T., Mercuri, M., Pyorala, K., Kjekshus, J., Pedersen, T. R. et al. (2004).

The metabolic syndrome and risk of major coronary events in the Scandinavian Simvastatin Survival Study (4S) and the Air Force/Texas Coronary Atherosclerosis Prevention Study (AFCAPS/TexCAPS). *American Journal of Cardiology*, *93*, 136-141.

Girois, S. B., Kumanyika, S. K., Morabia, A., & Mauger, E. (2001). A comparison of knowledge and attitudes about diet and health among 35- to 75-year-old adults in the United States and Geneva, Switzerland. *American Journal of Public Health 91*(3), 418-424

Glanz, K., Brug, J. & Van Assema, P. (1997). Are awareness of dietary fat intake and actual fat consumption associated? – a Dutch-American comparison. *European Journal of Clinical Nutrition*, *51*, 542-547

Glanz, K., Lewis, F. M. & Rimer, B. K. (1990). *Health behavior and health education*. California: Jossey-Bass Publishing

Glanz, K., Rimer, B. K., Lewis, F. M. (2002). *Health behavior and health education. Theory, research, and practice*. San Francisco: Jossey-Bass A Wiley Imprint

Gnasso, A., Calindro, M. C., Carallo, C., De Novara, G., Ferraro, M., Gorgone, G., et al. (1997). Awareness, treatment and control of hyperlipidaemia, hypertension and diabetes mellitus in a selected population of southern Italy. *European Journal of Epidemiology*, *13*, 421-428

Goedde, H. W., Agarwal, D. P., Fritz, G., Meier-Tackmann, D., Singh, S., Bechmann, G., et al. (1992). Distribution of ADH2 and ALDH2 genotypes in different populations. *Human Genetics*, *88*(3), 344-346

Goldberg, R. J., O'Donnell, C., Yarzebski, J., Bigelow, C., Savageau, J., Gore, J. M. (1998). Sex differences in symptom presentation associated with acute myocardial infarction: A population-based perspective. *American Heart Journal, 136*(2), 189-195

Gombeski, W. R., Kramer, R. K., Freed, L., Foody, J., Parkosewich, J., Wilson, T. et al., (2005). Women's Heart Advantage Program: the impact 3 years later. *The Journal of Cardiovascular Management*, Fall, 27-34

Gorsuch, R. L. (1983). *Factor analysis.* New Jersey: Lawrence Erlbaum Associates, Publishers

Grace, S. L., Abbey, S. E., Biaillon, S., Shnek, Z. M., Irvine, J., Stewart, D. E. (2003). Presentation, delay and contraindication to thrombolytic treatment in females and males with myocardial infarction. *Women's Health Issues*, *13*, 214-221

Grbich, C. (1999). *Qualitative research in health.* London: Sage Publications

Green, J. S, Grant, M., Hill, K. L., Bizzolara, J., Belmont, B. (2003). Heart disease risk perception in college men and women. *Journal of American College Health,* 51(5), 207-211.

Greenlund, K. J., Keenan, N. L., Giles, W. H., Zheng, Z. J., Neff, L. J., Croft, J. B. (2004). Public recognition of major signs and symptoms of heart attack: seventeen states and the US Virgin Islands, 2001. *American Heart Journal*, *147*, 1010-1016

Griffiths, S., Lau, J. T. F., Chow, J. K. W., Lee, S. S., Kan, P. Y. M., Lee, S. (2006). Alcohol use among entrants to a Hong Kong University. *Alcohol & Alcoholism*, *41*(5), 560-565

Grundy, S. M. (1999). Primary prevention of coronary heart disease: integrating risk assessment with intervention. *Circulation*, *100*, 988-998

Grundy, S. M., Balady, G. J., Criqui, M. H., Fletcher, G., Greenland, P., Hiratzka, L. F., et al. (1998). Primary prevention of coronary heart disease: guidance from Framingham. *Circulation*, *97*, 1876-1887

Grundy, S. M., Bazzarre, T., Cleeman, J., D'Agostino, R. B., Hill, M., Houston-Miller, N., et al. (2000). Prevention Conference V. Beyond secondary prevention: identifying the high-risk patient for primary prevention medical office assessment. *Circulation*, *101*, e3-e11

Grundy, S. M., Pasternak, R., Greenland, P., Smith, S., Fuster, V. (1999). Assessment of cardiovascular risk by use of multiple-risk-factor assessment equations. A statement for healthcare professionals from the American College of Cardiology. *Journal of the American College of Cardiology*, *34*(4), 1348-1359

Gulanick, M. Bliley, A., Perino, B., Keough, V. (1998). Recovery patterns and lifestyle changes after coronary angioplasty: the patient's perspective. *Heart & Lung*, *24*(4), 253-262

Hagberg, J. M., Montain, S. L., Martin, W. H., Ehsani, A. A. (1989). Effect of exercise training in 60- to 90-year old persons with essential hypertension. *American Journal of Cardiology*, *64*, 348

Hagger, M. S., Chatzisarantis, N., Biddle, S. (2002). A meta-analytic review of the theories of reasoned action and planned behavior in physical activity: Predictive validity and the contribution of additional variables. *Journal of Sport and Exercise Psychology*, *24*(1), 3-32.

Hair, J. F., Anderson, R. E., Tatham, R. L., Black, W. C. (1995). *Multivariate data analysis with readings.* New York: Macmillan.

Halliwill, J. R. (2001). Mechanisms and clinical implications of post-exercise hypotension in humans. *Exercise and Sports Science Reviews*, *29*, 65-70.

Hambleton, R. K., Swaminathan, H., Rogers, H. J. (1991). *Fundamentals of item respond theory*. Newbury Park: Sage

Hamer, M. (2006). Exercise and psychobiological processes. Implications for the primary prevention of coronary heart disease. *Sports Medicine*, *36*(10), 829-838.

Hammar, N., Johansson, S., Hu, G., Peltonen, M., Qiao, Q., Tuomilehto, J. (2004). Metabolic syndrome, smoking, and cardiovascular mortality. (abstr). *European Journal of Cardiovascular Prevention and Rehabilitation*, *11*, 259

Haskell, W. L. (2003). Cardiovascular disease prevention and lifestyle interventions. Effectiveness and Efficacy. Journal of Cardiovascular Nursing, 18 (4), 245-255.

Hergenhahn, B. R. & Olson, M. H. (1993). *An introduction to theories of learning*. New Jersey: Prentice-Hall International, Inc.

Holroyd, E. (2003). Hong Kong Chinese family caregiving: cultural categories of bodily order and the location of self. *Qualitative of Health Research*, *13*(2), 158-170

Hospital Authority (2005/2006). Hospital Authority Statistical Report. Hong Kong Hospital Authority

Hospital Authority. (2003/2004). *Hospital Authority Statistical Report*: Hong Kong Hospital Authority.

Hoyle, Q. H. (1995). *Structural equation modeling: concepts, issues, and applications*. Thousand Oaks: Sage Publications

Hsia, J., Rodabough, R., Rosal, M. C., Cochrane, B., Howard, B. V., Snetselaar, L., et al. (2002). Compliance with National Education Program dietary and lifestyle guidelines among older women with self-reported hypercholesterolemia: the Women's Health Initiative. *The American Journal of Medicine*, *113*, 384-392.

Hsieh, S. D., Yoshinaga, H., Muto, T., Sakurai, Y. (1998). Regular physical activity and coronary risk factors in Japanese men. *Circulation*, *97*, 661-665

Hu, F.B., Stampfer, M. J., Manson, J. E., Grodstein, F., Colditz, G. A., Speizer, F. E., et al. (2000). Trends in the incidence of coronary heart disease and changes in diet and lifestyle in women. *New England Journal of Medicine*, *343*(8), 530-537.

Hu, L. T. & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle, *Structural equation modeling. Concepts, issues, and applications* (pp.77-99). Thousand Oaks: Sage Publications

Hubert, H. B., Eaker, E. D., Garrison, R. J., Castelli, W. P. (1987). Life-style correlates of risk factor change in young adults: an eight-year study of coronary heart disease risk factors in the Framingham Heart Study. *American Journal of Epidemiology*, *125*(5), 812-831

Hubert, H. B., Holford, T. R., Kannel, W. B. (1982). Clinical characteristics and cigarette smoking in relation to prognosis of angina pectoris in Framingham. *American Journal of Epidemiology*, *115*, 231-242.

Hugehes, J., Keeley, J., Fagerstrom, K. O., Callas, P. W. (2005). Intentions to quit smoking change over short periods of time. *Addictive Behaviors*, *30*, 653-662

Hunink, M. G., Goldman, L., Tosteson, A. N., Mittleman, M. A., Goldman, P. A., Williams, L. W., et al. (1997). The recent decline in mortality from coronary heart disease, 1980-1990: the effect of secular trends in risk factors and treatment. *Journal of American Medical Association*, *277*(7), 535-542

Hwang, K. K. (1977). The patterns of coping strategies in a Chinese society. *Act Psychologica Taiwanica*, *19*, 61-73

Izzo, J. L., Levy, D., Black, H. R. (2000). Importance of systolic blood pressure in older Americans. *Hypertension*, *35*, 1021-1024.

Janevic, M. R., Janz, N. K., Dodge, J. A., Wang, Y., Lin, X., Clark, N. M. (2004). Longitudinal effects of social support on the health and functioning of older women with heart disease. *International Journal of Aging and Human Development*, *59*(2), 153-175

Janghorbani, M., Ho, S. Y., Lam, T. H., Janus, E. D. (2003). Prevalence and correlates of alcohol use: a population-based study in Hong Kong. *Addiction*, *98*, 215-224

Janus, E. D. (1997). *Hong Kong risk factor prevalence study 1995-1996*. Hong Kong: Department of Clinical Biochemistry, Queen Mary Hospital of Hong Kong

Janz, N. K., Champion, V. L., Strecher, V. J. (2002). The Health Belief Model. In K. Glanz, K. B. Rimer, F. M. Lewis (Ed.), *Health behavior and health education. Theory, research, and practice*, (pp.45-66). San Francisco: Jossey-Bass A Wiley Imprint

Johnston, D. W., Johnston, M. & Pollard, B. (2004). Motivation is not enough: prediction of risk behavior following diagnosis of coronary heart disease from the Theory of Planned Behavior. *Health Psychology*, *23*(5), 533-538.

Joreskog, K. G. & Sorbom, D. (1996). *LISREL 8: User's reference guide*. Chicago: Scientific Software

Joreskog, K. G. (1993).Testing structural equation models. In K. A. Bollen & J. S. Long, *Testing structural equation models* (pp. 294-316). Newbury Park: Sage

Juonala, M., Viikari, J. S. A., Rasanen, L., Helenius, H., Pietikainen, M., Raitakari, O. T. (2006). Young adults with family history of coronary heart disease have increased arterial vulnerability to metabolic risk factors. The Cardiovascular Risk in Young Finns Study. *Arteriosclerosis, Thrombosis, and Vascular Biology*, *26*, 1376-1382.

Karner A, Goransson A & Bergdahl B. (2002). Conceptions on treatment and lifestyle in patients with coronary heart disease- a phenomenographic analysis. *Patient Education and Counseling, 47*, 137-143.

Karner, A., Goransson, A. & Bergdahl, B. (2003). Patients' conceptions of coronary heart disease- a phenomengraphic analysis. *Scandivanin Jorunal of Caring Sciences, 17*, 43-50.

Katz, N. & Hartman-Maeir, A. (1997). Occupational performance and metacognition. *Canadian Journal of Occupational Therapy, 64*(2), 53-62

Kavanagh, T., Shephard, R. J., Hamm, L. F., Mertens, D. J., & Thacker, L. (2000). Risk profile and health awareness in male offspring of parents with premature coronary heart disease. *Journal of Cardiopulmonary Rehabilitation, 20*(3), 172-179.

Kelloway, E. K. (1998). *Using LISREL for structural equation modeling.* Thousand Oaks: Sage Publications

Khalid, Y., Malina, O., Rofiah, A., Latinah, M., Thahirahtul, A. Z., Zaridah, M. S., et al. (1994). Disease and risk factor perception among patients with coronary artery disease in Kuala Terengganu. *Medical Journal of Malaysia, 49*(3), 205-208.

Khor, G. L. (2001). Cardiovascular epidemiology in the Asia-Pacific region. *Asia Pacific Journal of Clinical Nutrition, 10*(2), 76-80.

Kivimäki, M., Leino-Arjas, P., Luukkonen, R., Riihimäki, H., Vahtera, J., Kirjonen, J. (2002). Work stress and risk of cardiovascular mortality: prospective cohort study of industrial employees. *British Medical Journal*, *325*, 857.

Kline, P. (1986). *A handbook of test construction.* London: Methuen

Kline, P. (1997). *An easy guide to factor analysis*. New York: Routledge

Kline, P. (1998). *The new psychometrics. Science, psychology and measurement*. New York: Routledge

Kline, P. (2000a). *The Handbook of Psychological testing*. London: Routledge

Kline, P. (2000b). *Psychometrics primer*. London: Free Association Books

Kline, R. B. (2005). *Principles and practice of structural equation modeling*. New York: Guilford Press

Knoops, K. T. B., de Groot, L. C. P. G. M., Kromhout, D., Perrin, A., Moreiras-Varela, O., Menotti, A., et al., (2004). Mediterranean diet, lifestyle factors, and 10-year mortality in elderly European men and women. *Journal of American Medical Association*, *292*(12), 1433-1439.

Kozakova, M., Palombo, C., Mhamdi, L., Konrad, T., Nilsson, P., Staehr, P. B. et al. (2007). Habitual physical activity and vascular aging in a young to middle-age population at low cardiovascular risk. *Stroke*, *38*, 2549-2555.

Krauss, R. M., Winston, M., Fletcher, B. J., Grundy, S. M. (1998). Obesity: impact on cardiovascular disease. *Circulation*, *98*, 1472-1476

Krueger, R. A. (1988). *Focus groups. A practical guide for applied research*. Newbury Park, California: Sage Publications

Krueger, R. A. (1995). The future of focus group. *Qualitative Health Research*, *5*(4), 524-530.

Kuper, H. & Marmot, M. (2003). Job strain, job demands, decision latitude, and risk of coronary heart disease within the Whitehall II study. *Journal of Epidemiology and Community Health*, *57*, 147–153.

LaBerge, D. (1998). Defining awareness by the Triangular Circuit of attention. *Psyche, 4*(7), 1-8.

Lakatta, E. G., Levy, D. (2003). Arterial and cardiac aging: major shareholders in cardiovascular disease enterprises: part I: aging arteries: a “set up” for vascular disease. *Circulation*, *107*, 139-146.

Landrine, H & Klonoff, E. A. (1994). Cultural diversity in causal attributions for illness: the role of the supernatural. *Journal of Behavioral Medicine*, *17*, 181-193

Landrine, H. & Klonoff, E. A. (1992). Culture and health-related schemas: a review and proposal for interdisciplinary integration. *Health Psychology*, *11*(4), 267-276

Lappalainen, R., Saba, A., Holm, L., Mykkanen, H., Gibney, M. J. (1997). Difficulties in trying to eat healthier: descriptive analysis of perceived barriers for healthy eating. *European Journal of Clinical Nutrition*, *51*(suppl 2), S36-S40

LaRosa, J. C., Hunninghake, D., Bush, D., Criqui, M. H., Getz, G. S., Gotto, A. M. et al. (1990). The cholesterol facts. A summary of the evidence relating dietary fats, serum cholesterol, and coronary heart disease. A joint statement by the American Heart Association and the National Heart, Lung, and Blood Institute. The Task Force on Cholesterol Issues, American Heart Association. *Circulation*, *81*, 1721-1733.

Laufs, U., Wassmann, S., Czech, T., Munzel, T., Eisenhauer, M., Bohm, M. et al. (2005). Physical inactivity increases oxidative stress, endothelial dysfunction, and atherosclerosis. *Arteriosclerosis, Thrombosis, and Vascular Biology*, *25*, 809-814

Lee, R. E., & Cubbin, C. (2002). Neighborhood context and youth cardiovascular health behaviors. *American Journal of Public Health* *92*(3), 428-436

Lee, W. L., Cheung, A. M., Cape, D., Zinman, B. (2000). Impact of diabetes on coronary artery disease in women and men: a meta-analysis of prospectve studies. *Diabetes Care*, *23*, 962-968.

Lee, Y. S. (2003). *The construction and validation if a speech perception test for Cantonese-speaking children.* Unpublished doctoral dissertation, The Chinese University of Hong Kong

Lefler, L. L. & Bondly, K. N. (2004). Women’s delay in seeking treatment with myocardial infarction: a meta-synthesis. *Journal of Cardiovascular Nursing*, *19*(4), 251-268

Lemaitre, R. N., Psaty, B. M., Heckbert, S. R., Kronmal, R. A., Newman, A. B., Burke, G. L. (2002). Therapy with hydroxymethylglutaryl coenzyme A reductase inhibitors. *Archives of Internal Medicine*, *162*, 1395-1400

Leslie, W. S., Urie, A., Hooper, J., Morrison, C. E. (2000). Delay in calling for help during myocardial infarction: reasons for the delay and subsequent parttern of accessing care. *Heart*, *84*, 137-141

Leung, C. M., Ho, S., Kan, C. S., Hung, C. H., Chen, C. N. (1993). Evaluation of the Chinese version of the Hospital Anxiety and Depression Scale. A cross-cultural perspective.

International Journal of Psychosomatics, *40*(1-4), 29-34

Leung, C. M., Wing, Y. K., Kwong, P. K., Lo, A, Shum, K. (1999). Validation of the Chinese-Cantonese version of the Hospital Anxiety and Depression Scale and comparison with the Hamilton Rating Scale of Depression. *Acta Psychiatrica Scandinavica*, *100*, 456-461

Leventhal, H., Nerenz, D. R., Steele, D. J. (1984). Illness representation and coping with health threats. In A. Baum, S. E. Taylor, & J. E. Singer (Eds.). *Handbook of psychology and health*, (pp. 219-252). New York: Erlbaum

Lezak, M. D. (1982). The problem of assessing executive functions. *International Journal of Psychology*, *17*, 281-297

Li, J. & Hsieh, Y. (2004). Traditional Chinese food technology and cuisine. *Asian Pacific Journal of Clinical Nutrition*, *13*(2), 147-155

Lincoln, Y. N, Guba, E. G.. (1985). *Naturalistic inquiry*. Newbury Park: Sage

LoBiondo-Wood, G & Haber, J. (1994). *Nurisng research. Methods, critical appraisal, and utilization.* St. Louis: Mosby

Long, J. S. (1983). *Confirmatory factor analysis.* Newbury Park: Sage Publications

Luezak, S. E., Wall, T. L., Cook, T. A. R., Shea, S. H., Carr, L. G. (2004). ALDH2 status and conduct disorder mediate the relationship between ethnicity and alcohol dependence in Chinese, Korean, and White American college students. *Journal of Abnormal Psychology*, *113*, 271-278

Luszczynska, A., Scholz, U. & Schwarzer, R. (2005). The General Self-Efficacy Scale: multicultural validation studies. *Journal of Psychology*, *139*(5), 439-457

Lynch, J. & Smith, G. D. (2005). A life course approach to chronic disease epidemiology. *Annual Review of Public Health*, *26*, 1-35

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, *35*(6), 382-385

Lynn, R. (1996). *Awareness in healing*. Boston: Delmar Publishers

Lynn, R. B. (1993). *Development of an instrument to measure the self-efficacy of critical care staff nurses.* Unpublished doctoral dissertation, University of Virginia

Mackay, J. & Mensah, G. A. (2004). *The atlas of heart disease and stroke*. Geneva: World Health Organization.

MacLennan, R. & Zhang, A. (2004). Cuisine: the concept and its health and nutrition implications-global. *Asian Pacific Journal of Clinical Nutrition*, *13*(2), 131-135

Maguen, S., Armistead, L. P. Kalichman, S. (2000). Predictors of HIV antibody testing among gay, lesbian, and bisexual Youth. *Journal of Adolescent Health*, *26*(4), 252-25.

Manson, J. E., Greenland, P., LaCroux, A., Stefanick, M. L., Mouton, C. P., Oberman, A. et al. (2002). Walking compared with vigorous exercise for the prevention of cardiovascular events in women. *New England Journal of Medicine*, *347*, 716-725.

Marcuccio E, Loving N, Bennett SK, Hayes SN. (2003).A survey of attitudes and experiences of women with heart disease. *Women's Health Issues,* 13(1), 23-31.

Marteau TM, Kinmonth A., Pyke S, Thompson SG. (1995). Readiness for lifestyle advice: self-assessments of coronary risk prior to screening in the British family heart study. *British Journal of General Practice, 45*, 5-8.

McKee, M. & Britton, A. (1998). The positive relationship between alcohol and heart disease in eastern Europe: potential physiological mechanisms. *Journal of the Royal Society of Medicine*, *91*, 402–407.

McKinley, S., Moser, D. K. & Dracup, K. (2000). Treatment-seeking behavior for acute myocardial infarction symptoms in North America and Australia. *Heart & Lung*, *29*(4), 237-247.

Meischke, H., Ho, M. T., Eisenberg, M. S., Schaeffer, S. M., Larsen, M. P. (1995). Reasons patients with chest pain delay or do not call 911. *Annals of Emergency Medicine*, *25*(2), 193-197

Meischke, H., Larsen, M. P., Eisenberg, M. S. (1998). Gender differences in reported symptoms for acute myocardial infarction: impact on prehospital delay time interval. *American Journal of Emergency Medicine*, *16*, 363-366

Merz, C. N. B., Felando, M. N. & Klein, J. (1996). Cholesterol awareness and treatment in patient with coronary artery disease participating in cardiac rehabilitation. *Journal of cardiopulmonary Rehabilitation*, *16*(2), 117-122

Meshack, A., Goff, D. C., Chan, W., Ramsey, D., Linares, A., Reyna, R., et al. (1998). Comparison of reported symptoms of acute myocardial infarction in Mexican American versus non-hispanic whites (The Corpus Christi heart project). *American Journal of Cardiology*, *82*, 1329-1332

Miczo, N. (2004). Stressors and social support perceptions predict illness attitudes and care-seeking intentions: re-examining the sick role. *Health Communication*, *16*(3), 347-361

Mirotznik, J., Feldman, L., Stein, R. (1995). The health belief model and adherene with a community center-based, supervised coronary heart disease exercise program. *Journal of Community Health*, *20*(3), 233-47

Mishel, M. H. (1998). Methodological studies: instrument development In P. J. Brink, & M. J. Wood, *Advanced design in nursing research* (pp.235-281).and Oaks: Sage Publications

Mok, E., Lai, C., Zhang, Z. X (2004). Coping with chronic renal failure in Hong Kong.

International Journal of Nursing Studies, *41*, 205-213

Momtahan K, Berkman J, Sellick J, Kearns SA, Lauzon N. (2004).Patients' understanding of cardiac risk factors. *Journal of Cardiovascular Nursing,* 19(1), 13-20.

Mona, L., Schei, B., Hole, T. (2006). Women with myocardial infarction are less likely than men to experience chest symptoms. *Scandinavian Cardiovascular Journal*, *40*, 342-347

Montano, D. E., Kasprzyk, D.. (2002). The Theory of Reasoned Action and the Theory of Planned Behavior. In K. Glanz, K. B. Rimer, F. M. Lewis (Ed.), *Health behavior and health education. Theory, research, and practice*, (pp.67-98). San Francisco: Jossey-Bass A Wiley Imprint

Mooney, J., Shaw R., Portu, J., Sawicki, E., Kilber, L., Mooney, M. (1992). Are coronary angioplasty and coronary bypass patients different in medical status and psychosocial perception at 2 year follow-up? *Heart & Lung*, 21, 289

Moore, S. M., Dolansky, M. A., Ruland, C. M., Pashkow, F. J., & Blackburn, G. G. (2003). Predictors of women's exercise maintenance after cardiac rehabilitation. *Journal of Cardiopulmonary Rehabilitation 23*, 40-49

Moran S, Glazier G. & Armstrong K. (2003). Women smokers' perceptions of smoking-related health risks. *Journal of Women's Health, 12*(4), 363-372.

Morbidity and Mortality Weekly Report. (2001). State-specific trends in high blood cholesterol awareness among persons screened-United States, 1991-1999. *Journal of American Medical Association*, *286*(14), 1706-1707

Morgan, D. L. (1995). Why things (sometimes) go wrong in focus groups. *Qualitative Health Research*, *5*(4), 516-523

Morgan, D. L. (1997). *Focus groups as qualitative research*. Thousand Oaks: Sage Publications

Morse, J. M. & Field, P. A. (1995). *Qualitative research methods for health professionals*. Thousand Oaks: Sage Publications

Morse, J. M. & Field, P. A. (1996*). Nursing research: the application of qualitative approaches* (2nd ed.). London: Chapman & Hall

Morse, J. M. (1991). *Qualitative nursing research: a contemporary dialogue*. Newbury Park: Sage Publications

Mosca, L., Appel, L. J., Benjamin, E. J., Berra, K., Chandra-Strobos, N., Fabunmi, R. P., et al. (2004b). Evidence-based guidelines for cardiovascular disease prevention in women. *Circulation*, *109*, 672-693

Mosca, L., Ferris, A., Fabunmi, R., Robertson, R. M. (2004a). Tracking women's awareness of heart disease. An American Heart Association National Study. *Circulation, 109*, 573-579.

Mosca, L., Jones, W. K., King, K. B., Ouyang, P. R., Redberg, R. F., & Hill, M. N. (2000). Awareness, perception, and knowledge of heart disease risk and prevention among women in the United States. *Archives of Family Medicine, 9*, 506-551.

Mosca, L., Mochari, H., Christian, A., Berra, K., Taubert, K., Mills, T. et al., (2006). National study of women's awareness, preventive action, and barriers to cardiovascular health. *Circulation*, *113*, 525-534.

Mukamal, K. J. & Rimm, E. B. (2001). Alcohol's effects on the risk for coronary heart disease. *Alcohol Research and Health*, *25*, 255–261.

Murabito, J. M., Pencina, M. J., Nam, B. H., D'Agostino, R. B., Wang, T. J., Lloyd-Jones, D. et al. (2005). Sibling cardiovascular disease as a risk factor for cardiovascular disease in middle-aged adults. *Journal of American Medical Association*, *294*, 3117-3123.

Murphy, B, Worcester, M., Higgins, R., Le Grande, M., Larritt, P., Goble, A. (2005).Causal attributions for coronary heart disease among female cardiac patients. *Journal of Cardiopulmonary Rehabilitation, 25*, 135-143.

Murphy, K. R. & Davidshofer, C. O. (2005). *Psychological testing. Principles and applications*. New Jersey: Pearson Prentice Hall

Murray, R. P., Connett, J. E., Tyas, S. L., Bond, R., Ekuma, O., Silversides, C. K. et al. (2002). Alcohol volume, drinking pattern and cardiovascular disease morbidity and mortality: is there a U-shaped function? *American Journal of Epidemiology*, *155*, 242–248.

Myers, J., Prakash, M., Froelicher, V., Do, D., Partington, S., Atwood, J. E. (2002). Exercise capacity and mortality among men referred for exercise testing. *New England Journal of Medicine*, *346*, 793-801.

Nanchahal, K., Ashton, W. D., Wood, D. A. (2000). Alcohol consumption, metabolic cardiovascular risk factors and hypertension in women. *International Journal of Epidemiology*, *29*, 57–64.

Nasir, K., Budoff, M. J., Wong, N. D., Scheuner, M., Herrington, D., Arnett, D. K. et al. (2007). Family history of premature coronary heart disease and coronary artery calcification. Multi-ethnic Study of Atherosclerosis (MESA). *Circulation*, *116*, 619-626.

National Institutes of Health. (2002). Third report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Revaluation, and treatment of high Blood cholesterol in adults (Adult Treatment Panel III0: final report. (NIH Publication No. 02-5215) *Circulation*, *106*, 3143-3420

Neumark-Sztainer, D., Story, M., Perry, C., Casey, M. A. (1999). Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *Journal of the American Dietetic Association*, *99*(8), 929-937

Newcomb, M. D. (1994). Drug use and intimate relationships among women and men: separating specific from general effects in prospective data using structural equal models. *Journal of Consulting and Clinical Psychology*, *62*(3), 463-476

Newman, M. A. (1994). *Health as expanding consciousness.* New York: National League for Nursing Press.

Ng, J. Y. Y., Tam, S. F., Man, D. W. K., Cheng, L. C., Chiu, S. W. (2003). Gender differences in self-esteem of Hong Konf Chinese with cardiac diseases. *International Journal of Rehabilitation Research*, *26*, 67-70.

Nieswiadomy, R. M. (1998). *Foundations of nursing research* (3rd ed.). Stamford, Connecticut: Appleton & Lange.

Nourjah, P., Wagener, D. K., Eberhardt, M., Horowitz, A. M. (1994). Knowledge of risk factors and risk behaviors related to coronary heart disease among blue and white collar males. *Journal of Public Health Policy*, *15*(4), 443-459

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGRAW-Hill Book Company

Nunnally, J. C. & Bernstein, I. H. (1994). *Psychometric theory*. New York: McGRAW-Hill, Inc.

Nystedt, L., & Ljungberg, A. (2002). Facets of private and public self-consciousness: construct and discriminant validity. *European Journal of Personality*, *16*, 143-159

O'Brien, R & Timmins, K. (1994). The role of oxidation and glycation in the pathogenesis of diabetic atherosclerosis. *Trends in Endocrinology and Metabolism*, *5*, 329-334.

Orbell, S., Blair, C., Sherlock, K., Conner, M. (2001). The theory of planned behavior and ecstasy use: Roles for habit and perceived control over taking versus obtaining substances. *Journal of Applied Social Psychology*, *31*, 31-47.

Oxford English Dictionary. (2nd ed.) (1989). Oxford: Clarendon Press.

Pallant, J. (2001). *SPSS survival manual: a step by step guide to data analysis using SPSS for Windows (version 10).* Philadelphia: Open University Press

Papageorgiou, P., Fotinakis, P., Tsitskari, E., & Giasoglou, V. (2004). Evaluation of motivation in patients with coronary heart disease who participate in different rehabilitation programs. *Sport Journal, 7*(2), 6p.

Pender, N. J., Murdaugh, C. L., Parsons, M. A. (2002). *Health promotion in nursing practice*. New Jersey: Prentice Hall

Perkins-Porras, L., Whitehead, D. L., Steptoe, A. (2006). Patients's beliefs about the causes of heart disease: relationships with risk factors, sex and socio-economic status. *European Journal of Cardiovascular Prevention and Rehabilitation*, *13*, 724-730

Phillips, M. R. & Pearson, V. (1996). Coping in Chinese communities: the need for a new research agenda. In M. H. Bond (Eds.). *The handbook of Chinese psychology*, (pp. 429-440). Hong Kong: Oxford University Press

Plotnikoff, R. C. & Higginbotham, N. (1998). Protection motivation theory and the prediction of exercise and low-fat diet behaviors among Australian cardiac patients. *Psychology and Health*, *13*(3), 411-429.

Plotnikoff, R. C. & Higginbotham, N. (2002). Protection Motivation Theory and exercise behaviour change for the prevention of coronary heart disease in a high-risk, Australian representative community sample of adults. *Psychology, Health and Medicine*, *7*(1), 87-98.

Polit, D. F., & Hungler, B. P. (1995). *Nursing research: principles and methods.* (5th ed.). Philadelphia: J.B. Lippincott Company.

Polit, D. F., & Hungler, B. P. (1999). *Nursing research: principles and methods*. (6th ed.). Philadeophia: Lippincott Company.

Polit-O'Hara, D. (1996). *Data analysis statistics for nursing research.* Stanford: Appleton Lange

Portney, L. G., & Watkins, M. P. (2000). *Foundations of clinical research: applications to practice*. Connecticut: Appleton & Lange.

Potvin L, Richard L. & Edwards AC. (2000). Knowledge of cardiovascular disease risk factors among the Canadian population: relationships with indicators of socioeconomic status. *Canadian Medical Association Journal, 162*(9 suppl), S5-S11.

Puddey, I. B., Rakic, V., Dimmitt, S. B. & Beilin, L. J. (1999). Influence of drinking on cardiovascular disease and cardiovascular risk factors—a review. *Addiction*, *94*, 649–663.

Prochaska, J. O., Redding, C. A., Evers, K. E. (2002). The Transtheoretical Model and stages of change. In K. Glanz, K. B. Rimer, F. M. Lewis (Ed.), *Health behavior and health education. Theory, research, and practice*, (pp.99-119). San Francisco: Jossey-Bass A Wiley Imprint

Rankin, J. (1994). Biological mechanisms at moderate levels of alcohol consumption that may affect coronary heart disease. *Contemporary Drug Problems*, *21*, 45–57.

Rehm, J., Room, R., Graham, K., Monteiro, M., Gmel, G., Sempos, C. T. (2003b). The relationship of average volume of alcohol consumption and patterns of drinking to burden of disease: an overview. *Addiction*, *98*, 1209–1228.

Rehm, J., Sempos, C. T. & Trevisan, M. (2003a). Average volume of alcohol consumption, patterns of drinking and risk of coronary heart disease—a review. *Journal of Cardiovascular Risk*, *10*, 15–20.

Renaud, S. C., Criqui, M. H., Farchi, G. & Veenstra, J. (1993). Alcohol drinking and coronary heart disease. In: Verschuren, P. M., ed. *Health Issues Related to Alcohol Consumption*. Washington, DC: International Life Sciences Institute.

Rimm, E. B., Williams, P., Fosher, K., Criqui, M. H. & Stampfer, M. J. (1999). Moderate alcohol intake and lower risk of coronary heart disease: meta-analysis of effects on lipids and haemostatic factors. *British Medical Journal*, *19*, 1523–1528.

Rosenberg, L., Kaufman, D. W., Helmrich, S. P., Shapiro, S. (1985). The risk of myocardial infarction after quitting smoking in men under 55 years of age. *New England Journal of Medicine*, *313*, 1511-1514.

Rosenstock, I. M. (1974). Historical origins of the Health Belief Model. *Health Education Monographs*, *2*(1), 1-8

Rosenstock, I. M., Strecher, V. J., Becker, M. H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly*, *15*(2), 175-183

Rogers, R. W. (1975). A protective motivation theory of fear appeals and attitude change. *The Journal of Psychology*, *91*, 93-114

Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. R. Cacioppp and R. E. Petty (Eds.), *Social psychology: A source book* (pp.153-176). New York: Guilford Press

Ruston, A., Clayton, J. & Calnan, M. (1998). Patients' action during their cardiac event: qualitative study exploring differences and modifiable factors. *British Medical Journal*, *316*, 1060-1065

Rutledge, T., Reis, S. E., Olson, M., Owens, J., Kelsey, S. F., Pepine, C. J., et al. (2004). Social networks are associated with lower mortality rates among women with suspected coronary disease: The National Heart, Lung, and Blood Institute-Sponsored Women's Ischemia Syndrome Evaluation Study. *Psychosomatic Medicine*, *66*, 882-888

Rutter, D. R. (2000). Attendance and reattendance for breast cancer screening: A prospective 3-year test of the theory of planned behaviour. *British Journal of Health Psychology*, *5*, 1-13.

Ryan, C. J. & Zerwic, J. J. (2004). Knowledge of symptom clusters among adults at risk for acute myocardial infarction. *Nursing Research*, *53*(6), 363-369

Sacks, F. M., Tonkin, A. M., Shepherd, J., Braunwald, E., Cobbe, S., Hawkins, C. M., et al. (2000). Effects of Pravastatin on coronary disease events in subgroups defined by coronary risk factors. The Prospective Pravastatin Pooling Project. *Circulation*, *102*, 1893-1900

Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing & Health*, *18*, 179-183.

Sandelowski, M. (2000) Combining qualitative and quantitative sampling, data collection, and analysis techniques in mixed-method studies, *Research in Nursing & Health*, *23*, 246-255.

Sandelowski, M. (2000a). What happened to qualitative description? *Research in Nursing & Health*, *23*, 334-340

Sandelowski, M. (2001). Real qualitative researchers do not count: the use of numbers in qualitative research, *Research in Nursing & Health*, *24*, 230-240.

Schoenberg, N. E., Peters, J. C., & Drew, E. M. (2003). Unraveling the mysteries of timing: women's perceptions about time to treatment of cardiac symptoms. *Social Science & Medicine, 56*, 271-284.

Schwarzer, R. & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: a user's portfolio. Causal and control beliefs* (pp. 35-37). Windsor, England: Nfer-Nelson

Sesso, H. D., Stampfer, M. J., Rosner, B., Hennekens, C. H., Gaziano, J. M., Manson, J. E. et al. (2000). Systolic and diastolic blood pressure, pulse pressure, and mean arterial pressure as predictors of cardiovascular disease risk in men. *Hypertension*, *36*, 801-807.

Shen, J. & Tang, D. (2004). Use of General Self-Efficacy Scale (GSES) in Chinese aged people. *Chinese Journal of Clinical Psychology*, *12*(4), 342-344

Shepherd, J., Alcade, V., Befort, P.-A., Boucher, B., Erdmann, E., Gutzwiller, F., et al. (1997). International comparision of awareness and attitudes towards coronary risk factor reduction: the HELP study. *Journal of Cardiovascular risk, 4*, 373-384.

Sheps, D. S., McMahon, R. P., Becker, L., Carney, R. M., Freedland, K. E., Cohen, J. D. et al. (2002). Mental stress–induced ischemia and all-cause mortality in patients with coronary artery disease. Results from the psychophysiological investigations of myocardial ischemia study. *Circulation*, *105*, 1780-1784.

Sheeran, P., & Orbell, S. (2000). Using implementation intentions to increase attendance for cervical cancer screening. *Health Psychology*, *19*, 283-289

Single, E., Robson, L., Rehm, J. & Xie, X. (1999). Morbidity and mortality attributable to alcohol, tobacco and illicit drug use in Canada. *American Journal of Public Health*, *89*, 385–390.

Smith, S. C. Greenland, P., Grundy, S. M. (2000). Prevention Conference V. Beyond secondary prevention: identifying the high-risk patient for primary prevention executive summary. *Circulation*, *101*, 111-116

Spector, P. E. (1992). *Summated rating scale construction: an introduction*. Newbury Park, CA: Sage

SPSS Inc. (2003). *SPSS 12.0 for Windows.* Chicago: SPSS Inc.

Stampfer, M. J., Hu, F. B., Manson, J. E., Rimm, E. B., Willett, W. C. (2000). Primary prevention of coronary heart disease in women through diet and lifestyle The New England Journal of Medicine, 343(1), 17-23.

Steenkiste, B. V., Weijden, T. V. D., Timmermans, D., Vaes, J., Stoffers, J., Grol, R. (2004). Patients' ideas, fears and expectations of their coronary risk: barriers for primary prevention. *Patient Education and Counseling*, *55*, 301-307

Steffen-Batey, L., Nichaman, M. Z., Goff, D. C., Frankowski, R. F., Hanis, C. L., Ramsey, D. J., et al. (2000). Change in level of physical activity and risk of all-causes mortality or reinfarction. *Circulation*, *102*, 2204-2209.

Steptoe, A. & Brydon, L. (2005). Psychoneuroimmunology and coronary heart disease. In K. Vedhara & M. R. Irwin (Eds.). *Human psychoneuroimmunology.* (pp.107-35). Oxford: Oxford University Press

Steptoe, A., Magid, K., Edwards, S., Brydon, L., Hong, Y., Erusalimsky, J. (2003). The influence of psychological stress and socioeconomic status on platelet activation in men. *Atherosclerosis*, *168*, 57-63.

Steptoe, A., Wardle, J., Cui, W., Bellisle, F., Zotti, A. M., Baranyai, R., et al. (2002). Trends in smoking, diet, physical exercise, and attitudes toward health in European university students from 13 countries, 1990-2000. *Preventive Medicine*, *35*, 97-104

Stevens, J. (2002). *Applied multivariate statistics for the social sciences.* New Jersey: Lawrence Erlbaum Associates, Publishers

Stout, R. W. (1991). Insulin as a mitogenic factor: role in the pathogenesis of cardiovascular disease. *American Journal of Medicine*, *90*, 62S-65S.

Strauss, A. & Corbin, J. (1998). Grounded theory methodology: an overview. In N.K. Denzin & Y.S. Lincoln (Eds.). *Strategies of qualitative inquiry* (pp. 158-183). London: Sage

Streiner, D. L., & Norman, G. R. (1995). *Health measurement scales: a practical guide to their development and use*. New York: Oxford University Press

Tabachnick, B. G. & Fidell, L. S. (2001). *Using Multivariate statistics.* Boston: Allyn and Bacon

Tanasescu, M., Leitzmann, M. F., Rimm, E. B., Willett, W. C., Stampfer, M. J., Hu, F. B. (2002). Exercise type and intensity in relation to coronary heart disease in men. Journal of American Medical Association, 288, 1994-2000.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis.* Washington, DC: American Psychological Association

The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1979). *The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research*. Washington: DHEW

Tiwari, A., Lam, D., Yuen, K. H., Chan, R., Fung, T., Chan, S. (2005). Students learning in clinical nursing education: perceptions of the relationship between assessment and learning, *Nurse Education Today*, *25*, 299-308

Tod, A. M., Read, C., Lacey, A., Abbott, J. (2001). Barriers to uptake of services for coronary heart disease: qualitative study. *British Medical Journal*, *323*, 1-6

Tonstad, S. & Svendsen, M. (2005). Premature coronary heart disease, cigarette smoking, and the metabolic syndrome. *American Journal of Cardiology*, *96*, 1681-1685

Trevisan, M. T., Ram, M., Hovey, K., Russel, M., Freudenheim, J. L., Muti, P., et al. (2001b). Alcohol drinking patterns and myocardial infarction. *American Journal of Epidemiology*, *153*, S97.

Trevisan, M. T., Schisterman, E., Mennotti, A., Farchi, G., Conti, S. (2001a). Drinking pattern and mortality. The Italian Risk Factor and Life Expectancy Pooling Project. *Annals of Epidemiology*, *11*, 312–319.

Trinidad, D. R., Chou, C. P., Unger, J. B., Anderson, J. C., Li, Y. (2003). Family harmony as a protective factor against adolescent tobacco and alcohol use in Wuhan, China. *Substance Use and Misuse*, *38*(8), 1159-1171

Tullmann, D.F & Dracup, K. (2005). Knowledge of heart attack symptoms in older men and women at risk for acute myocardial infarction. *Journal of Cardiopulmonary Rehabilitation*, *25*, 33-39

Twinn, S. (1997). An exploratory study examining the influence of translation on the validity and reliability of qualitative data in nursing research. *Journal of Advanced Nursing*, *26*(2): 418-23

Twinn, S. (1998). An analysis of the effectiveness of focus groups as a method of qualitative data collection with Chinese populations in nursing research. *Journal of Advanced Nursing*, *28*(3), 654-661

Twohig, P. L. & Putnam, W. (2002). Group interviews in primary care research: advancing the state of the art or ritualized research? *Family Practice*, *19*(3), 278-284

Umilta, C. (1992). The control of consciousness. In A. J. Marcel & E. Bisiach*, Consciousness in contemporary science* (pp. 334-356). Oxford: Clarendon Press

Unal, B., Critchley, J. A. & Capewell, S. (2004). Explaining the decline in coronary heart disease mortality in England and Wales between 1981 and 2000. *Circulation*, *109*, 1101-1107

Van Jaarsveld, C. H. M., Ranchor, A. V., Kempen, G. I. J. M., Coyne, J. C., Van Veldhuisen, D. J., Ormel, J. et al. (2006). Gender-specific risk factors for mortality associated with incident coronary heart disease – a prospective community-based study. *Preventive Medicine*, *43*, 361-367.

Van Tiel, D., Van Vliet, K. P., Moerman, C. J. (1998). Sex differences in illness beliefs and illness behaviour in patients with suspected coronary artery disease. *Patient Education and Counseling, 33*, 143-147.

Vanhecke, T E., Miller, W. M., Franklin, B. A., Weber, J. E., McCullough, P. A. (2006). Awareness, knowledge, and perception of heart disease among adolescents. *European Journal of Cardiovascular Prevention and Rehabilitation*, *13*, 718-723

Visscher, T. L., & Seidell, J. C. (2001). The public health impact of obesity. *Annual Review of Public Health*, *22*, 355-375

Vlassara, H. (1994). Recent progress on the biologic and clinical significance of advanced glycosylation end products. *Journal of Laboratory and Clinical Medicine*, *124*, 19-30.

Von Känel, R., Mills, P. J., Fainman, C., Dimsdale, J. E. (2001). Effects of psychological stress and psychiatric disorders on blood coagulation and fibrinolysis. A biobehavioral pathway to coronary artery disease? *Psychosomatic Medicine, 63*, 531-544.

Wagenknecht, L. E., Zaccaro, D., Espeland, M. A., Karter, A. J., O'Leary, D. H., Haffner, S. M. (2003). Diabetes and progression of carotid atherosclerosis. *Arteriosclerosis, Thombosis, and Vascular Biology*, *23*, 1035-1041

Wall, T. L. & Ehlers, C. L. (1995). Genetic influences affecting alcohol use among Asians. *Alcohol Health and Research World*, *19*, 184-190

Walther, C., Gielen, S., Hambrecht, R. (2004). The effect of exercise training on endothelial function in cardiovascular disease in humans. *Exercise and Sport Sciences Reviews*, *32*, 129-34.

Wammes, B., Breedveld, B., Looman, C., Brug, J. (2005). The impact of a national mass media campaign in The Netherlands on the prevention of weight gain. *Public Health Nutrition*, *8*(8), 1250-1257

Wang, C. & Liu, Y. (2000). Correlation among General Self-Efficacy, Trait Anxiety, State Anxiety and Test Anxiety, *Chinese Journal of Clinical Psychology*, *8*(4), 229-230

Wang, H. X., Mittleman, M. A., Orth-Gomer, K. (2005b). Influence of social support on progression of coronary artery disease in women. *Social Science and Medicine*, *60*, 599-607

Wang, J-S., Li, -S., Chen, J-C., Chen, Y-W. (2005a). Effects of Exercise Training and Deconditioning on Platelet Aggregation Induced by Alternating Shear Stress in Men. *Arteriosclerosis, Thrombosis, and Vascular Biology*, *25*, 454-460.

Wang, Y. W., Davidson, M. M., Yakushko, O. F., Savoy, H. B., Tan, J. A., Bleier, J. K. (2003). The scale of ethnocultural empathy: development, validation, and reliability. *Journal of Counseling Psychology*, *50*(2), 221-234

Warrington, D., Cholowski, K., & Peters, D. (2003). Effectiveness of home-based cardiac rehabilitation for special needs patients. *Journal of Advanced Nursing, 41*(2), 121-129.

Wei, H., Derson, Y., Xiao, S., Li, L., Zhang, Y. (1999). Alcohol consumption and alcohol-related problems: Chinese experience from six area samples. *Addiction*, *94*(10), 1467-1476

Weinstein, N. D. (1988). The Precaution Adoption Process. *Health Psychology*, *7*, 355-386

Weinstein, N. D. (1993). Testing four competing theories of health-protective behavior. *Health Psychology*, *12*, 324-333.

Weinstein, N. D. & Sandman, P. M. (2002). The Precaution Adoption Process Model. In K. Glanz, K. B. Rimer, F. M. Lewis (Ed.), *Health behavior and health education. Theory, research, and practice*, (pp.121-143). San Francisco: Jossey-Bass A Wiley Imprint

Weinstein, N. D. & Sandman, P. M. (1992). A model of the Precaution Adoption Process: evidence form home radon testing. *Health Psychology*, *11*, 170-180

Weinstein, N. D., Rothman, A. J., Sutton, S. R. (1998). Stage theories of health behavior: conceptual and methodological issues. *Health Psychology*. *17*(3), 290-299

West, R. (2005). Time for a change: Putting the Transtheoretical (Stages of Change) Model to rest. *Addiction*, *100*, 1036-1039.

West, S. G., Finch, J. F., Curran, P. J. (1995). Structural equationmodels with ninnormal variables: problems and remedies. In R. H. Hoyle (Eds.). *Structural equation modeling: concepts, issues, and applications* (pp.56-75). Thousand Oaks: Sage Publications

Wilcox S, Stefanick ML. (1999) Knowledge of perceived risk of major diseases in middle-aged and older women. *Health Psychology 18*(4), 346-353.

Wiles, R. & Kinmonth, A. (2001). Patients' understandings of heart attack: implications for prevention of recurrence. *Patient Education and Counseling*, *44*, 161-169

Wilhelmsson, S. & Foldevi, M. (2003). Exploring views on Swedish district nurses' prescribing – a focus group study in primary health care, *Journal of Clinical Nursing*, *12*, 643-650

Williamson, J. W., McColl, R., Mathews, D. (2004). Changes in regional blood flow distribution during post-exercise hypotension in human. *Journal of Applied Physiology*, *96*, 719-24.

Wilson, P. W. F., D'Agostino, R. B., Levy, D., Belanger, A. M., Silbershatz, H., Kannel, W. B. (1998). Prediction of coronary heart disease using risk factor categories. *Circulation*, *97*, 1837-1847.

Wolk, R., Berger, P., Lennon, R. J., Brilakis, E. S., Somers, V. K. (2003). Body mass index. A risk factor for unstable angina and myocardial infarction in patients with angiographically confirmed coronary artery disease. *Circulation*, *108*, 2206-2211

Woodward, M., Lam, T. H., Barzi, F., Patel, A., Gu, D., Rodgers, A., et al. (2005). Smoking, quitting, and the risk of cardiovascular disease among women and men in the Asian –Pacific region. *International Journal of Epidemiology*, *34*, 1036-1045

World Health Organization (2002). *World health report 2002 - reducing risk, promoting healthy life*. Geneva: WHO.

World Medical Association (2002). The World Medical Association Declaration of Helsinki. Ethical principles for medical reseach involving human subjects. *Nursing Ethics*, *9*(1), 105-109.

Yeung, E. H., Pankow, j. S., Astor, B. C., Powe, N. R., Saudek, C. D., Kao, W. H. L. (2007). Increased risk of type 2 diabetes from a family history of coronary heart disease and type 2 diabetes. *Diabetes Care*, *30*(1), 154-156

Yusuf, S., Hawken, S., Ounpun, S., Dans, T., Avezum, A., Lanas, F., et al. (2004). Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART STUDY): case-control study. *Lancet*, *364*, 937-52

Zerwic, J. J. (1998). Symptoms of acute myocardial infarction: expectations of a community sample. *Heart & Lung*, *72*(2), 75-81

Zhang, J. X. & Schwarzer, R. (1995). Measuring optimistic self-beliefs: a Chinese adaptation of the General Self-Efficacy Scale. *Psychologia: An International Journal of Psychology in the Orient*, *38* (3), 174-181.

Zureik, M., Touboul, P. J., Bonithon-Kopp, C., Courbon, D., Berr, C., Leroux, C. et al. (1999). Cross-sectional and 4-year longitudinal associations between brachial pulse pressure and common carotid intima-media thickness in a general population. The EVA study. *Stroke*, *30*, 550-555.