PREDICTING FACTORS OF QUALITY OF LIFE AMONG CORONARY ARTERY DISEASE PATIENTS POST PERCUTANEOUS CORONARY INTERVENTION

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The purpose of this survey research for causal analysis was to examine the relationships between cardiac self-efficacy, social support, left ventricular ejection fraction, angina, dyspnea, depression, vital exhaustion, functional performance, and quality of life in coronary artery disease patients (CAD) post Percutaneous Coronary Intervention (PCI). The conceptual framework was guided by the revised Wilson and Cleary model. 303 patients with coronary artery disease post PCI participated in this study. The research instruments included demographic data questionnaire, quality of life index-cardiac version IV, Cardiac Self-efficacy Scale, the Social Support Questionnaire, the Rose questionnaire for angina, the Rose Dyspnea Scale, the Center for Epidemiologic Studies Depression Scale, the short-form health survey: vitality subscale (VT), and Functional Performance Inventory Short-Form, having reliability ranging from 0.72 to 0.98. Data were analyzed using descriptive statistic and a linear structural relationship (LISREL) analysis.

The results showed that the hypothesized model fit the empirical data and explained 54% of the variance of quality of life (χ^2=1.90, df=3, p=.59, χ^2/df=.63, RMSEA=.00, GFI=.99, AGFI=.98). The significant factors directly affected on quality of life of CAD patients post PCI were social support, depression, vital exhaustion and self-efficacy, the value of standardized path coefficients were .307, .239, .235, and .205, respectively. Self-efficacy is the only variable that had indirect effect on quality of life (β = .212, p<.001).

These results contribute to a better understanding of the variables that predict quality of life in CAD patients post PCI. Thus, nurses need to be aware of the effects of these contributing factors and develop appropriate nursing interventions to improve quality of life in CAD patients post PCI.

Field of Study : Nursing Science Student's Signature .....
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การศึกษาวิเคราะห์ความสัมพันธ์เชิงบรรยายในครั้งนี้ มีวัตถุประสงค์เพื่อพัฒนาและทดสอบโมเดลที่อธิบายความสัมพันธ์ของ สมรรถนะสำหรับผู้ป่วยโรคหัวใจ การสนับสนุนทางสังคม ประสิทธิภาพการทำงานของหัวใจ อาการเจ็บหน้าอก อาการหายใจลำบาก ความซึมเศร้า ความเหนื่อยล้าทางจิตใจ และความสามารถในการทำหน้าที่ ต่อคุณภาพชีวิตผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการถ่างขยายหลอดเลือดหัวใจ โดยใช้แบบจำลองภาวะสุขภาพที่สัมพันธ์กับคุณภาพชีวิตของ Wilson and Cleary ฉบับปรับปรุงใหม่เป็นกรอบแนวคิดในการศึกษา ผู้เข้าร่วมในการวิจัยคือผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการถ่างขยายหลอดเลือดหัวใจ จำนวน 303 ราย ซึ่งมารับการรักษาที่ห้องตรวจผู้ป่วยนอก แผนกอายุรกรรม จากโรงพยาบาลระดับตติยภูมิ 5 แห่ง คัดเลือกกลุ่มตัวอย่างแบบมีเกณฑ์ในการคัดเลือก เก็บรวบรวมข้อมูลโดยการสัมภาษณ์ และตอบแบบสอบถาม แบบสอบถามประกอบไปด้วย แบบสอบถามข้อมูลส่วนบุคคล แบบสอบถามสมรรถนะสำหรับผู้ป่วยโรคหัวใจ แบบสอบถามการสนับสนุนทางสังคม แบบสอบถามอาการเจ็บหน้าอก แบบสอบถามอาการหายใจลำบาก แบบสอบถามความซึมเศร้า แบบสอบถามความเหนื่อยล้าทางจิตใจ แบบสอบถามความสามารถในการทำหน้าที่ และแบบสอบถามคุณภาพชีวิต ค่าความเที่ยงของแบบสอบถามทั้งหมดอยู่ในช่วง 0.72 to 0.98. ทดสอบเส้นทางอิทธิพลของสมมุติฐานการวิจัยโดยใช้โปรแกรมลิสเรล 8.72

ผลการศึกษา พบว่าโมเดลแสดงเส้นทางความสัมพันธ์มีความสอดคล้องกับข้อมูลเชิงประจักษ์ และสามารถอธิบายความแปรปรวนคุณภาพชีวิตของผู้ป่วยโรคหลอดเลือดหัวใจ ที่ได้รับการขยายหลอดเลือดหัวใจได้ 54% (χ^2=1.90, df=3, p=.59, χ^2/df=.63, RMSEA=.00, GFI=.99, AGFI=.98) ผลการวิจัยครั้งนี้แสดงให้เห็นถึง การสนับสนุนทางสังคม ความซึมเศร้า ความเหนื่องล้าทางจิตใจ และสมรรถนะสำหรับผู้ป่วยโรคหลอดเลือดหัวใจ มีอิทธิพลทางตรงต่อคุณภาพชีวิตอย่างมีนัยสำคัญทางสถิติ (β = .307, .239, .235, และ .205 ตามลำดับ) ทั้งนี้ สมรรถนะสำหรับผู้ป่วยโรคหลอดเลือดหัวใจ เป็นตัวแปรเดียวที่มีอิทิพลทางอ้อมต่อคุณภาพชีวิตผู้ป่วยโรคหลอดเลือดหัวใจในการศึกษานี้

ข้อมูลจากการศึกษาที่ได้ในครั้งนี้ ช่วยทำให้เกิดความเข้าใจถึงปัจจัยที่ส่งผลต่อคุณภาพชีวิตผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการถ่างขยายหลอดเลือดหัวใจทั้งทางตรง และทางอ้อม เพื่อนำไปใช้ในการพัฒนาการปฏิบัติทางการพยาบาล และส่งเสริมคุณภาพชีวิตในผู้ป่วยโรคหลอดเลือดหัวใจต่อไป

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CHAPTER I

INTRODUCTION

Background and significance of the study

Quality of life has become a major outcome of health and nursing outcome because it could be used to evaluate the progress of any diseases and its impact on patients' life. Patients with coronary artery disease suffer from cardiac symptom which degrades their quality of life through the rest of their lives by affecting the daily life: personal activities, family activities, social relations, and works. However, they can live with this disease, but dealing with the sudden cardiac arrest, resulting in a different life pattern from the past.

Quality of life of coronary artery disease patients is interesting to study, because these diseases are effect within every life process. Moreover, CAD patients had a functional in each process, such as: householder, housewife, working group, owner of business, office working, that effect to their work including income of family, and high health care cost of government (Tanjunsatiean, 2002). In additional, if the patients can deal and living with these disease within good quality of life, every life process can go on with effectiveness of their works.

Quality of life is a person's sense of well-being that stems from satisfaction or dissatisfaction with the areas of life that are important to him / her, which have had

four domains: health and functioning, social and economic, psychological / spiritual, and family (Ferrans & Powers, 1998).

Coronary artery disease (CAD) is a disease of any coronary artery. One such disease is atherosclerosis, which reduces the blood flow and oxygen supply to the heart muscle and induces a symptomatic cardiac event that threatens patients' lives (Cassar, 2009). At present, revascularizations by percutaneous coronary intervention or coronary artery bypass graft (CABG) are effective treatments for symptomatic cardiac events. Otherwise, clinical evidence has indicated that PCI patients with recurrent angina had significantly lower quality of life than CABG patients did (Barnason, 2006; Durmaz, 2009). More investigation is needed to study the factors that affect quality of life among PCI patients, especially CAD patients that have received PCI and after one year of recovery from the wound healing process (Velnar, Bailey, & Smrkolj, 2009), which might have affected their quality of life.

The most important goals for treatment of CAD patients are avoidance of angina, maintenance of exercise tolerance, and reduction of mental illness (such as depression and anxiety disorder) in order to improve patients' quality of life (Ruβ et al., 2009). Thus, secondary prevention is an essential measure to prevent the deterioration of an established illness or to avoid new attacks for CAD patients. Recent studies have indicated that secondary prevention is significantly related to patients' quality of life. Methods of secondary prevention (lifestyle modification and medication treatment) include management of risk factors (lipids, hypertension, weight, diabetes, and smoking), psychosocial counseling, nutrition counseling, active physical activity, and appropriate use of cardio-protective drugs for CAD patients

(Leon et al., 2005; Byrne, Walsh & Murphy, 2005; Throndson & Sawatzky, 2010; Ruβ et al, 2009; Brassard, 2009; Piepoli et al., 2010). A meta-analysis performed by Clark, Hartling, Vandermeer, & McAlister (2005) indicated that the effect size of secondary prevention programs was small. Relevant empirical evidence suggested that more than half of the nursing interventions (57%) had statistically-significant results in terms of improving at least one outcome, such as blood pressure, lipids, physical activity, dietary intake, cigarette smoking, weight loss, psychological outcome, and quality of life (Allen & Dennison, 2010). Prior studies have shown that some dimensions of quality of life were not significantly improved, such as social support, social functioning, social isolation, physical functioning, general quality of life with a subscale of the physical health composite summary (PCS), or life stress (Lukkarinen & Hentinen, 2006; Wong & Chair, 2007; Eastwood et al., 2010). Moreover, some studies focusing on post-PCI patients have found that quality of life improved after PCI but improvement did not last long (Kattainen, Meriläinen & Sintonen, 2006; Wong & Chair, 2007; Weintraub et al., 2008). It is a challenge for professional nurses to provide and develop nursing interventions in order to improve and maintain HRQOL for CAD patients. To develop such interventions, nurses need a crystal clear picture of quality of life and its determinants.

In Thailand, a number of research studies have investigated the effects of revascularization treatment on quality of life and the findings show short-term increase in quality of life. Previous studied the quality of life among CAD patients before and after PCI reported that quality of life was improve after PCI at three months (Polkanchanakorn, 1998; Puengwongsamran, 1998).

The study of the effect of self-care promotion program on quality of life in CAD patients reported that after four months follow up quality of life not statistical significantly, but body weight were decreasing significantly ($p<.05$) (Saengsiri, 2003). One study followed up on CAD patients 1 year after they participated in an intensive lifestyle management program. The quality of life had not significantly improved (Saengsiri et al., 2010). There might be factors influencing quality of life that has been left out of the research in CAD patients post PCI. Based on literature reviews, psychological symptoms (such as depression and anxiety), angina, Vital exhaustion, and dyspnea symptoms had the most significant influence on quality of life among people with CAD (Mendes de Leon, Kop, Swart, Bär & Appels, 1996; Höfer, et al., 2005; Appels et al., 2006; Pedersen, Denollet et al., 2007; Pederson, Daemen et al., 2007; Konstantina & Helen, 2009; Škodová et al., 2010; Kimble et al., 2011). The factors such as gender, socioeconomic, social support, and personality factors have also been identified as significant predictors of quality of life in CAD patients (Bosworth et al., 2000; Veenstra, Pettersen, Rollag, & Stavem, 2004; Shaw et al., 2008; Sakai et al., 2009; Farin & Meder, 2010; Skodová et al., 2010; Norris et al., 2010). Han, Lee, Park, Park, & Cheol (2005) have pointed out that health-promoting behavior and self-efficacy are significantly related to quality of life. In summary, the relationships between the factors that affect quality of life are needed to be investigated that could be give more information among the relationship of health outcomes. Especially, CAD patients with post PCI that quality of life after PCI show improves in short time of each studies, but not last long. If the causes for quality of life are identified, then specific interventions to improve quality of life among CAD patients can be applied to those causes (Wilson & Cleary, 1995).

The theory of Wilson and Cleary (1995) is the theory cited in the quality of life literature because it merges the biomedical and social science paradigms. This model represents the causal relationship among the component of quality of life which filled the gap between the two paradigms. However, it has not been widely used (Ferrans, Zerwic, Wilbur, & Larson, 2005). Later, Ferrans and collegues (2005) revised the Wilson and Cleary model to suggest that biological functions are antecedents of quality of life and are influenced by characteristics of both individuals and environments (see Figure 1.1). They also encouraged the application of the revised model to a specific clinical population. However, few studies have investigated the application of the revised model for chronically-ill patients such as those with cancer, liver disease, and type-2 diabetes and for persons on hemodialysis (Chia, 2007; Hacker, 2009; Kring & Crane, 2009; Nokes et al., 2011).

In addition, previous studies focused only on the direct effect of these factors on health outcome, while only a limited number of studies have focused on their indirect effects. In reality, the relationships among the factors that determine health outcome are complex. Understanding and explaining the relation of both direct and indirect affecting factors of health outcome contribute valuable information about how, why, and when this phenomenon occurs (Youngblut, 1994; Youngblut, 1994; Greenland, 2000; Muller, Judd, & Yzerbyt, 2005).

In Thailand, no study has examined the causal relationship among variables that related to quality of life in CAD patients post PCI. Thus, this study examined the application of the revised Wilson and Cleary model of quality of life for CAD patients post PCI. In order to fill this gap of knowledge, this study aims to explain the relationship

between self-efficacy, social support, Left ventricular ejection fraction (LVEF), symptom of angina, dyspnea , depression, and vitality exhaustion, functional performance and quality of life in CAD patients post PCI. A clear understanding of these several factors affecting patients' perception of quality of life will facilitate the design of an appropriate nursing intervention for maintaining and improving quality of life in CAD patients post PCI . The proposed relationships between variables and concepts are defined in Figure 1.2.

Research Questions

What are the relationships between self-efficacy, social support, LVEF, angina, dyspnea, depression, vitality exhaustion, functional status, and quality of life in CAD patients post PCI?

Purpose of the study

The purpose of this study was to examine the relationships between self-efficacy, left ventricular ejection fraction, angina, dyspnea, vitality exhaustion, depression, functional status, and quality of life in Coronary Artery Disease (CAD) patients post Percutaneous Coronary Intervention.

Conceptual framework of the study

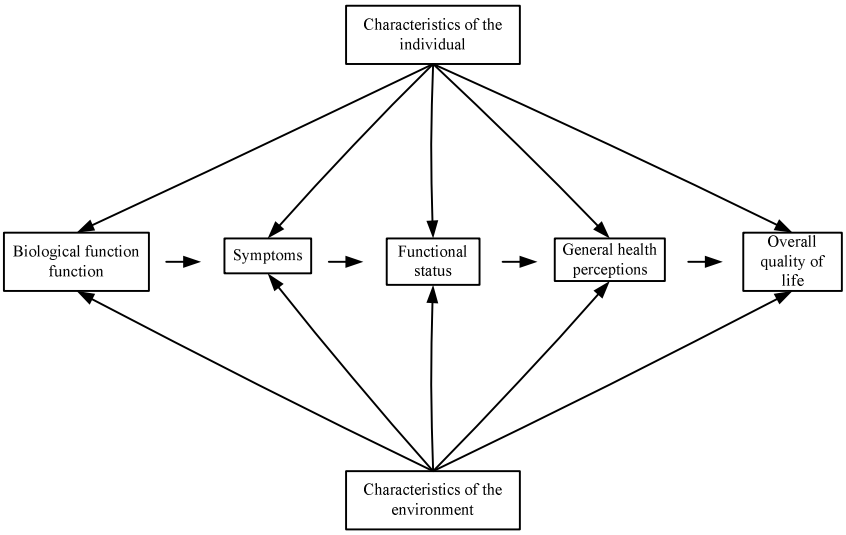
According to revised Willson & Cleary health related quality of life model and an integrative literature review, there are three main determinants of overall quality of life: biological function, symptoms, and functional status. Especially, the

characteristics of the individual and characteristics of the environment influence all of these determinants in all three domains and quality of life; more widely explain the relationship between components. For this study, general health perception was eliminated from the study since the revised model calcified unclear measures of functional status and general health perception. The revised model explained used specific subscales of the SF-36 health survey to measure functional status and general health perception. It might have a relation effect between two domains of this questionnaire. In order to solve this issue, this solution was to merge functional status and general health perceptions into one category as "functional status".

The revised model is a useful taxonomy of the variables that commonly has been used to measure quality of life and provides a theoretical background for each of the components of the revised model and examples of the instruments for measuring them. In other words, it will provide a roadmap for exploring the causal relationships among some components that affect quality of life in each clinical population as CAD patients.

Using the revised Willson & Cleary health related quality of life model and existing knowledge; this study selected the strong factors correlated with quality of life which professional nurse can manipulate specific nursing interventions for this group of patients. Such factors include individual characteristics (self-efficacy), environment (social support), biological and physiological (Left Ventricle Ejection Fraction (LVEF), symptom status (angina, dyspnea, Vital exhaustion and depression), functional status (functional performance). Meanwhile, more previous nursing studied indicates that the factors influencing quality of life can provide evidence to develop more effective nursing interventions and need to be investigated (Spiraki, Kaiteldou,

Papakonstantinous, Prezerakos & Maniadakis, 2008; Rantanen et al., 2009; Konstantina & Helen, 2009).



Adapted from "Linking Clinical Variables with Health-Related Quality of Life: A Conceptual Model of Patient Outcome," by I. B. Wilson and P. D. Clearly, 1995

Figure 1.1 The revised Wilson and Cleary model

Then, theoretical substruction provides a mechanism for reevaluating the models and creates results for the model testing that may contribute to nursing knowledge development (McQuiston & Campbell, 1997; Wolf & Heinzer, 1999; Bekhet & Zauszniewski, 2008). The constructs are highly abstract and must be operationally defined and testable and derived from the theoretical concept, as seen in Figure 1.2.

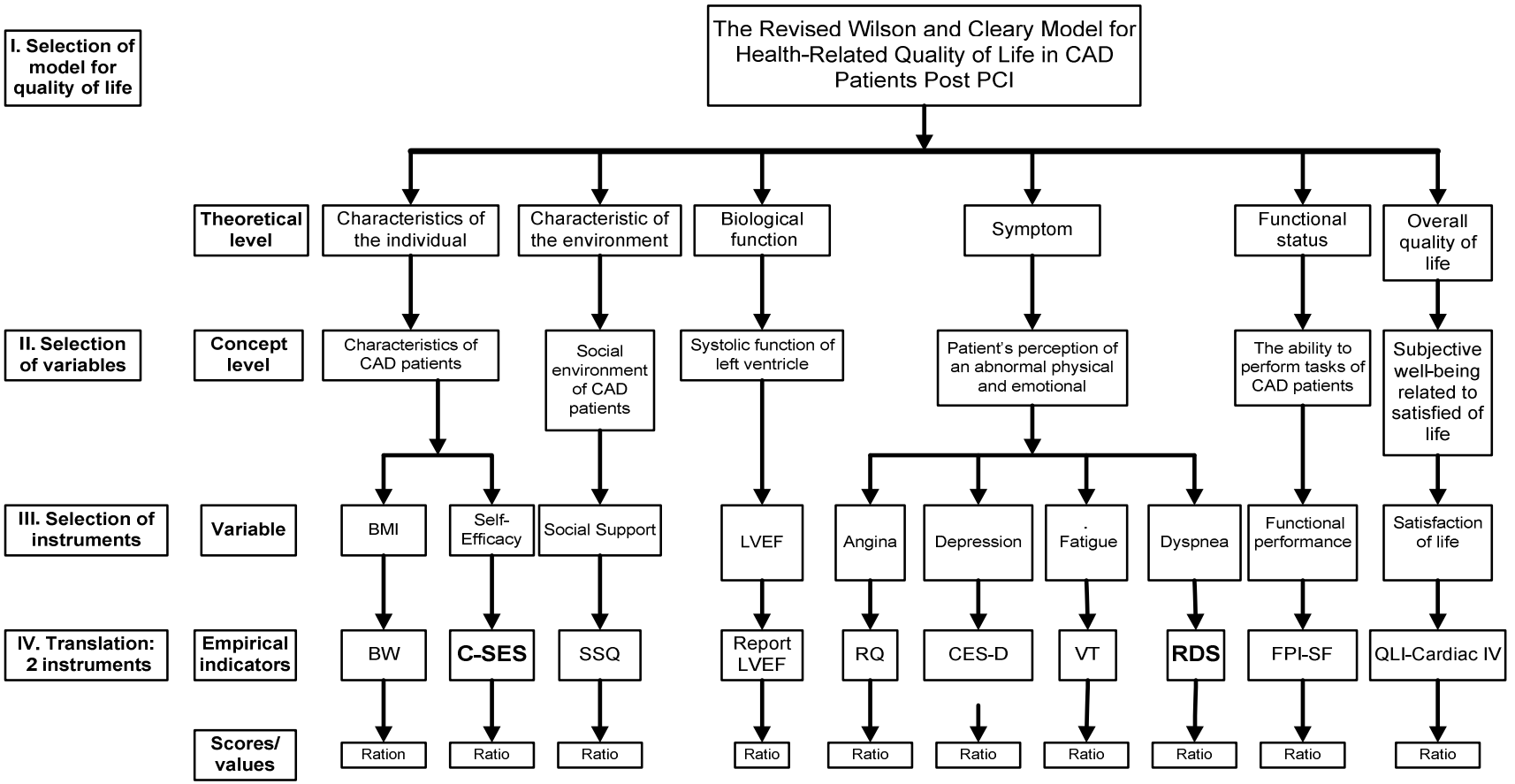


Figure 1.2 Hierarchy of the revised Wilson and Cleary model

Characteristic of the individual According to Eyler et al., 2002 (cited in Ferrans, Zerwic, Wilbur, & Larson, 2005) the characteristics of the individual can be described as the demographic, developmental, psychological, and biological factors that influence health outcomes. Based on the literature review, the biological and psychological factors affected quality of life among the CAD patients. In this study, *the self-efficacy* represents psychological factors.

Characteristic of environment The social environmental characteristics are the interpersonal or social influences on health outcomes, including the influence of family, friends, and healthcare providers (Ferrans et al., 2005). This factor can also influence susceptibility to disease or disease severity. For this study, one characteristic of the environment is *social support* in CAD patients, which actively contributes to quality of life.

The revised model clarified the links between individual characteristic and environment to biological function as an attributes to increase or decrease health problem which influence all three domains and quality of life.

Biological function Biological function is viewed broadly and encompasses molecular, cellular, and whole organ level processes, including the dynamic processes that support life. It can be described as a continuum of ideal function on one end and serious life-threatening pathological function at the other end (Ferrans et al., 2005). In this study *Left Ventricular Ejection (LVEF)* represented biological function.

Symptoms The revised model clarified the links between symptoms to functional status. According to Ferrans et al. (2005), symptoms are defined as "a patient's perception of an abnormal physical, emotional, or cognitive state," which can be categorized as physical, psychological, or psychophysical. Increasing of multiple symptoms in CAD patients will affect a decrease in functional status and low quality of life, where the symptoms are shown as three groups: 1) severe ischemic pain 22%; 2) severe fatigue, sleep disturbance, and shortness of breath 29%; and 3) mild symptoms 49% (Lindgren et al., 2008). Based on the literature review, *angina*, fatigue and *dyspnea* symptoms are the most common symptoms that influence quality of life in CAD patients (Kimble et al., 2011). Including previous study presented depression is the one psychological factor that influences quality of life of CAD patients (HÖfer et al., 2005),

Functional status In this model, functional status is characterized as the ability of the individual to perform defined tasks and adjust to his/her environment and it can be measured either subjectively or objectively over a given time frame (Wilson & Cleary, 1995). In Leidy's framework, functional status has four dimensions: function capacity, functional performance, functional capacity utilization, and functional reserve, which are useful for clarifying functional status in CAD patients (Coyne & Allen, 1998, Ferrans et al., 2005, Miller-Davis, Marden & Leidy, 2006). This study focuses only one dimension, *functional performance*.

Overall quality of life The last concept of the revised Wilson and Cleary model is overall quality of life. Wilson & Cleary (1995) defined overall quality of life as subjective well-being related to how happy or satisfied someone is with life as a whole. However, this definition is too broad to be operationally defined in research. Therefore

the revised model has been operationalized quality of life as satisfaction of life (Ferrans et al., 2005). To date, *quality of life* is the most clinical outcome in health research, especially nursing research.

The rationale and empirical evidence to support the hypotheses are presented as follows:

Self-efficacy

The revised model identified the psychological factors as cognitive appraisal, affective response, and motivation as the dynamic intrapersonal factors by Cox, 1982, 2003 (Ferrans et al., 2005). Cognitive appraisal is viewed as knowledge, beliefs, and attitudes toward an illness, treatment or behavior which the same as Bandura defined self-efficacy as participants' confidence in their ability to take care of their health (Bandura, 1977).

Prospective study of patients after cardiac catheterization reported that the self-efficacy score significantly predicted physical function, social function, and family function (Sullivan, LaCroix, Russo, & Katon, 1998). Current studies indicate that self-efficacy is a social cognitive variable that was strong mediating behavior change and influences particular in many activities as predicted in cardiac rehabilitation to maintain physical activity (Luszczynska & Sutton, 2006; Millen & Bray, 2009). A structural model to represent quality of life of chronic CAD patients from Han et al (2005) suggested that self-efficacy has a significantly direct effect on quality of life. The Heart and Soul study

presented that CAD patients low cardiac self-efficacy is associated with poor health status, depressive symptom (Sarkar, Ali, & Whooley, 2007).

Therefore, it was hypothesized that self-efficacy has a positive direct effect on quality of life and an indirect effect on quality of life through symptom and functional status (see figure 1.3).

Social support

Social support is an important factor influencing quality of life in CAD patients. The CAD patients that received social support had a higher overall quality of life score with significant improvements in quality of life (Schulz et al., 2008; Durmaz et al., 2009). The effect of social support from partner, friends and grandchildren was significantly influenced lower level in physical and psychological dimensions of quality of life. Social support was then selected as a characteristic of the environment in CAD patients (Kristofferzon, LÖfmark, & Carlsson, 2005).

Thus, it was expected that social support would have a positive direct effect on quality of life and a positive indirect effect through symptom and functional status (see figure 1.3).

Left Ventricular Ejection (LVEF)

The revised model clarified the links between individual characteristic to biological function as an attributes to increase or decrease health problem, and influence all three domains and quality of life.

Left Ventricular Ejection (LVEF) is the single most used non-invasive measure of cardiac function in clinical practice. LVEF presented the important prognostic factor for survival after Myocardial Infarction (MI), in stable coronary artery disease CAD, and in heart failure (Clayton et al., 2005). In this study LVEF represents biological function. LVEF was an independent determinant the prognosis of Acute myocardial infraction (AMI) for reduced quality of life in CAD patients with a history of AMI (Pettersen, Kvan, Rollag, Stavem, & Reikvam, 2008).

In this study it was hypothesized that LVEF has a positive direct effect on quality of life and a positive indirect effect on quality of life through symptom and functional status (see figure 1.3).

Angina symptom

Chest pain predicted disease-specific quality of life (Echteld, Elderen, & Kamp, 2003), and angina frequency had a large statistically-significant direct effect on quality of life (Norris, Murray, Triplett, Hegadoren, 2010) with a strong relationship between depression and angina (Sundel et al., 2007).

It is hypothesized that angina has a negative direct effect on quality of life and an indirect effect on quality of life through functional performance, and negative direct effect on depression (see figure 1.3).

Dyspnea symptom

Dyspnea is the subjective experience of breathing distress and limits the activities of CAD patients. Dyspnea is a common symptom assessment that identifies asymptomatic patients with increased risk of death from cardiac events (Abidov et al.,

2005). The PREMIER registry study reported that dyspnea was strongly associated with impaired quality of life (Arnold et al., 2009).

Thus, it was hypothesized that dyspnea has a direct effect on quality of life and an indirect effect on quality of life through functional status (see figure 1.3).

Depression

Depression is the one psychological factor that influences quality of life of CAD patients (HÖfer et al., 2005), which relevant to the previous reviews of depression that depression is an important predictor of change in quality of life (Staniute & Varoneckas, 2005; Shen, Myers, & McCreary, 2006; Škodová et al., 2010). Furthermore, depression is the strongest predictor of quality of life which the results relevance to Western countries (Höfer et al., 2005; Yusim, 2006; Broddadottir, Jensen, Norris, & Graham, 2009). Previous studies reported that major depression was associated with functional disability in CAD patients (Spertus, McDonell, Woodman, & Fihn, 2000; Steffens et al., 1999; Sullivan, LaCroix, Baum, Grothaus, & Katon, 1997).

Therefore, it was hypothesized that depression has a negative direct effect on quality of life and an indirect effect through functional perfotmance (see figure 1.3).

Vital exhaustion

Vital exhaustion is a common feeling in CAD patients that includes tiredness and exhaustion, and these are addressed in this study. This symptom found in cardiac event after coronary angioplasty (Bonet, Mautner, Kerbage, Bonet, & Perez Lloret, 2009; Kop, Appels, Mendes de Leon, de Swart, & Bar, 1994). Vital exhaustion is still highly

prevalent1 year post PCI and predicted quality of life (Appels et al., 2006; Pedersen et al., 2007; Škodová et al., 2010). However, no study this symptom in Thailand. This is a n interersting symptom and its relationship with quality of life in CAD patients' needs more investigation. According to Pedersen et al. (2007), vital exhaustion is still highly prevalent 1 year post PCI and predicted quality of life. Thus, this study will focus on vital exhaustion, which affects quality of life.

In the current study, it was hypothesized that vitality has a direct effect on quality of life and an indirect effect on quality of life through functional status (see figure 1.3).

Functional performance

Functional performance refers to activities that one performs on a day-to-day basis and is assessed by the level of physical activity and energy expended. Lower quality of life of CAD patients were due to lower in the physical function dimension in many studies which has a direct effect on quality of life (Unsar, Sut, & Durna, 2007; Wong & Chair, 2007; Eastwood et al., 2010). Therefore, it was hypothesized that functional performance has a direct effect on quality of life (see figure 1.3).

The literature review has provided empirical evidence for deriving the revised model. Although the five factors were significantly related in the theorized direction, general health perception is related in the part of quality of life dimensions. Thus, general health perception was not examined in this study. Furthermore, individual and environment characteristics were associated with the four central variables (endogenous

variables): biological function, symptom, functional status, and quality of life. The study by HÖfer et al (2005) reported that the overall model explained approximately 49% of the variance in overall quality of life, which also supports the application of structural equation modeling in the investigation of quality of life.

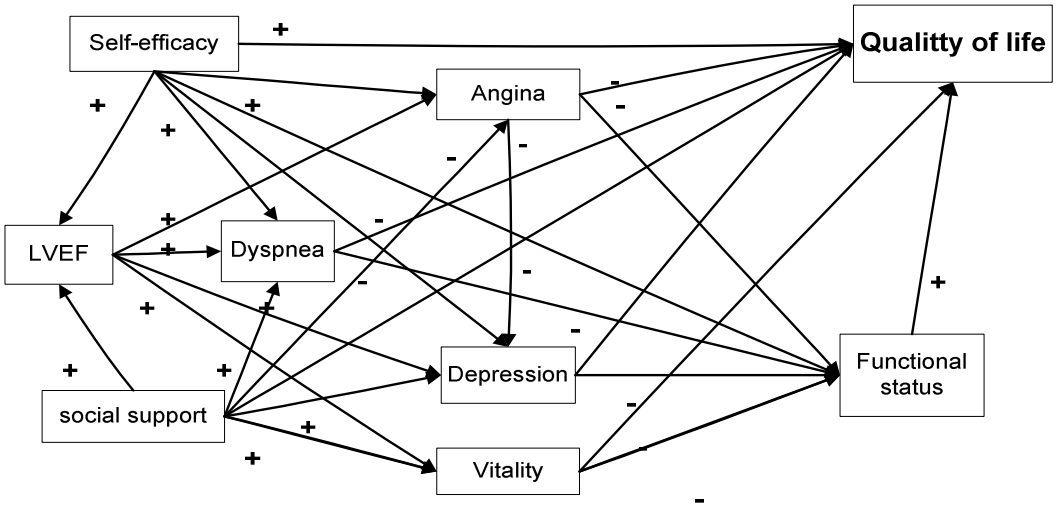


Figure 1.3 Hypothesized model for CAD patients post PCI

Research Hypotheses

1. Cardiac self-efficacy has a positive direct effect on quality of life, and positive indirect effect though LVEF, symptoms and functional performance in CAD patients post PCI.

2. Social support has a positive direct effect on quality of life, and indirect effect though LVEF, symptoms and functional performance in CAD patients post PCI.

3. LVEF has a positive direct effect on quality of life, and indirect effect though symptom and functional performance in CAD patients post PCI.

4. Angina has a negative direct effect on quality of life, and indirect effect through functional performance. In addition, angina has negative direct effect on depression in CAD patients post PCI.

5. Depression has a negative direct effect on quality of life and indirect effect though the functional performance of CAD patients in CAD patients posts PCI.

6. Vital exhaustion has a negative direct effect on quality of life, including a negative indirect effect through functional performance in CAD patients post PCI.

7. Dyspnea has a negative direct effect on quality of life, including a negative indirect effect through functional performance in CAD patients post PCI.

8. Functional performance has a positive direct effect on quality of life in CAD patients post PCI.

Scope of the study

This study examined factors predicting quality of life of Thai CAD patients post PCI in Thailand. The populations were CAD patients post PCI and recruited from outpatient units of the secondary and tertiary hospitals in Thailand. The time of the study for data collection was November 2011 to February 2013. The independent variables were self-efficacy, social support, angina, dyspnea, vital exhaustion, depression, and functional performance, while quality of life was the dependent variable of the study.

Operational Definitions

Quality of life (QOL) is defined as a person's sense of well-being that stems from satisfaction or dissatisfaction, and important or unimportant with the areas of live of CAD patients post PCI within four domains, 1) health and functioning, 2) social and economic, 3) psychological/spiritual, and 4) family.

For this study, quality of life was measured using the Quality of Life Index-Cardiac Version- IV (Saengsiri et al., 2010). A high score was defined as good quality of life.

Cardiac self-efficacy is the patients' confidence in their ability to perform certain health behaviors that influence their engagement in and actual performance of those behaviors, which in turn influence health outcome of CAD patients post PCI.

The self-efficacy was measured by cardiac self-efficacy questionnaire that translated to Thai in this study. Higher scores indicate a greater level of cardiac self-efficacy to maintain function.

Social supports are the interpersonal or social influences on health outcomes, including the influence of family, friends, and healthcare providers of CAD patients post PCI.

The social supports were measure by the Social Support Questionnaire (SSQ) (Khuwatsamrit et al., 2006). The higher score show the higher level of social support

Left Ventricular Ejection Fraction (LVEF) is the measure of systolic function of the left ventricle indicated.

The LVEF was used as the indicator of biological and physiological function by echocardiography or multiple gated-acquisition radionuclide ventriculography (MUGA). According to the reported, LVEF in this study were normal (>50%) (McGowan & Cleland, 2003).

Angina is chest discomfort that occurs when there is a decreased blood oxygen supply to an area of the heart muscle. CAD patients who reported angina, that there were felt like a pressure, heaviness, tightening, squeezing, or aching across the chest, particularly behind the breastbone. This pain often radiates to the neck, jaw, arms, back, or even the teeth.

This study used the Rose Questionnaire for angina (Udol & Mahanonda, 2000) for measure angina. The score of 0 -1 presenting no chest pain, 2-7 borderline chest pain, and 8 indicating chest pain.

Dyspnea is the subjective experience of breathing discomfort, which assesses the patients' level of dyspnea with common activity in CAD patients post PCI.

The dyspnea used the rose dyspnea scale which translated in Thai in this study. This questionnaire has scores ranging from 0 to 4, with 0 indicating no dyspnea and increasing scores indicating more limitations due to dyspnea.

Vital exhaustion is state characterized by unusual fatigue, loss of energy, increased irritability, and feelings of demoralization in CAD patients post PCI.

This study used the SF-36, the vitality subscale (Jirarattanaphochai, Jung, Sumananont, & Saengnipanthkul, 2005), and representing with higher values indicating more vital exhaustion.

Depression is an indicated as a low mood and aversion to activity that can affect a person's thoughts, behavior, feelings and physical well-being. It may include feelings of sadness, depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance in CAD patients post PCI.

The Center for Epidemiologic Studies Depression Scale (CES-D) was used to measure depression in this study (Vorapongthorn, Pandi, & Triamchaisri, 1990). The report of depression score in Thai people were 19 or higher considering indicative of depression (Kuptniratsaikul & Pekuman, 1997).

Functional performance is the day-to-day activities that CAD patients engage in their lives to meet basic needs, fulfill usual roles, and maintain their health of CAD patients post PCI.

This study used the Functional Performance Inventory Short-Form (FPI-SF) for measure the functional performance (Sriprasong & al., 2009). The FPI-SF was higher scores indicate grater functional performance.

Expected outcomes and benefits of the study

1. This research contributes to the body of knowledge in nursing science, and provides basic knowledge for clinical nurses to understand the factors that influence quality of life among CAD patients post PCI. Especially, information of direct effect and indirect effect in each variable that effect on quality of life of CAD patients post PCI. Advanced practice nurse will be able to use the finding of this study to develop research and create nursing intervention for CAD patients.

2. The value of the path model provides scientific information for healthcare providers, multidisciplinary teams, and policy makers to provide suitable support to enhance quality of life for CAD patients.

CHAPTER II

LITERATURE REVIEW

This literature review was an integrative review of the theoretical and interrelationships among the factors affecting quality of life in coronary artery disease (CAD) patients. The reviews were divided into four parts:

1) Patients with Coronary Artery Disease (CAD)

1.1 Treatment for CAD

1.2 Nursing intervention

2) Quality of life of CAD patients

3) Revised Wilson and Cleary model for Health-Related Quality of Life

4) The relationships among self-efficacy, social support, angina, dyspnea, depression, vital exhaustion, functional status, and quality of life in CAD patients.

1) Patients with Coronary Artery Disease (CAD)

Coronary artery disease patients have cardiovascular disease, which is the leading cause of death in the world and 60% of such chronic disease patients have coronary artery disease (WHO, 2005). In Thailand, the situation of non-communication chronic disease is similar to that in other countries. Cardiovascular disease is the second leading cause of death in Thailand after cancer, but it is the first leading cause of admitting rate to the hospital, which has increased from 486.3 : 100,000 in 1998 to 1,767.7 : 100,000 in 2008 (Bureau of Non-communicable disease, 2008). A national registration of acute coronary syndrome (ACS) registry collected by the Heart

Association of Thailand under The Royal Patronage indicates that the overall in-hospital mortality and complication in Thailand are higher than those in the Western countries (Maraprasertsak, 2006 ; Srimahachota, Kanjanavanit & Boonyavatavej, 2007). These findings suggest that there are benefits from improving management guidelines and alerting the government to adopt an appropriate health policy to solve these problems, specifically because the current policy was drafted to prevent many diseases without considering this second leading cause of death. Coronary Artery Disease (CAD), or stable angina, is mostly caused by the obstruction of at least 1 large epicardial coronary artery by plaque, and according and according to the Framingham study (Cassar et al., 2009), approximately 50% of all cardiovascular disease is chronic CAD disease. Patients with CAD suffer from prolonged pain during the course of their illness and decreased quality of life. CAD is an illness which is related to physical and psychological functions that are affected as a result of the disease. Angina symptoms are due to an imbalance between myocardial oxygen demand and supply, which is caused by myocardial ischemia. CAD patients, who received medical treatment according to angina symptom, had received treatment of revascularization treatment between Percutaneous Coronary Intervention or Coronary Artery Bypass Surgery (CABS). Revascularization treatments are performed significantly worldwide for relief of angina symptoms, most of which are from revascularization (Bateman & Prvulovich, 2004; Timmis, Feder, & Hemingway, 2007). Thus, the goal of treatment of CAD patients is improvement of the prognosis and increased quality of life for the patients (Ruβ et al., 2009).

1.1 Treatment of CAD

The purpose of treatments patients with coronary artery disease are decrease angina and mortality rate. The treatments are based on many factors determined symptoms, a physical exam, and diagnostic testing. The option for treatments are cardiovascular drugs, Percutaneous Coronary Intervention (Kabasakal et al.), and Coronary Artery Bypass Graf (CABG).

Cardiovascular drugs

Treatment of coronary artery disease is aimed at controlling symptoms and slowing or stopping the progression of the disease. Medications could help the heart work more efficiently and receive more oxygen-rich blood. The medications are prescribed depending on the prognosis of CAD, the person's health condition, and specific heart condition. CAD patients require medical therapy to prevent the disease from progressing and recurrent cardiovascular events. Three classes of medication are essential to therapy: lipid-lowering, antihypertensive, and antiplatelet agents (Clevelandclinic, 2009).

Percutaneous Coronary Intervention (PCI)

This brings about highly effective revascularization for CAD patients. The PCI procedure fixes the condition of the coronary arteries with the use of the ballon or stent. Although CAD patients can improve their prognosis and recover from chest pain, PCI does not cure the disease. CAD patients are likely to have a restenosis at approximately 20-30% (Wijns et al., 2010). There are two types of PCI, 1) percutaneous transluminal coronary angioplasty (PTCA), or plain old balloon angioplasty (POBA), and 2) stenting. PCI or POBA are uses only a balloon for extending the vessel. Stents are placed into the artery based to prevent artery collapse

and restenosis (Sukonthasarn & Kuanprasert, 2002). At present, the news equipment and technology improved stent as Drug eluting stent (DES). DES is a coronary stent placed into narrowed coronary arteries which slowly releases a drug (drugs coated stent) to block cell proliferation. DES is increasing clinical use for treatment of coronary artery narrowing risk lower rates of major adverse cardiac events, and improve patients outcomes, but should be concerns the risk of stent thrombosis. DES is effective in reducing revascularization in CAD patients with highest risk for restenosis (Tu et al., 2007).

Coronary Artery Bypass Graf (CABG)

Coronary artery bypass surgery is a treatment for patients with obstructive coronary artery with complex lesions. The physician will use the internal thoracic artery from the left arm or veins in the legs from the ankle to the thigh, stitched with veins from arteries to carry blood to the heart muscle (Mohr et al., 2013).

At the present time, there are many high technologies for treatment of patients with CAD. However, the mortality rates of CAD have not declined. So, the role of the advance practice nurse specialty regarding cardiovascular has been challenge for management of patients in this population.

1.2 Nursing intervention

Coronary artery disease brings with it complex risk factors such as: overweight, high blood pressure, and high cholesterol level. The linkages between behaviors and risk factors are interesting, such as: we can say that the behavior of eating more fruits and vegetables is the cause of a decrease in low-density lipoprotein induced by dietary antioxidants (Farquhar, 1993). WHO (2005) has reported that the

majority of chronic diseases deaths among all age groups are an unhealthy diet, physical inactivity, and tobacco use, and there have been many projects created to solve this problem until the present time. Nurses tried to promote physical activity, diet control: low fat and eat more fruit and vegetable, and quick smoking that can decrease body weight, decrease serum lipid level and stop smoking, that the cause of chronic disease death including coronary artery disease.

Behavior change is the most interesting strategies for cardiovascular nursing in terms of helping coronary artery disease patients decrease the risk factors, improve or maintain the cardiac health of both healthy and sick individuals, and still have a good quality of life (Fridlund, Hidebrandt, Hildingh, & Lidell, 2007).

Aldana et al. (2006) examined the effect of the Ornish Program for reversing Heart Disease and Cardiac rehabilitation (CR) on the psychosocial risk factors and quality of life of patients with coronary artery disease, and they found that the Ornish group demonstrated significant improvement in all 12 outcomes and significantly affected the psychosocial risk factors and quality of life at 3 and 6 months follow up. This study showed the significant of effect of the Ornish Program on coronary artery disease patients. Although lifestyle intervention was a success in reducing risk factors regarding short-term effects, patients needed to be encouraged to improve their healthy behaviors in long-term care. Presently, we know how to help patients change their behavior and about the many factors affecting adherence and lifestyle change in preventive cardiology, such as: stage of change/decisional balance, inconvenience and lifestyle barriers, social support and health belief perceived benefits of lifestyle change, perceived barriers to lifestyle change and self-efficacy beliefs (Bellg, 2003),

A review of the key factors that facilitate and obstruct lifestyle change revealed that several variables are significant predictors of lifestyle change. The variables are: past health behavior, demographics, personality traits, social support, family functioning, ongoing contact with healthcare providers, an individual's social ecology or network predict lifestyle change, and adherence to lifestyle intervention (Harris, Oelbaum, & Flomo, 2007). On the other hand, it is difficult for patients to change their lifestyle; nevertheless, these findings increased our understanding of this area and helped nursing professionals to develop nursing interventions to improve and maintain the good quality of life of coronary artery disease patients.

The behavioral changes during Phase III of the cardiac rehabilitation program were recorded using the "stages of change" model, and found that patients had modified their behavior during the program (6 or 8 weeks) and showed significant improvement, whereas no significant improvement in the risk factors at 6 months was shown. They concluded that patients enter Phase III rehabilitation at different stages in their risk behavior. This model is a useful, simple method of recording behavioral change and could be used effectively for patients' individual care plans (McKee, Bannon, Kerins, & FitzGerald, 2007).

The pilot study with randomization were comparing a health-related lifestyle self-management intervention based on the transtheoretical model (TTM) with standard cardiac rehabilitation at 8 weeks follow up, found that there was no significant difference in diastolic blood pressure or cholesterol level, but the participants reported high levels of satisfaction with this intervention (Fernandez et al., 2009). These two reports used the TTM for short term care of cardiac rehabilitation, which is a useful method of recording behavioral change, and as stated,

the patients showed a high degree of satisfaction but were not able to achieve the goal of risk factor reduction.

In the north of Thailand, study about health behavior in coronary artery disease patients has found that the subjects had a moderate level to a good level of overall health behaviors (Liangchawangwong, 1998; Phuritatkul, 2003; Homthong, 2004). The effect of Home Cardiac Rehabilitation with coronary artery disease patients was that it could improve peak oxygen uptake as well as the quality of life within 12 weeks (Keawcharoenta, 2002). These findings have been used as basic data for nurses to modify the health behavior of coronary artery disease patients.

A self-care promotion program for coronary heart disease patients reported that this program could decrease the mean body weight in the experimental group more than in the control group ($p < .05$), and the LDL level significantly increased. The mean QOL scores were not significantly different ($p > .05$). These findings suggest that an educational class for knowledge and training in self-care for the reduction of cardiovascular risk factors, as well as to learn about continued supportive measures, can assist patients that are overweight or obese in terms of reducing their body weight within 4 months (Saengsiri, 2003).The short-term effect of an intensive lifestyle modification program can reduce risk factors, such as body weight and cholesterol, and increase anti-oxidants in coronary artery disease patients (Jatuporn et al., 2003; Tosukhowong et al., 2003).

The report, “Health promotion effect of an intensive lifestyle management program on quality of life and oxidative stress in patients with coronary heart disease,” found that no difference significant change on serum lipid, body mass index and quality of life but protein carbonyl was significant change in 6 and 12 months

follow up (Srimahachota, Saengsiri, Boonyaratavej-Songmuang, & Tosukhowong, 2009).

2) Quality of life in CAD patients

Coronary artery disease patients sometimes have sudden cardiac arrest, which is a crisis situation of course for them and their families. During that time, their quality of life is very low because they severely face unknown symptoms of this disease such as cardiac pain, palpitation, hypotension, hypertension, headache, nausea and vomiting, fear of death, anxiety, depression, and not feeling comfortable (Tumnong, 1997). This will be a serious event for their families if the patient is a householder because they will have high mortality rate, and their treatments will be very expensive.

Quality of life with coronary artery disease has been widely encourage and its outcome has been measured in clinical practice and health research. A meta-analysis of quality of life in cardiac patients indicates the effect size of .31, which is considered small but it has a significant positive effect on pharmacologic, mechanical, surgical, nursing, or other treatments on quality of life (Kinney, Burfitt, Stullenbarger, Rees, & DeBolt, 1996). Previous results were similar to this study, indicating that revascularization is a predictor of quality of life improvement, including study in Thailand (Polkanchanakorn, 1998; Puengwongsamran, 1998)**.** The previous study compared pre- and post-revascularization and found that quality of life can be improved with higher physical and mental health scores but lower social function scores (Leingkobkij, 1998). Furthermore, the assessment of quality of life by identifying symptoms, physical functional status, social functioning, and

psychological status can indicate the major outcome of care of coronary artery disease patients that have instability and whose life is threatened .

A measurement of the outcomes of CAD rely on biological parameters, psychosocial factors, risk factors and mortality rate, whereas perceived quality of life is still important to the measurement that contributes to understanding of a patient's reactions to illness and enhanced insight into assessment of health perception (Swenson & Clinch, 2000).

Quality of life has become a major goal outcome of healthcare practice and research because it has been used to assess measured changes in physical, functional, mental, and social health in order to evaluate the human and financial costs and benefits of intervention (Testa & Simonson, 1996). The World Health Organization (WHO) defines quality of life as "an individual's perception of his/her position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHO, 2011). Thus, this is the basic measurement used to evaluate quality of life, which is a broad concept and consists of a person's physical health, psychological state, personal beliefs, and social relationships. As a result, quality of life as perception outcome is reflex the result of care . So, the nature of the outcomes that have been found has been categorized as: 1) clinical end points related to the patients' response to health intervention; 2) functional status related to the maintenance or improvement of physical, mental, and social functioning; 3) perceptual outcome related to patients' general well-being as a result of care; and 4) financial outcomes related to use of resources and costs (Sidani & Braden, 1998). Also, at present, the concept of quality of life is widely used in health research and have many research investigate especially in healthcare. The term

quality of life then is interchangeable with Health-related Quality of Life, which narrows the focus to the effect of health. Illness and treatment of quality of life were excluded aspects of quality of life that were not related to health as cultural, political or societal attributes (Ferrans et al., 2005).

Patients with CAD suffer from cardiac symptoms, which degrades their QOL through the rest of their life by affecting their daily life in personal activities, family activities, social relations, and work. However, they can live with this disease, but they have to deal with the possibility of sudden cardiac arrest all the time, resulting in a different life pattern from the past. The health-related quality of life of CAD patients is interesting to study, because these diseases affect every life process such as: householder, housewife, working group, owner of business, office work, which affect their work including income of family, and high healthcare costs by the government (Tanjunsatiean, 2002). Moreover, if their patients can deal and live with this disease with a good quality of life, every life process will go on with the effectiveness of their work.

Roebuck, Furze & Thompson (2001) explored and gained insights into the effects of myocardial infarction on health-related quality of life. Thirty-one participants diagnosed with myocardial infarction (6 weeks after discharge) were recruited and interviewed at home. Semi-structured interviews were conducted based on a guide developed from a review of the literature pertaining to quality of life and expert opinion. The results showed seven major categories: 1) physical activity/symptoms, 2) insecurity, 3) emotional reactions, 4) dependency, 5) lifestyle modification, 6) concern over medication, and 7) side-effects. The major problems

were breathlessness, insecurity and feelings of over-protection, and dissatisfaction with information and support.

The development of a quality of life instrument in Thai patients with post MI (at least 2 months) was carried out with 526 participants with post MI. The findings have 9 dimensions of effects on quality of life: 1) symptoms and complications, 2) psychological comfort, 3) family ties, 4) adapted ADL, 5) economic stability, 6) spiritual health, 7) social engagement, 8) basic physical capacity, and 9) feeling of empowerment (Lortajakul, Yunibhand & Jitpanya, 2007).

For elective coronary angiography study 753 outpatients admitted for elective cardiac catheterization. Four instruments were used to measure quality of life: Canadian Cardiovascular Society (CCS), the New York Heart Association, and two self-reported quality of life, the Seattle Angina Questionnaire, and the Short Form 36 (SF-36). The results reported that the physical dimension was significant associations of CCS and NYHA on quality of life (Ulvik et al., 2006).

Durmaz et al. (2009) evaluated the quality of life of patients with coronary heart disease in Turkey and the factors associated with the quality of life of these patients. Eighty-five patients diagnosed with CAD were enrolled in this study and Ferrans and Powers' Quality of life Index Cardiac Version-IV was used for data collection. This study concluded that marital, financial status, prior MI, and having difficulty in daily work were the main effects on the quality of life of patients with CAD. Patients that had social support and psychosocial activity increased their quality of life. Two longitudinal studies on health-related quality of life in different periods following PCI short term and long-term follow up.

Wong & Chair (2007) investigated the changes of quality of life from before PCI and 3 months after PCI in Hong Kong. Sixty-five patients were enrolled and completed the data collection: the Seattle Angina Questionnaire (Saquib et al.) and the Short Form 36 (SF-36), that all domains of SF-36 and SAQ were improved at 1 month but did not continue in all domains at 3 months.

Regarding long-term follow up, Viswanathan et al. (2010) investigated the benefits of PCI with patients with a history of CABG at 2 years follow up using Part I of the Nottingham Health Profile (NHP). Two hundred and fifty-five patients undergoing PCI with a history of CABG and 2680 patients in the control group were recruited for this research. The results indicated that patients with previous CABG had less improvement in quality of life after PCI.

A study estimating a structural model to represent the quality of life of patients with chronic cardiovascular disease in Korea reported that health-promoting behavior and self-efficacy were found to have a significant direct effect on quality of life. The other variables—health perception, self-esteem, perceived barriers to action, and preference were found to have indirect effects on quality of life (Han, Lee, Park, Park & Cheol, 2005).

Konstantina & Helen (2009) reviewed the research literature which refers to coronary intervention and quality of life. They reported that the factors influencing quality of life after coronary intervention were age, sex, family status, clinical variables, depression, and symptom of angina.

3) Revised Wilson and Cleary model for Health-Related Quality of Life

Wilson and Cleary (1995) introduced a useful framework for classifying the predictors of health-related quality of life. They introduced five subsections from the patient's point of view: biological and physiological factors, symptoms, functioning, general health perceptions, and overall quality of life, including individual characteristics and environmental characteristics (Figure 2.1).

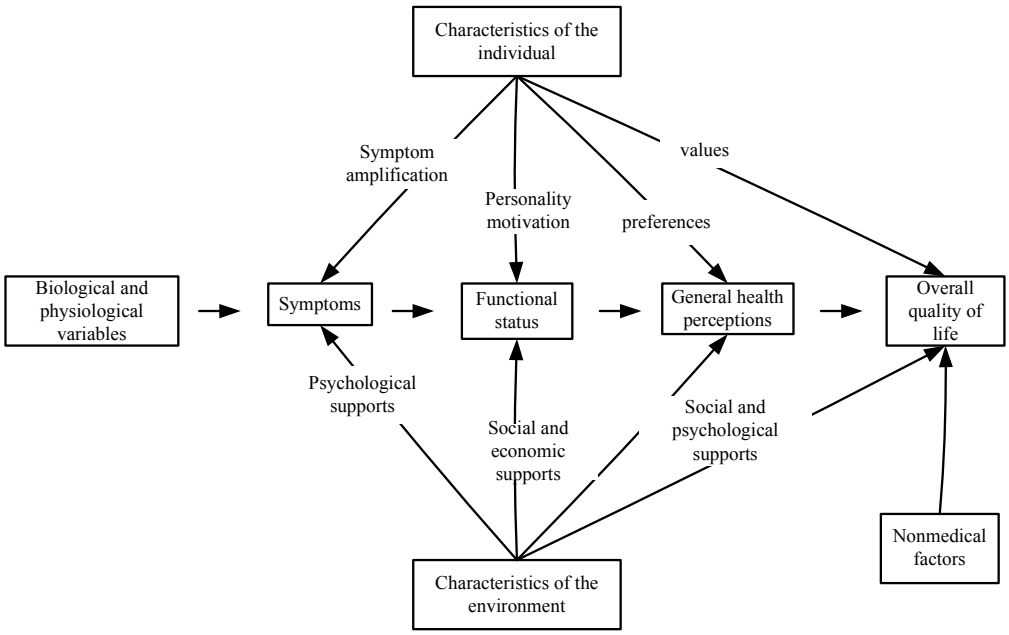


Figure 2.1 Wilson and Cleary (1995) conceptual model of HRQoL

The original model was "Linking Clinical Variables with health-related quality of life: A conceptual model of patient outcomes" by Wilson and Cleary (1995). This model presented the characteristics of the individual and of the environment, and focused on five types of measures of a patient's outcomes as biological function, symptoms, functional status, general health perceptions, and overall quality of life.

In 2005, Ferrans, Zerwic, Wilbur, & Larson revised the Wilson and Cleary model for Health-Related Quality of Life in three substantive ways: 1) adding arrows to show that biological function was influenced by characteristics of both individuals and environments, 2) deleting nonmedical factors, and 3) deleting the labels on the arrows because they tended to restrict characterization of the relationships. This revised model of Wilson and Cleary's was useful for describing each component of the model and classifying the predictor of quality of life, which is the framework of this study (see Figure 1.3).

Revisions of the model were focused on the five boxes in the center of the model that represent the measurement of patient's outcomes. Ferrans and her team (2005) described the interesting relationships in the revised model as follows: "First, biological function (originally biological and physiological variables) is described as focusing on the function of cell, organs, and organ systems. Biological function would be accessed through such indicators as laboratory tests, physical assessment, and medical diagnoses. Second, symptoms (originally symptom status), refers to physical, emotional, and cognitive symptoms perceived by a patient. Functional status, the third component, is composed of physical, psychological, social, and role function. Fourth, is general health perceptions, which refers to a subjective rating that includes all of the health concepts that precede it. Fifth, overall quality of life is described as subjective well-being, which means how happy or satisfied someone is with life as a whole. The arrows indicate the dominant causal associations."

4) The relationships among self-efficacy, social support, angina, dyspnea, depression, vitality exhaustion, functional status, and quality of life in CAD patients

4.1) The relationship between self-efficacy and quality of life

Self-efficacy is a social cognitive variable that a strong mediating behavior change and influences participation in many activities as predicted HRQoL in cardiac rehabilitation (Luszczynska & Sutton, 2006; Millen & Bray, 2009) and self efficacyhave a significant direct effect on QoL (Han et al., 2005).

Han et al. (2005) investigate estimate a structural model to represent the quality of life of patients with chronic cardiovascular disease. They suggested that self-efficacy had a significant direct effect on quality of life.

Luszczynska & Sutton (2006) investigated a longitudinal study, data were collected from 114 participants 4–10 days after myocardial infarction (MI), two weeks after rehabilitation (two months after MI), and eight months after MI. The results showed that the subgroup of participants that maintained regular activity at eight months after MI, maintenance self-efficacy that predicted physical activity. Among the participants that had relapsed by 8 months after MI, they were recovery and found that self-efficacy predicted physical activity

Millen & Bray (2009) examined the effects of an intervention targeting self-efficacy, outcome expectations, and adherence to upper-body resistance exercise after CR. Forty cardiac patients were randomly allocated to receive either standard exercise recommendations (wait-list control) or an intervention involving a theory-based instructional manual and Thera-Band resistive bands for upper-body resistance exercise. Self-efficacy and outcome expectations were assessed at baseline and 4

weeks later. Participation in resistance exercise was measured at 4 weeks post-baseline and at 3 months follow up. The results revealed that the intervention group had higher levels of self-efficacy, outcome expectations, and resistance exercise volume compared with the control group at the 4-week follow up. Adherence differences were sustained at 3-month follow up with some support that self-efficacy for adhering to resistance training mediated the effects of the intervention regarding follow up exercise training frequency.

A six-month prospectively study of the role of specific forms of self-efficacy in the physical and role function of patients with coronary heart disease after controlling for the effects of anxiety and depression was conducted after cardiac catheterization of 198 HMO members, demonstrating clinically significant coronary disease. They reported that the Cardiac Self-Efficacy Scale had two factors (maintenance function and controlling symptoms) with high internal consistency and good convergent and discriminant validity. The results showed that the self-efficacy scales significantly predicted physical function, social function, and family function after controlling for baseline function, baseline anxiety, and other significant correlates (Sullivan, LaCroix, Russo, & Katon, 1998).

A study of Sarkar, Ali, & Whooley (2009) indicated that measuring cardiac self-efficacy provides a rapid and potentially useful assessment of cardiac function among outpatients with CHD. They recruited 1,024 predominately male, older CHD patients: 1013 (99%) that were available for follow up, 124 (12%) that were hospitalized for HF, and 235 (23%) that had died during the 4.3 years of follow up. The mean cardiac self-efficacy score was 9.7 (SD 4.5, range0–20), corresponding to responses between “not a tall confident” and “somewhat confident” for the ability to

maintain function. Lower self-efficacy predicted subsequent HF hospitalization (OR per SD decrease =1.4, p = .0006), and all-cause of mortality (OR per SD decrease = 1.4, p = .0001). After adjustment, the association of cardiac self-efficacy with both HF hospitalization and mortality was explained by worse baseline cardiac function.

Ratja Srisuthep (1999) conducted a study, Cardiovascular death and lifestyle determinants of Cardiovascular disease: A study of Phi chit province, and pointed out that the factors that directly affected ischemic heart disease were age, the parent's history, health responsibilities, eating habits, and exercise; and the indirect determinants were family income, residential area, education, sex, occupation, perceived health status, and self-efficacy.

4.2) The relationship between social support and quality of life

It is well known that social support is an interactional process, in which part of the action or behaviors directed at an individual has a positive effect on the individual's social, psychological or physical well-being, which affect cardiac events and quality of life (Bosworth et al., 2000; Kristofferzon, LÖfmark, & Carlsson, 2005; Schulz et al., 2008; Durmaz et al., 2009).

Bosworth et al. (2000) studied the relationship between perceived social support and QOL. They recruited 4278 CAD patients, 2721 patients with low CAD severity, and 432 patients with high severity CAD. The results showed that social support and other relevant variables interacted across various quality-of-life domains. Physical function and physical role functions were lower with age, whereas mental health, emotional role function, and vitality were higher with age. Females reported lower quality of life than males across all domains. Minority patients reported lower levels of quality of life than white patients across four domains. Increased disease

severity was related to lower levels among four of the eight quality-of-life domains. There are suggest that a subset of individuals may suffer lower levels of quality of life, and these individuals may subsequently require the greatest degree of care and potentially benefit most from intervention.

Kristofferzon, LÖfmark, & Carlsson (2005) reported on a study that compared coping, social support, and quality of life in Swedish women and men after myocardial infarction. Seventy-four women and 97 men were recruited in this study, which employed 4 instruments: the Jalowiec Coping Scale, the Social Network and social support Questionnaire, the Short Form-36 Health Survey, and the Quality of Life Index-Cardiac version. The results showed that more women perceived available support from friends and grandchildren and more men perceived available support from their partner. Women rated lower levels in the physical and psychological dimensions of quality of life.

A quantitative study investigated the differences in social support and illness perceptions between Caucasian and South Asian patients with CAD. Five hundred and sixty-two CAD patients were recruited from 2 hospitals. They reported that South Asian participants had significantly lower levels of tangible and emotional / informational support compared with Caucasian participants. South Asians were less likely than Caucasians to believe, and have personal control over, their illness. Trends were observed, with South Asian participants being more likely to attribute their condition to stress / worry and poor medical care in the past and less likely to attribute their illness to aging compared with Caucasian participants. These findings revealed that CAD patients among South Asians in Canada with lower levels of social support

may have negative effects on recovery and prognosis (Grewal, Stewart, & Grace, 2009).

Schulz et al (2008) studied 440 CAD patients in the Multicenter Lifestyle Demonstration Project and examined changes in coronary risk factors, health behaviours, and quality of life by a social support group for 1 year. The results suggest that significant improvement in quality of life were related to social support group attendance.

Durmaz et al. (2009) evaluated the quality of life of 85 patients with stable CAD, using Ferrans and Power QLI-cardiac version IV. They found that the patients that received social support had a higher global quality of life score.

4.3) The relationship between symptom (angina, dyspnea, depression, vital exhaustion) and quality of life

An increase in the multiple symptoms in CAD patients will decrease functional status and low quality of life. Three symptoms (angina, fatigue, vital exhaustion, and dyspnea symptoms) were the independent symptom contributions of quality of life in CAD patients (Kimble et al., 2011).

Chest pain has been seen to predict disease-specific quality of life (Echteld, Elderen, & Kamp, 2003; Spertus et al., 2004).

Edėll-Gustafsson & Hetta (2001) examined sleep and tiredness in male and female after PCI, and reported that sleep and tiredness are reduced quality of life.

Spertus et al. (2004) studied 1517 patient undergoing PCI and follow up of 1 year on their quality of life. They reported that baseline angina and physical function were the strongest predictors of quality of life improvement 1 year after PCI.

Norris, Murray, Triplett, & Hegadoren (2010) focused their study on the gender of CAD patients regarding health status, with 2403 patients 1 year after catheterization. They found that angina frequency had large statistically-significant direct effects on HRQOL.

Riegel and her team (2010) conducted a randomized controlled PROMOTION clinical trial which tested a secondary prevention intervention of education and counseling intended to reduce pre-hospital delays in response to ACS symptoms. A sample of 565 patients (16%) who followed up over 2 years were recruited in this study of 3522 persons enrolled in this trial. Symptoms were measured by scripted telephone interview with items adapted from the REACT Trial. Cluster analysis was used to identify the patients' subgroup and 8 symptoms were analyzed using 2-step cluster analysis. Four symptom clusters were identified: 1) classic ACS (chest pain), 2) pain symptoms (neck, throat, jaw, back, shoulder, arms), 3) stress symptoms (shortness of breath, sweating, nausea, indigestion, dread, anxiety), and 4) diffuse symptoms (low frequency of most symptoms). The results indicated that the pain symptom group was most likely to have a history of angina to a significant degree.

The emotion evoked is the later variable from affective response including anxiety, fear, sadness, or joy , and there are an important predictors of change in quality of life (Staniute & Varoneckas, 2005; Shen, Myers, & McCreary, 2006; Skodová et al., 2010). Furthermore, depression and anxiety are the strongest predictors of quality of life (HÖfer et al., 2005, Broddadottir, Jensen, Norris, & Graham, 2009), the relevance of which is to Western countries (Yusim, 2006).

The incidence of anxiety and depression is increasing in cardiac patients. Although the mechanism of the interaction has not been fully studied, the complex

pathophysiology of CAD suggests that the psychosocial and physiological effects of depression underlie the disease process. Doering, Moser, Riegel et al. (2009) studied this prevalence and reported that anxiety and depressive symptoms contributed significantly to mortality when compared to symptom-free participants (OR 2.35 95%CI, 1.23-4.47, p=0.01). Many studies have indicated that depression contributes significantly to functional status, and clinical event and mortality (Sullivan et al., 1997; Pedersen et al., 2007).

Sullivan et al. (1997) examined prospective cohort study in 1 year, they recruited 198 CAD patients undergoing elective cardiac catheterization, and reported that anxiety and depression had a significant and persistent effect on functional status (Sullivan et al., 1997).

Horsten, et al (2000) examined the prognosis impact of depression, lack of social integration in woman with coronary heart disease, they reported that woman with depressive and lack of social integration were recurrent cardiac event, then, depression and lack of social integration are the independent predicted recurrent cardiac event.

HÖfer et al. (2005) used structural equation modeling to test a conceptual model of Health-Related Quality of Life in coronary artery disease patients, and reported that the final model fit each time and presented a link to clinical variables, such as the number of diseased vessels and the number of risk factors. This study concluded that mediating factors, depression and anxiety symptoms exerted the most significant influence on quality of life. Relavent to the work of Urizar & Sears (2006) were examined 120 Hispanic CAD at out-patients, whether psychosocial and cultural factors were related to four dimensions of quality of life: global, physical, emotional,

and social functioning. They found that psychosocial and cultural factors were associated with poorer quality of life and that depression was associated with all four quality of life dimensions ($p<.05$).

Sundel et al. (2007) investigated the occurrence of depressive symptoms with 121 women entering a cardiac rehabilitation program. They concluded a strong relationship between depression and angina in women with CAD. The occurrence of increasing cardiac symptoms indicated a need to screen for depression.

All of this evidence was gathered from western countries, and the one study was supported that depression and Thai CAD patients are linked as in Western countries by Yusim (2006). Her study sought to determine whether the correlation between CAD and depression documented in Western countries with as Asia nation: Thailand. Fifty-six Thai patients—33 cardiac and 23 orthopedic—were recruited to complete a self-rated depression inventory. The cardiac patients showed significantly greater depressive symptoms than the orthopedic patients.

From literature reviews of the relationship between coronary heart disease and major depressive disorder, under these reviews found the relationship between depression and coronary heart disease are associated with quality of life, relationship between coronary heart disease and depression and functioning, and the impact of treatment in depression (O'neil, 2013). Relavent with review of association between depression and development of coronary artery disease, reported that depression is an independent risk factor for heart disease, and effective depression therapy has been shown to improve quality of life od CAD patients (Serrano, Setani, Sakamoto, Andrei, and Fraguas., 2011).

Bonet, Mautner, Kerbage, Bonet, and Lloret (2009) investigated the association between the Vital exhaustion syndrome (VES) and acute coronary ischemic events in 180 patients with Acute myocardial infraction and unstable angina. They reported that vital exhaustion is a strong and independent factor associated to acute coronary events.

Pedersen and her colleagues (2007) selected patients undergoing PCI from the Rapamycin-Eluting Stent Evaluated at Rotterdam Cardiology Hospital (RESEARCH) registry among 692 patients who surviving at 12 months. This study examined whether anxiety had an incremental value regarding depressive symptoms in predicting health status. They stated that 471 (68.1%) patients had no symptoms of anxiety nor depression, 62 (9%) had anxiety only, 59 (8.5%) had depressive symptoms only, and 100 (14.5%) had co-occurring symptoms. There was overall significant improvement in health status between 6 and 12 months post-PCI ($p < .001$). Patients with co-occurring symptoms reported significantly poorer health status compared with the other three groups.

Fatigue has been defined as an unpleasant feeling of the inability to perform physical or intellectual efforts (physical fatigue, mental fatigue) during activity and resulting in an alteration of the subject's usual performances and quality of life (Schuttemaker, Dinant, van der Pol & Appels, 2004; Casillas, Damak, Chauvet-Gelinier, Deley & Ornetti, 2006; Callegaro, Shand-Lubbers & Dennis, 2009). This is a key symptom in the cause of CAD before considering the management of fatigue, especially mental fatigue, in CAD patients.

Kob, et al (1994) examined, vital exhaustion predicts new cardiac events after successful coronary angioplasty. They are using the Maastricht questionnaire for

measure vital exhaustion in 127 patients with successful PCI. The results showed that 35% had exhaustion experience, and 17% no exhaustion, had a new cardiac event (OR= 2.7; CI= 1.1-6.3; P=.02). Then, vital exhaustion influences the clinical course after PCI, and vital exhaustion can predictive the severity of CAD.

Fatigue,vital exhaustion was still highly prevalent 1 year post-PCI and predicted quality of life (Appels et al., 2006; Pedersen et al., 2007; Škodová et al., 2010).

Schuttemaker, Dinant, van der Pol & Appels (2004) investigated vital exhaustion contributes in relation to the identification of subjects at increased risk of myocardial infarction in general practice. Vital exhaustion was assessed using the Maastricht interview on vital exhaustion. The results showed that assessment of vital exhaustion contributes to the identification of subjects at increased risk of myocardial infarction in general practice.

Pedersen et al. (2007) studied the association between vital exhaustion and pathogenesis of CVD 1 year after PCI. They concluded that symptoms of exhaustion were still highly prevalent in PCI patients 1 year post-PCI.

Škodová et al. (2010) investigated change in quality of life of 106 CAD patients at 12 and 24 months follow up after coronary angiography. They suggested that change in physical quality of life was predicted by baseline psychological well-being and baseline quality of life, and change in mental quality of life was predicted by baseline psychological well-being, vital exhaustion, and baseline quality of life.

Dyspnea has been seen to be common and strongly associated with impaired quality of life (Arnold et al., 2009). Lindgren et al. (2008) studied 247 elderly patients with ischemic coronary heart disease and proposed three clusters 1). the Classic Acute

Coronary Syndrome (severe ischemic pain; 22%), 2). weariness (severe fatigue, sleep disturbance, and shortness of breath; 29%), 3). diffuse symptoms (mild symptom atology; 49%). Post hoc tests revealed that the weary group was more likely to have a history of heart failure; they also exhibited significantly more psychological distress and lower quality of life than the other subgroups.

Johansson, Karlson, Grankvist, & Brink, (2010) reported that the variables of anxiety, depression and disturbed sleep were all associated with fatigue. Regression model analysis revealed 46% of the variance in fatigue with depression and disturbed sleep as predictors; however, infarct size measured by conventional biochemical markers, left ventricle ejection fraction, and history of previous MI were not correlated with disturbed sleep, fatigue, anxiety, or depression.

Koertge, et al (2007) investigated the effects of a stress management program on vital exhaustion and depression in woman with coronary heart disease, 247 woman with CAD participated in the program with 1 year and 1-2 years follow up. They reported that vital exhaustion was decreased in the intervention group but did not change at 2 year follow up, and depression was no difference between two group.

Temcharoen et al. (2000) conducted a longitudinal structural causal study using a model for the Cardiovascular Risk Factors in employees of a government savings bank. They concluded that current physiological status was affected by age, education, health behaviors, BMI, and physiological status 5 years ago. Previous studies in Thailand found that the risk factors of coronary heart disease in the Thai population could be identified consisted with Western countries.

4.4) The relationship between functional status and quality of life

Functional status can be viewed from various perspectives. In the revised model of Wilson and Cleary, functional status was defined as the ability to perform tasks in multiple domains, such as physical function, social function, role function, and psychological function. In the revised model, Ferrans and her team stated that functional status on the optimization of the function that are remain, and used Leidy's framework for functional status guide for study (Ferrans et al., 2005). CAD patients with lower quality of life was lower in the physical function dimension in many study which directed effect on quality of life (Unsar, Sut, & Durna, 2007; Wong & Chair, 2007; Eastwood et al., 2010).

Fitzgerald, Zlotnick., & Kolodner (1996) did a follow-up study of 135 CAD patients , 12 months after PCI by personal interview and self-administered questionnaire. The results reported that there were significant improvements in functional status outcomes in the categories of activities of daily living, mental health, and social interaction 12 months after PCI.

CHAPTER III

METHODOLOGY

This chapter describes the methodology used in this study. This study aims to explored the causal relationship of the theoretical linkage among factors of interest and quality of life in CAD patients post PCI. In this chapter, population and samples, research instruments, protection of the rights of human subjects, data collection, and data analysis are detailed.

Population and Sample

The population in this study was CAD patients post PCI who followed up at outpatient clinics of five tertiary hospitals in Thailand, and met the inclusion criteria as follows:

1) Being diagnosed with coronary disease in at least one vessel with more than 50% stenos

2) Having history of CAD for longer than or equal to one year with post PCI greater than 1 year

3) Male or female aged over twenty years

4) Stable angina pectoris class I-III

5) Being able to communicate in and understand Thai language, and

6) Willingness to participation in this study

Sample size

The sample size was estimated from estimate parameter. Hair et al (2006) suggest the most common is Maximum Likelihood Estimation (MLE) to estimate procedure, and provide valid results of sample size. The recommendation is a sound basic for estimate sample size is 200. However, the minimum ratio of observations to variables is 5:1, but the preferred ratio is 15:1 or 20:1 (Hair et al., 2006)**.** In this study, the hypothesized model contained 37 free parameters; so, a sample size of 185 - 740 was the minimum requirement to match the complex of the path model. In this study, 334 CAD patients post PCI were recruited and only 303 completed the questionnaires.

Setting

The samples were recruited from five of eight tertiary hospitals which high volume in the first three section of Thailand as 1) Bangkok & central, 2) North, and 3) South as show information of setting in Appendix I.

Research Instruments

The instruments in this study included 9 questionnaires: 1) the personal data form; 2) the Quality of Life Index-Cardiac version IV; 3) The Center for Epidemiologic Studies Depression Scale (CES-D); 4) the Cardiac self-efficacy scale (C-SES); 5) the Social Support Questionnaire (SSQ); 6) the Rose Questionnaire for angina; 7) the Rose Dyspnea Scale (RDS); 8) SF-36: vitality subscale (VT); and 9) the functional Performance Inventory Short-Form (FPI-SF). A descriptive of each instrument is presented in Table 3.7 and 3.8.

1) The Personal Data Form (PDF)

This personal data form was used to collected demographic data and socioeconomic status (SES) including age, gender, religion, marital status, education, occupation, income, exercise, drinking and smoking.

2) Quality of Life Index-Cardiac version IV (QLI-cardiac IV)

The Quality of Life Index, developed by Ferrans and Powers (1998) was used to measure quality of life in terms of satisfaction with life for cardiovascular patients, and translated in Thai by Saengsiri (2003). The instrument was constructed with 70 items and has two parts; the first part (35 items) measures satisfaction with various aspects of life and the second measures the importance of those same aspects. This instrument had four domains: 1) health and functioning, 2) social and economic, 3) psychological / spiritual, and 4) family.

Scoring

The patients decide, for each item, which one best describes how satisfied or important that area is in their lives and choose one of the following options in the scoring system. In Thai version, we had change the number of Likert scale in questionnaire which the score range from 0 to 5 for that made it more understand for Thai population. Then, before calculate the score following the step of computer syntax for SPSS-PC for the calculation of the quality of life score, the researcher add one score in each item.

The possible range for the final scores ranges from 0 to 30. The lower scores indicate lower quality of life and higher scores indicate good quality of life.

Validity, reliability and construct reliability

In Thailand, Saengsiri and team (2003) translated QLI-cardiac IV in to Thai version by back-translation which content validity index (Hillier, Caan, & McVicar) was 1.0 . The back-translation version was send to Prof. Ferrans who's developed the original version. She compared back-translation Thai version and original version, and consideration accepted Thai version. In additional, Cronbach's alpha was used for internal consistency of reliability. The reliability of this instrument was .77in 50 CAD patients, and .79 when test with 66 CAD patients.

In this study, the research tested the Confirmation Factor Analysis (CFA). The resulted of quality of life model presented that $\chi^2 = 1.32$, $\chi^2/df = 0.50$, p-value = 0.52, RMSEA = 0.00, the model is saturated, the fit is perfect. All indicators loading were statistically significant at level $p<.001$. The reliability of indicators of variance between indicators on a factor (R^2) for all measurement models ranged from 0.61 to 0.78, which interpreted the constructs was well represented, and overall measurement models fitted the data (see Table 3.1 and Figure 3.1).

Table 3.1 The analysis of the CFA for the Quality of life model

Measurement	Standardized Factor Loading		t-value	Factor Score	R^2
	b (SE)	B			
quality of life(QLI)					
- health and functioning (HFSUBA)	2.57 (.16)	.80	15.98***	.07	.63
- social and economic (SOCSUBB)	3.02 (.16)	.89	18.77***	.12	.78
-psychological/spiritual (PSPSUBB)	2.78 (.17)	.82	16.56***	.07	.66
- family (FAMSUBD)	2.83 (.18)	.78	15.59***	.06	.61
$\chi^2 = 1.32$, $\chi^2/df = 0.50$, p-value = 0.52, RMSEA = 0.00					

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

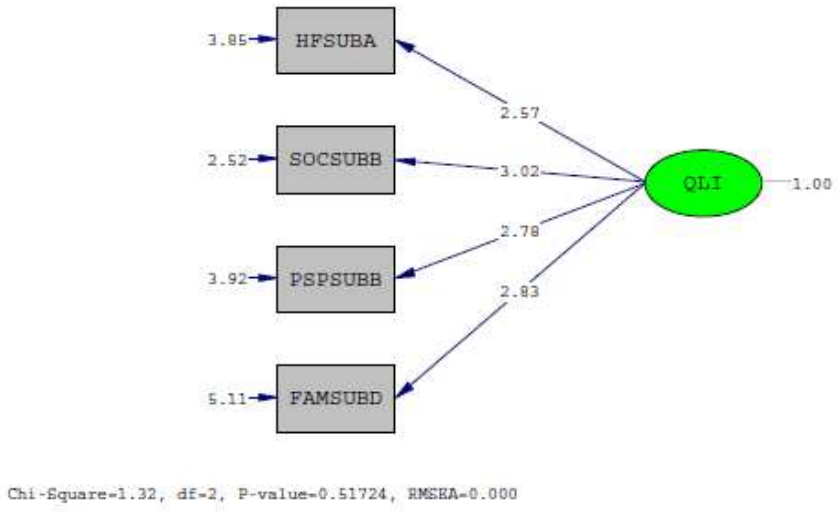


Figure 3.1 Quality of life model

3) The Center for Epidemiologic Studies Depression Scale (CES-D)

The Center for Epidemiologic Studies Depression Scale (CES-D) was developed by Radloff, 1977, and translated in Thai version by Vorapongthorn et al.,1990. CES-D is a self-reported symptoms associated with depression experienced in the past week. The 20 items CES-D was developed from items appearing on longer, well-validated depression scales. This instrument was composed of 4 components as 1) depressed affect, 2) positive affect, 3) somatic and retarded activity and 4) interpersonal. Response categories indicate the frequency of occurrence of each item.

Scoring

The scored on a 4-point scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time). Scores for items 4, 8, 12, and 16 are reversed before summing all items to yield a total score. Total scores can range from 0 to 60.

Validity and reliability and construct reliability CFA

The construct validity of CES-D, Thai version was assessed by CFA, and report four factors which each factor can explain depression varience of 32.21%, 8.70%, 5.63%, and 5.97%. The total explained varience was 52.51%, that showed good construct validity compare with original English (Ploylearmsang, 2005). Kuptniratsaikul & Pekuman(1997) study CES-D in Thai people and reported scores of 19 or higher was considered indicative of depression with 93.33% sensitivity, 94.2% specificity and 0.9154 reliability.

The depression measurement model was composed of 4 components: 1) depressed affect, 2) positive affect, 3) somatic and retarded activity and 4) interpersonal. The results of the CFA for the depression model with modified presented that χ^2 = 1.50, degree = 1, χ^2/df = 1.50, p-value = 0.22, GFI = 0.99, and

AGFI= 0.98, RMSEA = 0.04. In this study, the results showed that most of the components of the measurement had significantly strong estimates which related to their specific constructs and validated the relationships among the components of the model. Hence, there was only one component that did not have a valid relationship in this model. Furthermore, the R^2 for the components ranged from .001 to .70. Additionally,, the R^2 of positive affect (.001) was weak, thus indicating that the reliability based on the CFA did not support the measure. However, this instrument was used because it is a standard instrument that is widely used. Furthermore, the overall modified measurement models fit the data (see Table 3.2 and Figure 3.2).

Table 3.2 The analysis of CFA of the depression model

Measurement	**Standardized Factor Loading**		**t-value**	**Factor Score**	**R^2**
	b (SE)	**B**			
Depression (depressi)					
-depressed affect (dep aff)	4.47 (.33)	.84	13.61***	.11	.70
-positive affect (posit af)	-.11(.21)	-.04	-.53	-.01	.001
-somatic and retarded activity (somatic)	1.48 (.12)	.73	12.05***	.16	.54
-interpersonal (interper)	.47 (.05)	.58	9.75***	.21	.34
$\chi^2 = 1.50$, $\chi^2/df = 1.50$, p-value = 0.22, RMSEA = 0.04					

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

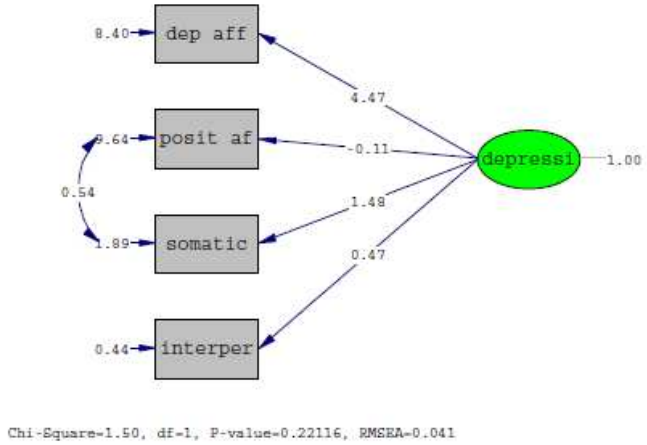


Figure 3.2 Depression model

4) Cardiac self-efficacy scale (C-SES)

Sullivan, LaCroix, Russo & Katon (1998) developed Cardiac Self-Efficacy Scale (CSES) using with self-efficacy associated with heart disease. The cardiac self-efficacy had 2 components; 1) control , and 2) maintain. This instrument developed and translated into Thai in this study, and the process of translation presented in table 3.6.

Scoring

The Cardiac Self-Efficacy Questionnaire Thai version consisted of 14 items with 5-point Likert scale (0 = not at all confident, 1 = somewhat confident; 2 = moderately confident, 3 = very confident, and 4 = completely confident). The score range from 0 – 56. This instrument has two factors (Control symptoms and Maintain function) with high internal consistency and good convergent and discriminant validity. The Control Symptoms factor consists of eight items and the Maintain

Function factors consists of 6 items with the remaining original five items and add 1 item related to ask about maintaining stress management.

Validity and reliability and construct reliability

The original version was Cronbach alphas for the two factors were 0.90 and 0.87, respectively (Sullivan, et al., 1998), and overall all for Korea version was .80 (Kang, Yang & Kim., 2010). This instrument translated in Thai in this study with back-translation and permission used this instrument by mail. Content Validity Index (Hillier et al.) was 1.00. The reliability for C-SES, Thai version was 0.87. Thus, C-SES, Thai version, has acceptable criteria of internal consistency reliability in new instrument (more than 0.70 in new scales, and 0.80 for mature scales) (Nunnally, 1978).

The cardiac self-efficacy measurement model was including 2 components; 1) control and 2) maintain. The results of the CFA for the cardiac self-efficacy model presented that χ^2 was equal to 0.00, degree of freedom as 0, χ^2/df = 0.00, p-value = 1.00, the model was saturated, and the fit was perfect. All indicators loading were statistically significant at level $p<.001$. The reliability of the indicators of variance between the indicators on a factor (R^2) for all measurement models ranged from 0.61 to 0.64. According to Acock (2012), R^2 greater than 0.30 is strong, which was interpreted here as the constructs being well-represented and that the overall measurement models fit the data. (see Table 3.3 and Figure 3.3).

Table 3.3 The analysis of the CFA of the Cardiac Self-efficacy model

Measurement	Standardized Factor Loading		t-value	Factor Score	R^2
	b (SE)	B			
cardiac self-efficacy -control (csesm)	0.93 (0.05)	0.80	6.61***	0.43	0.64
-maintain (csesc)	0.95(0.05)	0.78	7.15***	0.39	0.61
$\chi^2 = 0$, $\chi^2/df = 0.00$, p-value = 1.00, RMSEA = 0.00					

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

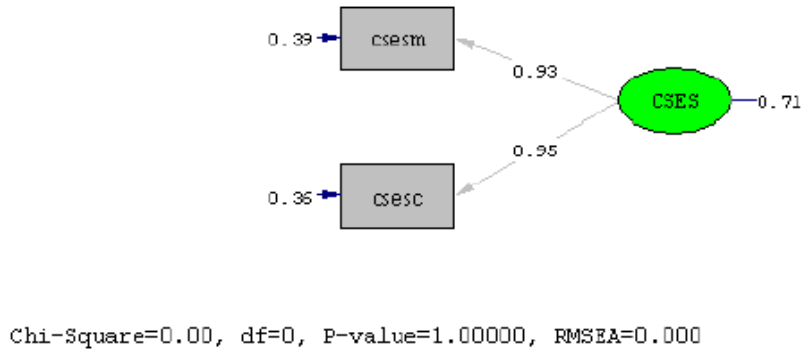


Figure 3.3 Cardiac self-efficacy model

5) The Social Support Questionnaire (SSQ)

The Social Support Questionnaire (SSQ), developed by Schaefer, Coyne and Larzarus, and modified by Hanucharurnkul in cancer patients, 1988, and Khuwatsamrit et al (2006) used in cardiac patients. The SSQ consists of 21 items which are divided into three parts, according to the sources of support: informative (7 items), emotional (7 items) and tangible (7 items) which measures support provided

by family, friends and health care providers. The SSQ was used with permission from Mahidol University.

Scoring

This instrument had five point Likert-like scale with 0 = no support to 4 = a great deal of support. A total score is obtained by summing the numerical value of the responses across items. Total scores range from 0 – 84, whereby, the higher the score the higher social support.

Validity and reliability and construct reliability

Prior studies produced an internal consistency reliability of 0.89 for the overall SSQ in pilot study, and 0.92 in the population of CAD (Khuwatsamrit et al., 2006). The reliability of SSQ in this study was 0.89.

Social support measurement model was composed of 3 components as 1) family, 2) healthcare team, and 3) friends. The results of CFA of social support model presented that χ^2 was equal to 0.00, degree of freedom were 0, χ^2/df = 0.00, p-value = 1.00, the model is saturated, the fit is perfect. All indicators loading were statistically significant at level $p<.001$. The reliability of indicators of variance between indicators on a factor (R^2) for all measurement models ranged from 0.37 to 0.81, which interpreted the constructs was well represented, and overall measurement models fitted the data.

The social support measurement model was composed of 3 components: 1) family, 2) healthcare team, and 3) friends. The results of the CFA of the social support model presented that χ^2 was equal to 0.00, degree of freedom was 0, χ^2/df = 0.00, p-value = 1.00, the model was saturated, and the fit was perfect. All indicator loadings were statistically significant at level $p<.001$. The reliability of the indicators of

variance between indicators on a factor (R^2) for all measurement models ranged from 0.37 to 0.81. According to Acock (2012), R^2 greater than 0.30 is strong, which was interpreted that the constructs was well represented, and overall measurement models fitted the data. (Table 3.4 and Figure 3.4)

Table 3.4 The analysis of the CFA of Social the support model

Measurement	Standardized Factor Loading b (SE)	B	t-value	Factor Score	R^2
social support (SSQ)					
-family (FAMILY)	3.05 (.29)	.64	10.46***	.04	.41
-healthcare team (HEALTH)	4.91 (.35)	.90	13.98***	.13	.81
-friends (FRIEND)	3.75 (.38)	.61	9.99***	.02	.37
$\chi^2 = 0$, $\chi^2/df = 0.00$, p-value = 1.00, RMSEA = 0.00					

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

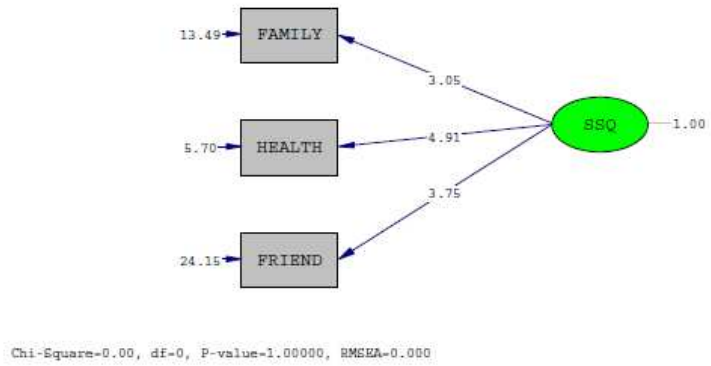


Figure 3.4 Social support model

6) the Rose Questionnaire for angina

Angina symptom measured using the Rose Questionnaire for angina, developed by Rose in 1968 and modified to Thai version by Udol & Mahanonda (2000). The Rose Questionnaire for angina has been widely used and translated in several languages (Hassan et al., 2007).

Scoring

In Thai version, this instrument consists of eight items, with scores ranging from 0 to 8, with 0 -1 presenting no chest pain, 2-7 borderline chest pain, and 8 indicating chest pain.

Validity and reliability

RQ had a sensitivity of 30.3 percent, specificity of 83.9 percent, positive predictive value of 35.3 percent, negative predictive value of 81.9 percent, and the total accuracy of 72.6 percent in Thai version (Udol & Mahanonda, 2000). For this study, the reliability was 0.86.

7) The Rose Dyspnea Scale (RDS),

The Rose Dyspnea Scale (RDS) was developed in 1968 by Rose & Blackbum (Arnold et al., 2009). This instrument translated into Thai in this study, and the process of translation presented in table 3.1. The English version translated to Thai version and back-translation by bilingual expert from chulalongkorn university language institute. The content validity index was evaluated by five experts, including three instructors with cardiovascular expertise, one professor in nursing science, and one cardiologist. The process of translation was present in table 3.6.

Scoring

RDS consisted of 4 items that assess patient's level of dyspnea with common activities, each activity associated with dyspnea is assigned 1 point. The scores range from 0-4, with 0 indicating no dyspnea with activity and increasing scores indicating more limitations due to dyspnea.

Validity and reliability

The RDS was translated into Thai and confirmed the accuracy by back translation. CVI for this study was 1.0, and reliability was 0.81. Thus, RDS, Thai version, has acceptable criteria of internal consistency reliability in new instrument (more than 0.70 in new scales, and 0.80 for mature scales) (Nunnally, 1978).

8) SF-36, vitality subscale, Thai version,

The original SF-36 came out from the Medical Outcome Study, MOS, done by the RAND Corporation, and update now, the working group is Quality Metric work (QualityMetric, 2013). The SF-36 Health Survey; vitality subscale was used to assess the vitality symptom, and permission from http://www.qualitymetric.com. Thai version was translated by Jirarattanaphochai, Jung, Sumananont, & Saengnipanthkul, (2005) and permission used vial electronic mail.

Scoring

The vitality subscale consisted of 4 items, from 1 (none of the time), 2 (a little of the time), 3 (some of the time), 4 (most of the time), and 5(all of the time). Scores for items 9.1 and 9.5 are reversed into 1 to 5 before summing all items to yield a total score. Total scores can range from 4 to 24. Higher values were indicating more vital exhaustion.

Validity and reliability

SF-36: vitality subscale, Thai version were evaluated in 212 cardiac patients. The reliability of the Thai version using Chronbach's alpha coefficient in every aspect of health was 0.7, and all inter-item correlation exceeded was 0.4 that it's a valuable tool in assessing clinical outcome research in Thai patients with cardiac disease (Krittayaphong et al., 2000), and evaluated in low back pain Chronbach's alpha coefficient was 0.72-0.94 (Jirarattanaphochai, Jung, Sumananont, & Saengnipanthkul, 2005). Especially, vitality subscale Chronbach's alpha coefficient was 0.0.68-0.71 (Lim, Seubsman, & Sleigh., 2008). For current study, the reliability was 0.72.

9) Functional Performance Inventory Short-Form (FPI-SF)

Leidy & Knebel (1999) developed Functional Performance Inventory Short-Form (FPI-SF) consists of 32 items. FPI-SF is a self-report instrument composes of six subscales (body care, household maintance, physical exercise, recreation, spiritual activities and social activities). The six subscales are grouped into three types of ADL such as 1) basic ADL (BADL) which consisted of body care and physical exercise, 2) Instrument ADL (IADL) which included household maintenance, and 3) Advanced ADL (AADL) which consisted of recreation, spiritual and social activities.

In the study of AMI, Sindhu & Sriprasong (2001) translated FPI-SF in Thai version and add eight activities in Thai version: toileting, doing the laundry by hand, washing the car, driving a car, taking public transportation, engaging in a special activity or hobby, having sexual relations, and working full time/part time. Then, in

Thai version was consisted 40 items. The FPI-SF used with permission from Mahidol University.

Scoring

The response for answer the scale, if the participants were able to do an activity, they are asked to indicated that activity was 1 (no difficulty), 2 (some difficulty), 3 (much difficulty), and if the cannot do the activity, they are asker was 4 (health reason), 5 (choose not to do). The scales are ranging from 1 to 5. The scales were recode each item as follows (1 = 3), (2 = 2), (3 = 1), (4 = 0), (5 = 0). Then, the calculate of the score following the step of computer syntax for SPSS-PC. Higher scores indicate greater functional status.

Validity and reliability and construct reliability

The psychometric test showed that CVI was 1.0, Cronbach's alpha were found 0.92 for total scale, and 0.81 to 0.88 for the three types of ADL. The currence reported Cronbach's alpha were 0.78-0.86, and 0.92 for overall scale (Sriprasong et al., 2009). Chinese version in patients with chronic obstractive pulmonary disease reported Cronbach's alpha .98 (Guo et al., 2011).The reliability for this study was 0.91.

The functional performance measurement model was composed of 6 components: 1) body care, 2) maintaining the household, 3) physical exercise, 4) recreation, 5) spiritual activities, and 6) social interaction. The results of the CFA for the functional performance with modified model presented that $\chi^2 = 9.25$, $\chi^2/df = 1.54$, p-value = 0.16, and RMSEA = 0.04. All indicator loadings were statistically significant at level $p<.001$. The reliability of the indicators of the variance between the indicators on factor (R^2) for all measurement models ranged from 0.15 to 0.61. According to Acock (2012), R^2 between 0.1 - 0.2 is moderate, which interpreted that

the constructs was moderate to good represented, and overall measurement models fitted the data (see Table 3.5 and Figure 3.5).

Table 3.5 The analysis of the CFA of the Functional performance model

Measurement	Standardized Factor Loading		t-value	Factor Score	R^2
	b (SE)	β			
functional performance	.11 (.02)	.39	6.198***	.11	.15
- body care (BC)					
-maintain of household (HH)	.55 (.04)	.74	14.06***	.34	.55
- physical exercise (PE)	.49 (.03)	.78	15.00***	.46	.61
- recreation (IR)	.35 (.03)	.70	12.55***	.34	.48
- spiritual activities (SA)	.41 (.03)	.69	12.61***	.32	.47
- social interaction (SI)	.54 (.04)	.76	14.18***	.33	.57
$\chi^2 = 9.25$, $\chi^2/df = 1.54$, p-value = 0.16, RMSEA = 0.04					

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

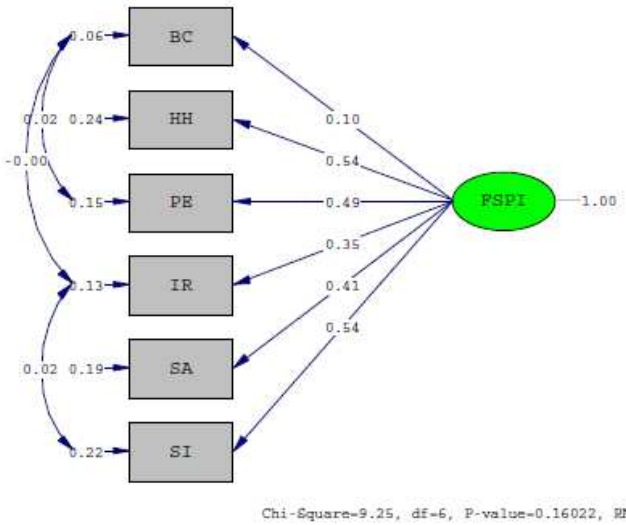
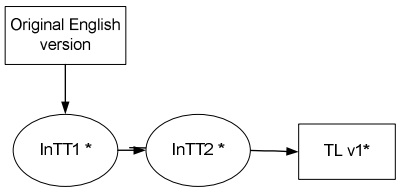
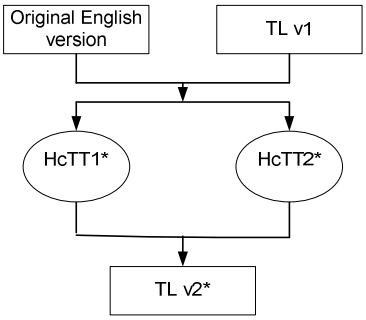
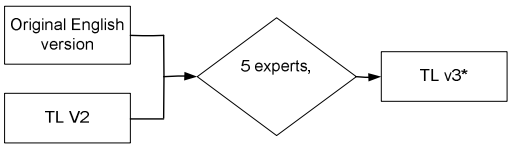
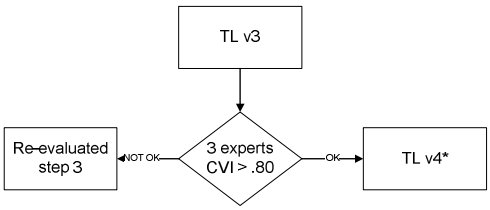
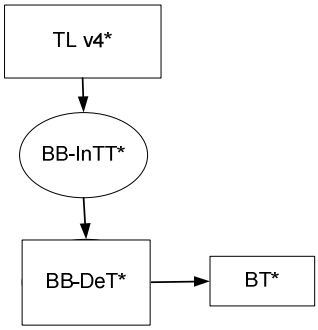
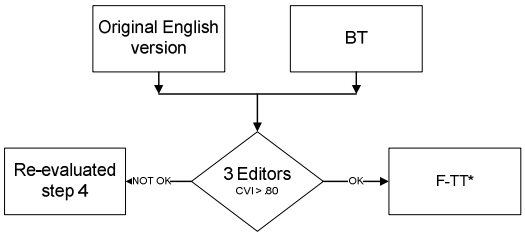


Figure 3.5 Functional performance model

Table 3.6 Seven steps of translation process in this study.

The Process of Translation	Description
Step 1.  InTT1* = Independent Thai Translator 1; InTT2* = Independent Thai Translator 2; TL v1* = Thai Language version 1	This process used Independent Thai Translators 1 (InTT1) and verified the translation by Independent Thai Translators 2 (InTT2). This process is a first synthesis of translation, and the result is a Thai language version 1(TL v1).
Step 2.  HcTT1*= Health care Thai Translator 1; HcTT2*= Health care Thai Translator 2; TL v2* = Thai Language version 2	Comparison of the original English version and TL v1 by two nurses who are experts in cardiovascular nursing as well as the Thai and English language. The result of synthesis II is the Thai language version 2 (TL v2).
Step 3.  TL v3* = Thai Language version 3	Comparison of the original English version and TL v2 by five experts: 1) cardiologist, 2) cardiovascular nurse, 3) PhD in Nursing, 4) advanced practice nurse in cardiovascular disease, and 5) PhD in Nursing and specialist in cultural translation. Five experts checked the wording that the researcher used to ensure that the Thai version corresponded with

The Process of Translation	Description
	the original version and also used words consistent with Thai culture. The result of this process was TL v3.
Step 4.  TL v4* = Thai Language version 4	Comparison of an original English version and TL v3 by three experts: 1) cardiologist, 2) PhD in Nursing, and 3) advanced practice nurse in cardiovascular disease. A Scale-level Content Validity Index (S-CVI) was used for synthesis in this step, and accepted at CVI > .80, but CVI < .80 was re-evaluated at step 3. This resulted in the Final Thai Translation (F-TT).
Step 5.  TL v3* = Thai Language version 3; BB-InTT1 = Blind Back-Independent Thai Translator 1; BB-DeT = Blind Back-Dependent Thai Translator; BT= Back-translation.	TL v4 was back-translated by Chulalongkorn University Language Institute, which used Blind Back-Independent Thai Translator (BB-InTT), and examined by Blind Back- Dependent Translator (BB-DeT). The result of this process was Back-Translation (BT).
Step 6.  	Comparison with original English version and BT version by three editors of Chulalongkorn University Language Institute with Scale-level Content Validity

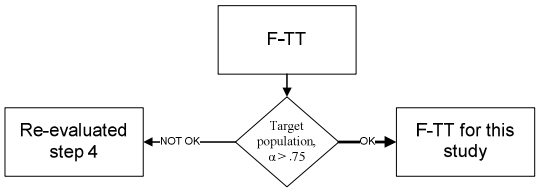
The Process of Translation	Description
F-TT*= Final Thai Translated	Index (S-CVI), which is accepted at CVI > .80, but CVI < .80 was re-evaluated at step 4. This was the Final Thai Translation (F-TT).
Step 7. 	Pilot study and Psychometric testing III: Reliability testing: Synthesis VI is the last synthesis. We enrolled 30 subjects who were coronary artery disease patients who received PCI more than 1 year ago and participated in this pilot study. We achieved reliability > .75.

Table 3.7 Summary of the variables, measured variables, instruments

Concepts	variables	source	item
1. overall quality of life	1.Satisfy with life	Quality of Life Index-Cardiac version IV	70
2. characteristic of individual	3. Self-efficacy	Cardiac self-efficacy scale (CSE)	14
3. characteristic of environment	4. Social support	The Social Support Questionnaire (SSQ)	21
4. biological and physiological function	5. LVEF	PR*: medical record	-
5. symptoms	6. angina	the Rose Questionnaire for angina	8
	7. dyspnea	the Rose Dyspnea Scale (RDS)	4
	8. depression	The Center for Epidemiologic Studies Depression Scale (CES-D)	20
	9. vital exhaustion	SF-36: vitality subscale (VT)	4
6. functional status	10.Functional performance	Functional Performance Inventory Short-Form (FPI-SF)	40

PR* = Profile Record

PDF** = Personal Data Form

Table 3.8 Summary of validity and reliability

	variable	Validity	Reliability Cronbach's alpha
1.Quality of Life Index-Cardiac Version	Quality of life	Goodness of fit $\chi^2 = 1.32$, $\chi^2/df = 0.50$, p-value = 0.52, RMSEA = 0.00	.98
2. The Center for Epidemiologic Studies Depression Scale (CES-D)	depression	Goodness of fit $\chi^2 = 1.50$, $\chi^2/df = 1.50$, p-value = 0.22, RMSEA = 0.04	.82
3. Cardiac self-efficacy scale	Self-efficacy	Goodness of fit $\chi^2 = 0$, $\chi^2/df = 0.00$, p-value = 1.00, RMSEA = 0.00	.87
4. The Social Support Questionnaire (SSQ)	Social support	Goodness of fit $\chi^2 = 0$, $\chi^2/df = 0.00$, p-value = 1.00, RMSEA = 0.00	.89
5. The Rose Questionnaire for angina	angina	30.3 % sensitivity, 83.9 % specificity (Udol & Mahanonda, 2000)	.86
6.The Rose Dyspnea Scale (RDS)	dyspnea	CVI = 1.0	.81
7. SF-36: vitality subscale (VT)	vitality	Inter-item correlation = 0.4 (Krittayaphong et al., 2000)	.72
8.Functional Performance Inventory Short-Form (FPI-SF)	Functional performance	Goodness of fit $\chi^2 = 9.25$, $\chi^2/df = 1.54$, p-value = 0.16, RMSEA = 0.04	.91

Protection of the rights of human subjects

Prior to data collection this study was approved by the Ethics Review Committee for Research Involving Human Research Subjects (Appendix F). The participants were informed about the purpose of the study before making decision to participate in the study. They were also informed that they could refuse to and could withdraw from the study at any time if they wished and their decision would not affect the treatments or services they would receive from healthcare providers at the hospital. The participants assured that their names and addresses would be kept strictly confidential and would not be reported with the study findings. Instead, a code number used to ensure confidentiality. The participants were also assured that the study data collected from them would be stored in a secure place and would not be accessible to any other person without their permission. Finally, the researcher explained that there were no harm to the participants in this study and it would take approximate 30 to 45 minutes to complete all the questionnaires. The participants were also given the researcher's mobile phone number in case that they need to contact the researcher.

Research assistance training

The nurses in each hospital having experiences in taking care in CAD patients or graduated master degree in nursing were trained as research assistants with the instruction for research assistance. After read the instruction the research assistants were guided how to interview the participants Research assistants were trained and examined by researcher to make sure that they understood in using questionnaires among three cases.

Data collection procedures

1. The letter asking for the permission to collect the data from the Faculty of Nursing, Chulalongkorn University was send to the ethical committee directors.

2. After the permission (see Appendix F), the researcher explained and clarified to doctors and head nurse of each outpatient department in the hospitals regarding the study objective, process and expected benefit of the study and ask for cooperation.

3. Participants who met the inclusion criteria were invited to participate in this study. They informed about the objectives, process of this study. Participants who agree to participant to this study were asked to sign in the consent forms.

4. The participants were interviewed question dealing the personal data form QLI – cardiac version IV, CES-D, CSES, SSQ, RDS, SF-36: vitality, and FPI-SF. The interview and self-report takes about 30-45 minutes.

5. After the participants completed all questionnaires, the researcher or research assistants were examine the questionnaires for data completed.

Data analysis

The participants were recruited 334 CAD patients from five hospital. Aftermost, the participants who completed all questionnaires were 303 case, see in Appendix I.

Data were analyzed using two computer software packages; 1). Statistical Package for the Social Sciences software (SPSS) version 11.5 for windows was used to analyze descriptive statistics; 2). Linear Structural Relationship (LISREL) version

8.72 was used for path analysis. An Alpha level of 0.05 was the accepted level of significance for this study. The analyses were performed as followings:

1. Data screening

It is an importance procedure to carefully consider the quality of the data input for analysis. SPSS 11.5 was performed for data screening. The frequency analysis was used to verify incorrectly keyed categories variables.

2. Missing data and outlier

The total of 334 participants was willing to give their information, but 309 questions were selected for accuracy data (25 questionnaires were patients-repeated = 7, miss criteria = 3, and incomplete = 15). Researcher found missing value about 5 questionnaires (1.62%). It is a common in clinical research to have some missing data. Some participants were not completed all questionnaires. Because of path analysis using LISREL program is very sensitive to the sample size, so, to deal with missing data was avoided. Then, the cases of missing were deleted from this analysis.

The extremes outliers were checked to assure the accuracy of data entry. The data set were checked for univariate, bivariate and multivariate methods (Hair, et al., 2006). The univariate outlier used box plot for detect outlier. The bivariate used scatterplots for detect outlier. And, the multivariate used Mahalanobis. The current study were no case had outlier in each variables.

3. Descriptive statistics including frequencies, means, and standard deviation will be used to describe the demographic data.

4. The measurement models were test for construct validity by confirmatory factor analysis.

5. The hypothesized model was tested with Path analysis using LISERL. This study used LISERL program to test relationship among variables simultaneously and allows more precise estimation of the exogenous variables on all endogenous variables (Hair et al., 2006).

6. The assumptions underlying structural equation model analysis were determined including normality of distribution, linearity of relationship, homogeneity of variance, and multicollinearity. Pearson Product Moment correlations used to test for bivariate relationships among pairs of variables and to assess multicollinearity among the independent variables.

5. The Chi-square (χ^2), the Goodness of fit index (GFI), the adjusted Goodness of fit index (AGFI), and the Root Man Square Error of Approximation (RMSEA) were tested to assess adequacy of model fit to the empirical data. If there are inadequate fit of data, the model was adjusted under the modification index and theoretical meaning until the model fitted with the data.

CHAPTER IV

FINDINGS

This chapter provides the analysis of the data from this research. In it, the findings regarding the demographic characteristics of the participants and the ten major study variables derived from the descriptive statistical analysis are presented, and the preliminary analysis and analysis of the hypothesized model are displayed. Data were analyzed using LISREL version 8.72, and SPSS version 11.5 for windows software. Statistical significance was determined for this study at the 0.05 level.

4.1 Characteristics of the study participants

Demographic characteristics of the participants

A total of 303 participants that were Coronary Artery Disease patients post PCI were included in this analysis. The findings revealed that the mean age of the participants was 61.11 years (SD = 10.94, range = 35-87). Most were male (73.60%), and almost all of of participants were couples (81.20%) and had completed primary/ elementary education at 52.20%. Moreover, some of the participants were unemployed/ housewives (31.30%), some worked in the field of agriculture (17.80%), and some were government officials (15.80%). Approximately, close to half of the participants (46.20%) had a monthly family income of less than 10,000 baht (1 US dollar = 31 baht). The findings regarding the demographic characteristics of the study participants are summarized in Table 4.1.

Table 4.1 Demographic characteristics of the study participants (n = 303)

Characteristics	Number	Percentage
Age (years)		
30-44	19	6.30
45-59	113	37.30
60-74	131	43.20
75 and over	40	13.20
Gender		
Male	223	73.60
Female	80	26.40
Marital status		
Married	246	81.20
Widowed//separated/divorced	47	15.50
Single	10	3.30
Education		
Primary/elementary education	158	52.20
Secondary education	61	20.10
High school	21	6.90
Diploma/certificate	2	0.60
Bachelor’s degree or higher	61	20.10
Occupation		
Unemployed/ housewife	95	31.30
Agriculturist	54	17.80
Government official	48	15.80
Business	32	10.60
Employed	28	9.20
other	46	15.20
Family income/month (Baht)		
< 5000	84	27.70
5,001 - 10,000	56	18.50
10,001 - 15,000	41	13.50
15,001 - 20,000	33	10.90
20,000 or more	89	29.40

Table 4.1 Demographic characteristics of the study participants (303) (Continued)

Characteristics	Number	Percentage
Exercise		
No	61	20.13
Yes	242	79.87
Type of exercise		
Walking	194	64.10
Running	35	11.50
aerobic	6	2.00
Time for exercise		
30 minus	134	44.10
20 minus	49	16.10
60 minus	39	12.80
Day of exercise		
3 days	81	26.60
7 days	74	24.30
5 days	57	18.80
Relaxation		
No	112	36.96
Yes	191	63.04
Type of relaxation		
Breathing	42	13.80
Muscle relaxation	39	12.80
Yoga	23	7.60
Recreation: activity for personal pleasure		
No	13	4.29
Yes	290	95.71
Type of recreation		
Watching TV	161	53.00
Sleep	113	37.20
Planting	94	30.90
Drinking status		
No	163	53.80
Ex-drinker	118	38.94
Drinker	22	7.26
Smoking status		
No	116	38.28
Ex-smoker	174	57.43
Smoker	13	4.29

Almost all of the participants exercised (79.87%), and the most popular form of walking (64.10%). The participants engaged in thirty minutes (44.10%) of exercise and three days per week (26.60%) for their health. The participants used strategies for relaxation (63.04%) by breathing (13.80%), muscle relaxation (12.80%), and yoga (7.60%). Ninety-five percent engaged in the recreation activity of watching TV (53.00%), sleeping (38.94%), and planting (30.90%). Half of the participants did not drink (53.80%), and were ex-drinkers (38.94%). Some of the participants were ex-smokers (57.43%) and some had never smoke (38.28%).

4.2 Characteristics of the study variables

The nine major variables in the current study include quality of life, cardiac self-efficacy, social support, LVEF, angina, dyspnea, depression, vital exhaustion, and functional performance. The details regarding the characteristics of each of the study variable are presented as follows:

4.2.1 Quality of life

The total scores of quality of life ranged from 12.24 to 30.00 points, with a mean of 24.92 (SD = 2.94). The HRQOL scores had a negative skewness value (-.67), thus indicating that most of the participants had scores of HROL higher than the mean score. The kurtosis value was positive (.84), thus suggesting that quality of life scores were shaped like a peakedness curve. Based on the mean score, skewness, and the kurtosis value, it could be concluded that the participants as a whole had a higher quality of life (see Table 4.2).

Because each dimension of quality of life varied in terms of the number of items, this study applied the average of the mean scores to compare them. The results

revealed that the dimension with the highest score was family dimension (average mean score = 26.60), followed by the psychological/spiritual dimension (average mean score = 25.26), the health and functioning dimension (average mean score = 24.53), and the social and economic dimension (average mean score = 24.26), respectively.

Table 4.2 Possible range, actual range, mean, SD, skewness, kurtosis, and the interpretation of quality of life (n = 303)

Variable	Possible range	Actual range	Mean	SD	Skewness (Z value)	Kurtosis (Z value)	Interpretation
quality of life	**0-30**	**12.24-30**	**24.92**	**2.94**	**-.67(.14)**	**.84(.28)**	**good**
health and functioning	0-30	12.46-30	24.53	3.23	-.63(.14)	.48(.28)	
social and economic	0-30	12.92-30	24.26	3.41	-.45(.14)	.18(.28)	
Psychological /spiritual	0-30	8.07-30	25.26	3.41	-.96(.14)	2.36(.28)	
Family	0-30	8.50-30	26.60	3.62	-1.48(.14)	2.97(.28)	

4.2.2 Symptoms (angina, dyspnea, depression, and vitality exhaustion)

4.2.2.1 Angina

The total scores for angina ranged from 0 to 8 points with a mean of .66 (SD =1.90). The skewness value of angina was moderately positive (2.70), thus indicating that most participants had scores of angina lower than the mean score. The kurtosis value of angina was a positive value (5.75), thus suggesting that the angina scores were shaped like a high peakedness curve. The findings regarding the mean

score and skewness value indicated that most participants had a lower level of angina symptoms (see Table 4.3).

4.2.2.2 Dyspnea

The total scores for symptoms dyspnea ranged from 0 to 4 points with a mean of .94 (SD = 1.28). The skewness value of dyspnea was moderately positive (1.16), thus indicating that most of the participants had scores of dyspnea lower than the mean score. The kurtosis value of dyspnea was a positive value (.09), thus suggesting that the angina scores were shaped like a peakedness curve. The findings regarding the mean score and skewness value indicated that most participants had a low level of dyspnea symptoms (see Table 4.3).

4.2.2.3 Depression

The total scores of depression ranged from 0 to 42 points with a mean of 12.72 (SD = 7.84). The skewness value of depression was moderately positive (.98), thus indicating that most participants had scores of depression lower than the mean score. The kurtosis value of depression was a positive value (1.17), thus suggesting that the depression scores were shaped like a peakedness curve. The findings regarding the mean score and skewness value indicated that most participants had a low level of depression symptoms (see Table 4.3).

4.2.2.4 Vital exhaustion

The total scores of SF-36: vital exhaustion ranged from 4 to 20 points, with a mean of 14.25 (SD = 1.28). The skewness value of Vital exhaustion was moderately positive (.01), thus indicating that most of the participants had scores of vitality lower than the mean score. The kurtosis value of Vital exhaustion was negative (-.36), thus suggesting that the vitality scores were shaped like a flattened curve. The findings

regarding the mean score and skewness value indicated that most participants had a low level of vital exhaustion symptoms (see Table 4.3).

Table 4.3 Possible range, actual range, mean, SD, skewness, kurtosis, and the interpretation of symptoms (angina, dyspnea, depression, Vital exhaustion) (n = 303)

Variable	Possible range	Actual range	Mean	SD	Skewness (Z value)	Kurtosis (Z value)	Interpretation
Angina	0-8	0-8	.66	1.90	2.70(.14)	5.75(.28)	Low
Dyspnea	0-4	0-4	.94	1.28	1.16(.14)	.09(.28)	Low
Depression	0-42	0-42	12.72	7.84	.98(.14)	1.17(.28)	Low
Vital exhaustion	4-20	6-20	14.25	2.90	.01(.14)	-.36(.28)	Low-mod

4.2.2.5 Social support

The total scores of social support ranged from 4 to 84 points, with a mean of 61.48 (SD = 13.45). The total scores were negatively skewed (-.73), thus indicating that most participants had scores of social support slightly higher than the mean score. The kurtosis value of social support was a positive value (1.29), thus suggesting that the social support scores were shaped like a slightly peakedness curve. Based on the mean score and skewness value, it could be concluded that most participants had a high level of social support. Regarding the average of the mean score and transformed mean score, the highest support was family support (average mean score = 22.93), followed by healthcare provider support (average mean score = 20.84), and friends' support (average mean score = 17.71), respectively (see Table 4.4).

Table 4.4 Possible range, actual range, mean, SD, skewness, kurtosis, and the interpretation of social support (n = 303)

Variable	Possible range	Actual range	Mean	SD	Skewness (Z value)	Kurtosis (Z value)	Interpretation
Social S. (total)	**0-84**	**4-84**	**61.48**	**13.45**	**-.73(.14)**	**1.29(.28)**	**moderate**
Family	0-28	0-28	22.93	4.77	-1.47(.14)	3.29(.28)	
Healthcare provider	0-28	0-28	20.84	5.47	-.63(.14)	.35(.28)	
friend	0-28	0-28	17.71	6.18	-.36(.14)	.01(.28)	

4.2.2.6 Cardiac self-efficacy

The score of cardiac self-efficacy ranged from 0 to 52 points, with a mean of 34.27 (SD = 9.25). The skewness value was a slightly negative value (-.14), thus indicating that most participants had scores of self-efficacy higher than the mean score. The kurtosis value of self-efficacy was a negative value (-.15), thus suggesting that the self-efficacy scores were shaped like a slightly flattened curve. The findings from the mean score and skewness value indicated that most participants had a moderate level of self-efficacy (see Table 4.5).

Table 4.5 Possible range, actual range, mean, SD, skewness, kurtosis, and the interpretation of cardiac self-efficacy (n = 303)

Variable	Possible range	Actual range	Mean	SD	Skewness (Z value)	Kurtosis (Z value)	Interpretation
Cardiac self-efficacy (total)	**0-56**	**5-52**	**34.27**	**9.25**	**-.14(.14)**	**-.15(.28)**	**moderate**
control	0-32	2-32	21.63	6.09	-.39(.14)	.13(.28)	
maintain	0-24	1-24	12.64	4.15	-.09(.14)	-.13(.28)	

4.2.2.7 Functional performance

The total scores of functional performance ranged from 55 to 118 points, with a mean of 2.55 (SD = .45). The functional performance had a slightly negative skewness value (-1.34), thus indicating that most participants had functional performance scores higher than the mean score. The kurtosis value of functional performance was a positive value (2.05), thus suggesting that the functional performance scores were shaped like a moderately peakedness curve. The findings regarding the mean score and skewness value indicated that most participants made moderate use of functional performance. Based on the average of the mean score, the participants had performed body care (average mean score = 2.92) more than spiritual activities (average mean score = 2.65), recreation (average mean score = 2.63), physical exercise (average mean score = 2.46), social interaction (average mean score = 2.36), and maintaining the household (average mean score = 2.27) (see Table 4.6).

Table 4.6 Possible range, actual range, mean, SD, skewness, kurtosis, and the interpretation of cardiac self-efficacy (n = 303)

Variable	Possible range	Actual range	Mean	SD	Skewness (Z value)	Kurtosis (Z value)	Interpretation
Functional performance (total)	**0-3**	**.5-3.0**	**2.55**	**.45**	**-1.34(.14)**	**2.05(.28)**	**Moderate**
Body care	0-3	0-3	2.92	.28	-4.67(.14)	41.92(.28)	
Maintaining the household	0-3	0-3	2.27	.75	-.86(.14)	.20(.28)	
Physical exercise	0-3	0-3	2.46	.68	-.23(.14)	5.25(.28)	
Recreation: activity for personal pleasure	0-3	0-3	2.63	.52	-1.51(.14)	3.14(.28)	
Spiritual activities	0-3	0-3	2.65	.59	-2.06(1.4)	4.55(.28)	
Social interaction: family and friends	0-3	0-3	2.36	.73	-.98(.14)	.32(.28)	

4.2.2.8 LVEF

The score of the LVEF ranged from 12 to 91 points, with a mean of 55.17 (SD = 11.82). The skewness value was a slightly negative value (-.16), thus indicating that most participants had LVEF higher than the mean score. The kurtosis value of the LVEF was positive (.23), thus suggesting that the self-efficacy scores were shaped like a slightly peakedness curve. The findings from the mean score and skewness value indicated that most participants had a good LVEF (see Table 4.7).

Table 4.7 Univariate Normality of self-efficacy before and after transformation with mean, SD, skewness, kurtosis, and the interpretation of LVEF (n = 303)

Variable	Mean	SD	Skewness (Z value)	Kurtosis (Z value)	Interpretation
LVEF	55.17	11.82	-.16(.14)	.23(.28)	**good**

4.3 Preliminary Analysis

Before future analysis with path analysis was conducted, normality, linearity, homoscedasticity, and muticollinearity were tested in order to ensure that there was no violation of the underlying assumption. The results of normality, linearity, homoscedasticity, and multicollinearity testing are presented.

4.3.1 Normality testing

In the current study, descriptive statistics, including mean, standard deviation, skewness, and kurtosis, were used to test normality of the variables. The skewness of the major nine variables ranged from -1.48 to 2.70, and the kurtosis of the variables ranged from -.36 to 5.75 (see Tables 4.2-4.7). Skewness is a measure of distribution trails, whether it does symmetric or skewers. Normal distribution had a skewness of 0 (perfectly symmetrical); the skewness is more than 0, the distribution is positively skewed; the skewness is less than 0, the distribution is negatively skewed (Acock, 2012). Skewness values falling outside the range of -1 to +1 indicate that skewed distribution (Hair et al., 2006). Kurtosis measures the thickness of the tails of the distribution. The normal distribution has a kurtosis of 3.00; less than 3.00, the tails are too thick (flat); greater than 3.00, the tails are too thin (peaked) (Acock, 2012).

According to Hair and colleagues (2006), the z value of skeweness and kurtosis not exceeding ± 1.96, which corresponds to a .05 level or ± 2.58 at the .01 probability level, reflects a normal distribution. As for the ten major variables, the z value of skewness ranged from -1.48 to 2.70 and for the kurtosis it ranged from -.36 to 5.75 (see Tables 4.2-4.7), where almost all variables were within the normal curve, except angina. Additionally, the Kolmogorov-Smirnov test and Q-Q plot indicated that the nine major variables were normally distributed (see Appendix H).

4.3.2 Linearity testing

The linearity relationship between the independent variables and the dependent variable represents the degree of change in the independent variables that are associated with the dependent variables, and can be checked by the residual plot (Hair and colleagues, 2006). In the current study, the scatter plot between the independent and dependent variables showed such a linear relationship (see Appendix H).

4.3.3 **Homoscedasticity testing**

Homoscedasticity, The assumption of homoscedasticity explained that the dependent variable exhibits equal levels of variance across the range of predictor variables. The best way to examine homoscedasticity is graphs that depart from an equal dispersion and present shapes as cones (Hair and colleagues, 2006). In the current study, the scatter plot of residuals showed the results from the homoscedastic data.

4.3.4 Multicollinearity testing

Two common criteria can be used to examine multicollinearity: 1) Pearson’s correlation coefficients and 2) tolerance values and the variance inflation factor (VIF).

The correlation of two variables that does not exceed ± 0.9 indicates that there is no multicollinearity (Tabachnick & Fidell, 2006). In the current study, the correlation coefficients among the five major variables ranged from -.57 to .54. Thus, these correlation coefficients indicated no multicollimearity (see Table 4.8).

In fact, the tolerance measures of multicollinearity among the independent variables (values ranging from 0 to 1) and the tolerance value that approaches zero indicate multicollinearity (Mertler and Vannatta, 2002). It is worth noting that the values of VIF that are greater than 10 indicate a cause of concern (Mertler and Vannatta, 2002). In the present study, the results of the multiple regression analysis indicated that the tolerance ranged from .60 to .96 (not approaching 0) and for the VIF ranged from 1.03 to 1.67 (not greater than 10) (see Table 4.9). Thus, these results confirmed no violation for multicollinearity.

Table 4.8 Bivariate relationships among cardiac self-efficacy, social support, LVEF, angina, dyspnea, vital exhaustion, depression, functional performance, and quality of life

variable	**Cardiac Self-efficacy**	**Social support**	**LVEF**	**Angina**	**dyspnea**	**depression**	**Vital exhaustion**	**functional performance**	**Quality of life**
Cardiac Self-efficacy	1.00								
Social support	.38**	1.00							
LVEF	.11	-.09	1.00						
Angina	-.02	-.07	-.04	1.00					
Dyspnea	-.22**	.01	-.11	.08	1.00				
Depression	-.43**	-.22**	-.08	.07	.29**	1.00			
Vitality exhaustion	.45**	.23**	.06	-.16**	-.29**	-.57**	1.00		
Functional performance	.37**	.11	.05	-.01	-.30**	-.26**	.30**	1.00	
Quality of life	.55**	.50**	-.01	-.06	-.17**	-.53**	.54**	.30**	1.00
Mean	2.44	2.92	55.17	0.08	0.23	0.63	0.71	2.53	0.83
SD	0.66	0.63	11.82	0.23	0.32	0.39	0.14	0.44	0.09

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

Table 4.9 Testing for multicollinearity of the studied variables

Variables	Tolerance	VIF
Cardiac Self-efficacy	.63	1.59
social support	.96	1.04
Angina	.97	1.03
Dyspnea	.81	1.23
Depression	.63	1.58
Vital exhaustion	.60	1.67
Functional performance	.80	1.25
Quality of life	.81	1.23

4.4 Findings of the research questions and hypothesis testing

The findings that answered the research questions and the results of the testing of the hypothesized model are described below:

Research question 1: What are the relationships among LVEF, cardiac self-efficacy, social support, angina, dyspnea, depression, vital exhaustion, functional performance, and quality of life in CAD patients?

Bivariate Pearson correlations were used to evaluate the relationships among cardiac self-efficacy, social support, LVEF, angina, dyspnea, depression, vital exhaustion, functional performance, and quality of life (see Table 4.13). The magnitude of relationships was determined by the following criteria: $r \leq .10$ = weak or low relationships, $0.30 \geq r \leq 0.50$ = moderate relationship and $r \geq .50$ = strong or high

relationship (Acock, 2012). The present study showed forty-five correlations between variables with significance at .01 among 20 pairs, and non-significance among 25 pairs. The Pearson correlation ranged from -.16 to 57. The strongest correlation was depression and vital exhaustion ($r = .57$, $p < .01$), and the weakness correlation was angina and vital exhaustion ($r = -.16$, $p < .01$), and dyspnea and quality of life ($r = -.16$, $p < .01$).

The results showed that a negative weak to moderate correlation existed between self-efficacy and dyspnea ($r = -.22$, $p < .01$), social support and depression ($r = -.22$, $p < .01$), angina and vitality exhaustion ($r = -.16$, $p < .01$), dyspnea and vital exhaustion ($r = -.29$, $p < .01$), dyspnea and quality of life ($r = -.16$, $p < .01$), and depression and functional performance ($r = -.26$, $p < .01$). In addition, a positive weak to moderate correlation existed between social support and vitality exhaustion ($r = .23$, $p < .01$), dyspnea and depression ($r = .29$, $p < .01$), and vital exhaustion and functional performance ($r = -.29$, $p < .01$).

In addition, a negative moderate correlation existed between self-efficacy and depression ($r = -.43$, $p < .01$), and dyspnea and functional performance ($r = -.30$, $p < .01$). Additionally, a positive moderate correlation existed between self-efficacy and social support ($r = .38$, $p < .01$), self-efficacy and vital exhaustion ($r = .45$, $p < .01$), self-efficacy and functional performance ($r = .37$, $p < .01$), and functional performance and quality of life ($r = .30$, $p < .01$).

The results showed that depression had a negative strong correlation with vital exhaustion ($r = -.57$, $p < .01$), and between depression and quality of life ($r = -.54$, $p < .01$). Furthermore, a positive strong correlation was presented between self-

efficacy and quality of life (r = .55, p < .01), social support and quality of life (r = .50, p < .01), and vital exhaustion and quality of life (r = .54, p < .01).

Research question 2: Does the hypothesized model explain** quality of life **of CAD patients, including cardiac self-efficacy, social support, LVEF, angina, dyspnea, depression, vital exhaustion, functional performance, and does it adequately fit the data?

Hypothesis testing: Model testing and modification

Although reliability and validity based on the confirmatory factor analysis did not yield support for most of the measurements, the classical approach testing of the reliability and validity provided adequate support for all of the measurements (see Table 3.8). Path analysis was conducted to test the proposed model of quality of life for the CAD patients.

Model identification

The hypothesized path model was drawn from revised health-related quality of life model and review literature. LISREL statistics were used to test this path model. The identification path model is a crucial process before testing a model (Norris, 2005) because the computer program analyzed when the model is only over-identification. According to Tabachnick and Fidell (2007), over-identification is one point more data points than free parameters. The number of data points is {p (p+1)}/2, where p equals the number of observed variables. In the hypothesized model, there were nine variables and 37 free parameters. The number of data points was 45 = {9(9+1)}/2. The hypothesized model had 8 fewer free parameters than data points. Thus, this model was over-identification, which meant that it could be identified.

Model testing

From the hypothesized model, the exogenous variables were cardiac self-efficacy, social support, and LVEF, angina, dyspnea, vital exhaustion, depression, functional performance, and quality of life. The process of the model testing is presented as follows.

In the hypothesized model (see Figure 4.1, Table 4.10), the researcher did not constrain or fix any parameter. Additionally, the hypothesized model explained 52 % (R^2 = .52) of the variance of the quality of life. However, this model did not fit for the Goodness of Fit statistics; χ^2/df = 14.45 was more than 2; RMSEA = 0.21 was more than .08; GFI = 0.93 less than .90, and AGFI = 0.55 less than .90. Because the hypothesized model did not fit the sample data, model modification was carried out. Some correlation errors were added to the model for the expected drop in chi-square.

The results of the final model reported the other Goodness of Fit statistics fit that in decrease in Chi-square (1.897), degree of freedom (3), the RMSEA (0.00), and increase in the GFI (0.99), AGFI (0.98), and a decrease in χ^2/df (0.63) with p-value = .59, which are show in Table 4.10. The final model fit well with the data (see Figure 4.2).

In summary, the final model was accepted and fit with the empirical data rather than the hypothesized model. The overall model explained approximately 54% of the variance in overall quality of life. (see Table 4.12).

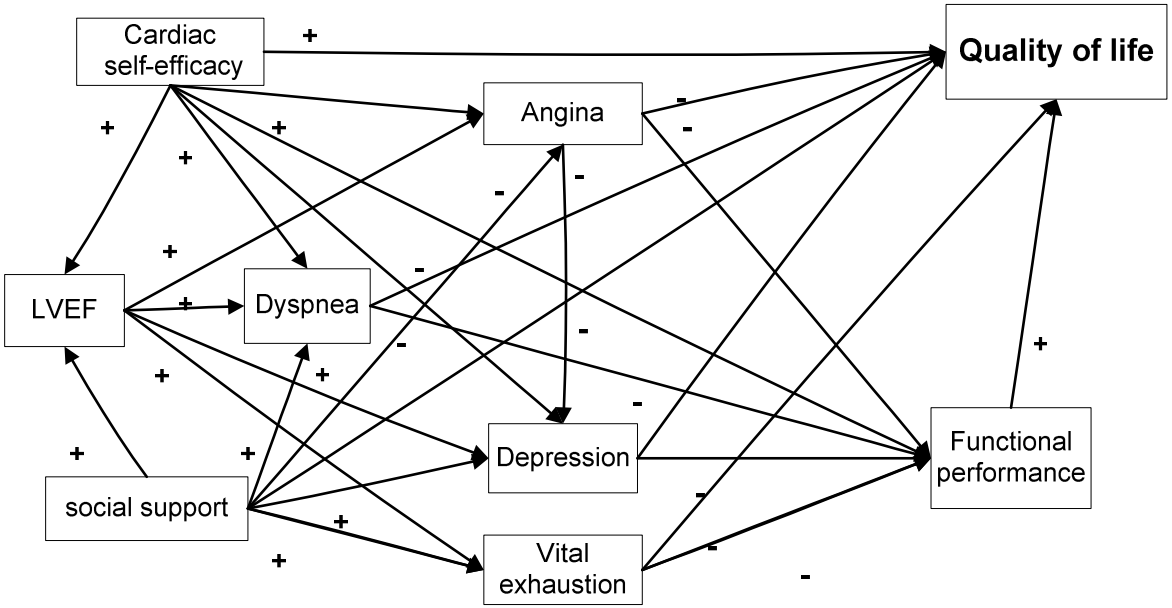
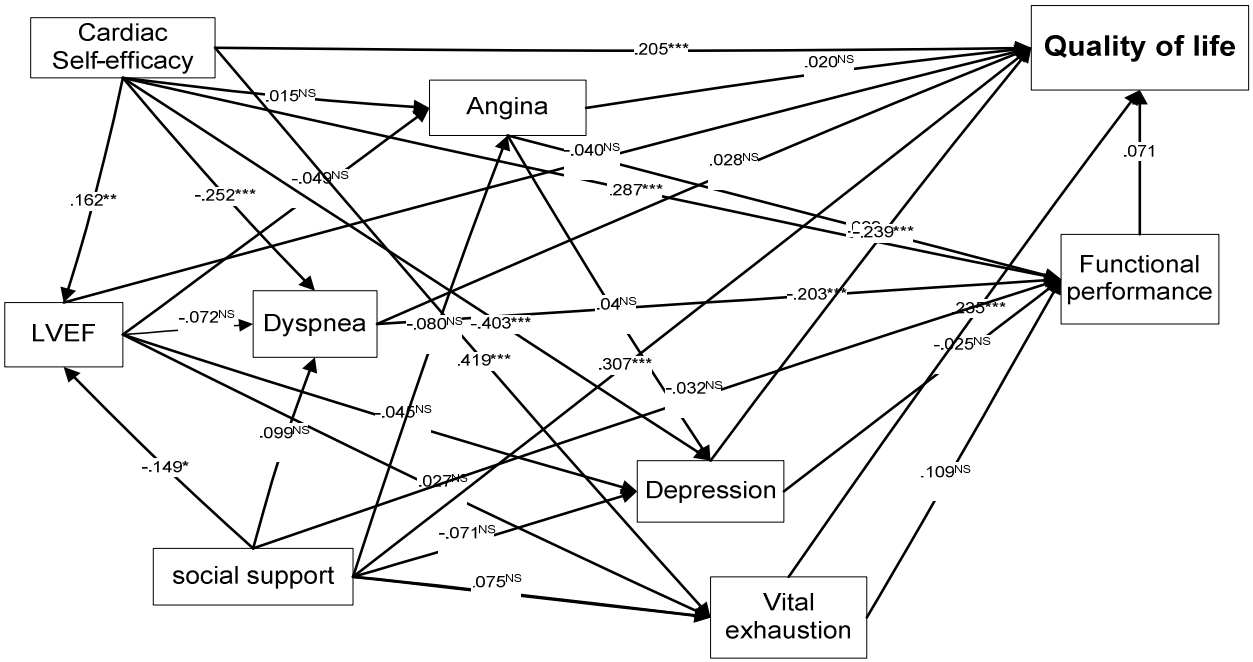


Figure 4.1 The hypothesized model of quality of life in CAD patients post PCI



* Significant at .05 level; ** Significant at .01; *** Significant at.001; ^{NS} non-significant

Figure 4.2 The final model of the quality of life in CAD patients post PCI

Table 4.10 Comparison of the Goodness of Fit statistics among the initially hypothesized model, the modified model, and the final model of quality of life in CAD patients post PCI

	Initial model	**Final model**	**Goodness of Fit Statistics**
χ^2	101.18	1.90	non-significant
p-value	0.00	0.59	p >.05
χ^2/df	14.45	0.63	less than 2
RMSEA	0.21	0.00	less than .08
GFI	0.93	0.99	more than .90
AGFI	0.55	0.98	more than .90

Abbreviations: χ^2, Chi-square**;** df, degree of freedom**;** RMSEA, Root Mean Square Error of Approximation**;** GFI, Goodness of Fit Index; AGFI**,** Adjust Goodness of Fit Index

Table 4.11 Standardized path coefficients, standard error (SE), and T-value of the parameters of the final model of quality of life in CAD patients post PCI (n = 303)

Path diagram			Standardized path coefficients		SE	T- value
			β	b		
BETA						
LVEF	→	angina	-.049	-.001	.001	-.844
LVEF	→	dyspnea	-.072	-.002	.002	-1.270
LVEF	→	depression	-.045	-.001	.002	-.853
LVEF	→	Vital exhaustion	.027	.000	.001	.521
LVEF	→	QOL	-.040	.000	.000	-1.000
Angina	→	depression	.041	.068	.083	.811
Angina	→	functional performance	.029	.053	.097	.549
Angina	→	QOL	.020	.008	.016	.508
Dyspnea	→	functional performance	-.203	-.281	.077	-3.693***
Dyspnea	→	QOL	.028	.009	.013	.649
Depression	→	functional performance	-.025	-.028	.074	-.383
Depression	→	QOL	-.239	-.060	.012	-4.793***
Vital exhaustion	→	functional performance	.109	.332	.202	1.644
Vital exhaustion	→	QOL	.235	.159	.034	4.629***
Functional performance	→	QOL	.071	.016	.010	1.615

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

Table 4.11 Standardized path coefficients, standard error (SE), and T-value of the parameters of the final model of quality of life in CAD patients post PCI (n = 303) (Continued)

Path diagram	Standardized path coefficients		SE	T- value
	β	b		
GRAMMA				
Self-efficacy → LVEF	.162	2.897	1.101	2.632**
Self-efficacy → angina	.015	.006	.023	.245
Self-efficacy → dyspnea	-.252	-.122	.030	-4.135***
Self-efficacy → depression	-.403	-.239	.034	-7.122***
Self-efficacy → Vital exhaustion	.419	.092	.012	7.460***
Self-efficacy → functional performance	.287	.193	.042	4.575***
Self-efficacy → QOL	.205	.030	.007	4.113***
Social support → LVEF	-.149	-2.758	1.135	-2.429*
Social support → angina	-.080	-.030	.023	-1.282
Social support → dyspnea	.099	.049	.030	1.623
Social support → depression	-.071	-.043	.035	-1.251
Social support → Vital exhaustion	.075	.017	.013	1.344
Social support → functional performance	-.032	-.022	.039	-.565
Social support → quality of life	.307	.047	.007	7.074***

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

Table 4.12 Summary the total, direct, and indirect effects of the causal variables on the affected variables (n = 303)

Causal variable	Affected variables																				
	LVEF			angina			dyspnea			depression			vital exhaustion			Functional performance			Quality of life		
	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE
Cardiac Self-Efficacy	.162**	.162**	-	.007	.015	-.008	-.264***	-.252***	-.012 NS	-.410***	-.403***	-.007	.423***	.419***	.004 NS	.397***	.287***	.110***	.417***	.205***	.212***
Social support	-.149*	-.149*	-	-.073	-.080	.007	.110	.099	.011	-.067	-.071	.004	.071	.075	-.004	-.047	-.032	-.015	.344***	.307***	.037 NS
LVEF	-	-	-	-.049	-.049	-	-.072	-.072	-	-.047	-.045	-.002	.027	.027	-	.017	-	.017	-.024	-.040	.016
angina										.041	.041	-				.028	.029	-.001	.012	.020	-.008
dyspnea																-.203***	-.203***	-	.013	.028	-.015
depression																-.025	-.025	-	.240***	-.239***	-.001 NS
Vital exhaustion																.109	.109	-	.242***	.235***	.007 NS
Functional performance																			.071	.071	-
R^2	.030			.007			.065			.198			.207			.207			.538		

* Significant at .05 level; ** Significant at .01; *** Significant at.001; NS non-significant

TE = total effects, DE = direct effects, IE = indirect effects

The results of final model testing are summarized in accordance with the hypothesized model as follows (see Table 4.17 – 4.18)

1. Social support had significant positive direct effect (β = 0.31, p < .001) on quality of life, and non-significant indirect effect (β = 0.04, p > .05) on quality of life through LVEF, symptoms and functional performance. Thus, the result supported some part of the hypothesized model. Therefore, the one of variable that social support had significant negative direct effect was LVEF (β = -.15, P < .05), and four path of social support had non-significantly on angina (β = -.08, p > .05), on dyspnea (β = .10, p > .05), on depression (β = -.07, p > .05), on vital exhaustion (β = .07, p > .05), and functional performance (β = -.03, P > .05).

2. Depression had a significant negative direct effect (β = -.24, p < .001) on quality of life, and a non-significant indirect effect (β = -.00, p > .05) on quality of life through functional performance. Thus, depression had non-significant direct effect (β = -.02, P > .05) on functional performance. These results supported one path of the hypothesis model.

3. Vital exhaustion had a significant direct effect (β = 0.23, p < .001) on quality of life, and non-significant indirect effect (β = 0.07, p > .05) on quality of life through functional performance. Then, vital exhaustion had a non-significant direct effect (β = .11, P > .05) on functional performance. This result supported the hypothesized model.

4. Cardiac self-efficacy had a significant direct effect on quality of life (β = .20, p < .001), and significant indirect effect (β = 0.21, p < .001) on quality of life through LVEF, symptoms, functional performance. This result supported the hypothesis model. However, cardiac self-efficacy had a significant direct effect on

LVEF (β = .16, p < .01), on dyspnea (β = .25, p < .001), on vital exhaustion (β = .40, p < .001), on functional performance (β = .29, p < .001), except that the one of angina (β = .01, p > .05).

5. Dyspnea had a non-significant direct effect (β = .03, p > .05) on quality of life, and a non-significant negative indirect effect (β = -.01, p > .05) on quality of life through functional performance. The result did not support the hypothesized model. However, dyspnea had negative direct effect (β = -.20, p < .001) on functional performance which supported one path from the revised Wilson and Cleary model.

6. LVEF had a non-significant direct effect (β = .04, p > .05) on quality of life, and a non-significant indirect effect (β = 0.02, p > .05) on quality of life through symptoms, functional performance. Hence, LVEF had a non-significant direct effect on angina (β = -.05, P > .05), on dyspnea (β = -.07, p > .05), on depression (β = -.04, p > .05), on vital exhaustion (β = .03, p > .05). This result not supported the hypothesis model.

7. Angina had a non-significant direct effect (β = 0.02, p > .05) on quality of life, and a non-significant indirect effect (β = .01, p > .05) on quality of life through functional performance. Hence, angina had a non-significant direct effect (β = .04, P > .05) on depression. The result did not support the hypothesized model.

8. Functional performance had a non-significant direct effect (β = 0.07, p > .05) on quality of life. This result not supported the hypothesis model.

CHAPTER V

DISCUSSION AND IMPLICATIONS

This chapter provides an understanding of the quality of life among CAD patients post PCI. This final chapter presents a discussion related to each research question. The limitations and implications for future research follow the discussion.

5.1 Conclusion

5.2 Characteristics of the study participants

5.3 Characteristics of the study variables

5.4 Findings of research questions and hypothesis testing

5.5 Limitations

5.6 Implications for nursing

5.1 Conclusion

The purpose of survey research for causal analysis was to develop and test a model that explains the relationship among LVEF, self-efficacy, social support, angina, dyspnea, depression, vital exhaustion, functional performance, and quality of life in CAD patients post PCI. The conceptual framework used in this study was the revised Wilson and Cleary model. A consecutive sample of 303 CAD patients post PCI was recuited from the outpatient heart clinic from five tertiary hospital in Thailand. Data collection was carried out from November 2011 to February 2013.

The instruments used in this study included demographic data questionnaire, quality of life index-cardiac version IV, Cardiac Self-efficacy Scale (CSE), the Social Support Questionnaire (SSQ), the Rose questionnaire for angina, the Rose Dyspnea Scale (RDS), the Center for Epidemiologic Studies Depression Scale (CES-D), SF-36: vitality subscale (VT), and Functional Performance Inventory Short-Form (FPI-SF). The validity and reliability of the instruments were examined. A LISREL version 8.72 was used to test the hypothesized path model.

A total of 303 participants that were Coronary Artery Disease patients post PCI were included in this analysis. The findings revealed that the mean age of the participants was 61.11 years (SD = 10.94, range = 35-87). Most were male (73.60%), and almost all of of participants were couples (81.20%) and had completed primary/ elementary education at 52.20%. Moreover, some of the participants were unemployed/ housewives (31.30%), some worked in the field of agriculture (17.80%), and some were government officials (15.80%). Approximately, close to half of the participants (46.20%) had a monthly family income of less than 10,000 baht (1 US dollar = 31 baht).

The study finding revealed that the hypothesized model fit the empirical data and explained 54% of the variance of quality of life (χ^2=1.90, df=3, p=.59, χ^2/df=.63, RMSEA=.00, GFI=.99, AGFI=.98). The most influential significant direct effect on quality of life of CAD patients post PCI were social support, depression, vital exhaustion and self-efficacy, the value of standardized path coefficiance were .307, .239, .235, and .205, respectively. However, self-efficacy is the one variable in this study that was powerful indirect effect on quality of life (.212, p<.001).

5.2 Characteristics of the study participants

The participants in this study were both males and females diagnosed with CAD. Close to three quarters of the participants (73.60%) were male, and their age ranged from 30 to 89 years, with a mean age of 61.11 years (SD = 10.94). These findings were consistent with the findings from previous studies conducted in Thailand, which reported that CAD was more prevalent in men (72.90%) than in women and where the average age was 63.36 (SD=12.06) (Khuwatsamrit, Putwatana, & Ungrattanachai, 2010). Almost all of the participants were couples (81.20%) and employed (68.70%). This was congruent with a prior study of the functional status model in acute myocardial infraction, which presented that participants were married (71.10%) and employed (55.50%) (Sriprasong et al., 2009). The characteristics of the participants in this study were also the same as the characteristics of the CAD patients in previous studies.

5.3 Characteristics of the study variables

The nine major variables in the current study include self-efficacy, social support, LVEF, angina, dyspnea, vitality exhaustion, depression, functional performance, and quality of life. The discussion of these variables is presented as follows:

5.3.1 Cardiac self-efficacy

The score for cardiac self-efficacy ranged from 0 to 52 points, with a mean of 34.27 (SD = 9.25), indicating that most participants had a moderate level of self-efficacy. The mean control score was 21.63 (SD = 6.09) and the mean maintaining score was 12.64 (SD = 4.15). This finding was consistent with the previous study where the control score

was higher than the maintaining score, with a control score of 19.4 (SD = 2.8) and a maintaining score of 8.0 (SD = 2.6) (Arnold et al., 2005). In this study, self-efficacy was measured using the Cardiac Self-Efficacy Questionnaire that was first used in Thailand; however, it has become commonly used in Western healthcare research.

5.3.2 Social support

The mean scores of social support ranged from 4 to 84 points, with a mean of 61.48 (SD = 13.45), and it was concluded that most participants had a high level of social support. The highest support was family support (average mean score = 22.93), followed by healthcare provider support (average mean score = 20.84), and friends' support (average mean score = 17.71). The current study's results were the same as in the previous study, where the highest support was family support (average mean score = 22.63), followed by healthcare provider support (average mean score = 18.40), and friends' support (average mean score = 14.01) (Khuwatsamrit et al., 2006).

5.3.3 LVEF

The scores for LVEF ranged from 12 to 91, with a mean of 55.17 (SD = 11.82), suggesting that most participants had a good LVEF. The current study's results were the same as in the previous study, where the myocardial infraction patients had an LVEE of 54.52 (SD = 14.22) (Sindhu & Sriprasong, 2001).

5.3.4 Symptoms (angina, dyspnea, depression, and vitality exhaustion)

5.3.4.1 Angina

This study demonstrated that 88.80% of participants had no angina,

10.30% had borderline angina, and 1.30% had angina. This indicated that CAD treatment with PCI can decrease angina symptoms. However, angina symptoms are of the most concern and are a good warning sign of CAD (Fox et al., 2006).

5.3.4.2 **Dyspnea**

This study has shown that 44.40% of participants had dyspnea. Dyspnea symptoms are not serious warning signs and might be omitted from physicians' examinations (Stern, 2005); however, these symptoms were found in one third of the CAD patients (DeVon, Ryan, Ochs, & Shapiro, 2008; Arnord et al., 2009).

5.3.4.3 Depression

This study found that 19.40% of the participants indicated that they had depression. The present study is relevant with previous reviews that found that 20% to 40% of CAD patients had depression (Celano & Huffman, 2011). Coronary artery disease and depression have a bidirectional relationship and evidence for this relationship is increasing in healthcare research (Sullivan et al., 1999; Khawaja, Westermeyer, Gajwani, & Feinstein, 2009). Furthermore, Yusim (2003) reported that CAD patients in Thai in-patient departments had depression, and that the results of this study are consistent with a previous Western study. In addition, an earlier study of the prevalence of anxiety and depression in CAD patients found a prevalence of depression at 31% (Rohani, Akbari, & Zarei, 2011).

5.3.4.4 Vital exhaustion

This study showed a mean score of SF-36: vital exhaustion of 14.25

(SD = 1.28) and indicated that most participants had a low level of vitality symptoms. Vitality symptoms were found to be correlated with CAD 0.81 (Kubzansky & Thurston, 2007). No study in Thailand has tested the linkage between vitality exhaustion and CAD, but the study of vitality exhaustion is increasing in Western psychological and CAD research (Rozanski & Kubsansky, 2005). The current study is a good start in explaining this linkage.

5.3.5 Functional Performance Inventory

The total scores for functional performance ranged from 0.00 to 3.00 points, with a mean of 2.55 (SD = .45), where most of the participants had a high score. Based on the average of the mean score, more participants engaged in functional body care (average mean score = 2.92) than spiritual activities (average mean score = 2.65), recreation (average mean score = 2.63), physical exercise (average mean score = 2.46), social interaction (average mean score = 2.36), or maintaining the household (average mean score = 2.27). This finding was different from the previous study of myocardial infraction patients where the participants had moderate scores on functional performance 1.81 (SD = 0.58) (Sindhu & Sriprasong, 2001).

5.3.6 Quality of life

The findings of the current study disclose that quality of life was good (24.92, SD 2.94). This study was consistent with the former study of the quality of life in Thai CAD patients, with a quality of life score that ranged from 23.73 (SD=2.73) to 25.11 (SD=2.37) in the control group, and 25.01 (SD=1.97) to 26.02 (SD=2.47) in the lifestyle

management group (Saengsiri et al., 2011). In addition, the participants in the previous study received treatment for CAD with PCI, CABG, and medication with the criteria of NYHA in I-III, which could imply that the participants were similar to those in this study. The participants in this group were among the CAD patients that followed up in the out-patient clinic and needed more help to increase their quality of life.

5.4 Findings of the research questions and hypothesis testing

The present study examined the relationship between selected variables (LVEF, self-efficacy, social support, angina, dyspnea, depression, vital exhaustion, functional performance) and disease-specific quality of life (measured by the Quality of Life-Cardiac Version IV). The disease-specific measurement is considered to evaluate the variables that are disease and treatment correlated in order to assess how different aspects of the disease affect patients' perceived quality of life (Benner, 1985; Ferrans, 1996). The results of this study are discussed below.

Research question 1:

What are the relationships among LVEF, self-efficacy, social support, angina, dyspnea, depression, vital exhaustion, functional performance, and quality of life in CAD patients?

Research question 2:

Does the hypothesized model explain quality of life for CAD patients, including self-efficacy, social support, LVEF, angina, dyspnea, depression, vital exhaustion, functional performance, and does it adequately fit the data?

The present study's findings reported that the hypothesized model fit the empirical data and explained 54% of the variance in quality of life by self-efficacy, social support, LVEF, angina, dyspnea, depression, vitality exhaustion, and functional performance. This finding is relevant to a previous study, which investigated the quality of life model in CAD patients, including biomedical factors, and individual environmental characteristics; overall, the model could explain 49% of its variance (Höfer et al., 2005).

Use of the revised Wilson and Cleary model plus evidence support found that the variables that had the most powerful direct effect on the quality of life of CAD patients post PCI were social support, depression, vital exhaustion and self-efficacy; the values of standardized path coefficients were .31, .239, .235, and .21, respectively. However, self-efficacy is the one variable in this study that had a powerful indirect effect on quality of life (.21, $p<.001$). The findings of this study explained that CAD patients post PCI who had more social support, less depression and vital exhaustion symptoms, and high self-efficacy appear to have better quality of life.

Hypothesis testing

According to the current study, four of the eight hypotheses were fully supported by the empirical data, whereas four hypotheses were rejected. A discussion of the hypothesis testing is presented as follows:

1. Self-efficacy had a significant direct effect on quality of life (.20, p<.001), and a significant indirect effect (0.21, p<.001) on quality of life through LVEF, symptoms, functional performance. This result supported the hypothesis model. However, self-efficacy had a significant direct effect (.16, p<.01) on LVEF, (.25, p<.001) on dyspnea, (.40, p<.001) on vitality exhaustion, and (.29, p<.001) on functional performance, but did not have a significant direct effect on angina (.01, p>.05).

According to this study's findings, self-efficacy had significantly positive direct and indirect effects on quality of life, thus indicating that CAD patients post PCI with a high score of self-efficacy also had a high score of quality of life. A study of the self-efficacy in CAD patients focused on success in cardiac rehabilitation. Moreover, Song (2003) studied the effect of self-efficacy in promoting a cardiac rehabilitation program for ischemic heart disease and found that this program was effective in improving self-efficacy and quality of life.

This study's findings are consistent with a report from the heart and soul study. Sarkar, Ali, & Whooley (2007) examined the relationship between cardiac self-efficacy and health status among patients with stable CAD and reported that patients with low self-efficacy were associated with worse quality of life (OR=1.6, P<.0001). Thus, the CAD patients who had high self-efficacy scores tended to have a high quality of life. A prior study of social support, self-efficacy, and adherence to self-care in Thai CAD patients revealed that self-efficacy was a prominent mediator in the relationship between social support and self-care (Khuwatsamrit et al., 2006).

Clinical researchers in the field of nursing are increasingly interested in self-efficacy. Katch & Mead (2010) conducted a systematic review of a disease self-management program in cardiovascular disease patients. This systematic review reported that self-efficacy is a key component in cardiovascular self-management programs.

Most of the research in recent decades has found that self-efficacy is a valuable significant predictor on health outcomes in almost all cardiac rehabilitation programs or behavior change (Kang & Yang, 2013; Lapier, Cleary, & Kidd, 2009; Senuzun, Fadiloglu, Burke, & Payzin, 2006) The cardiac self-efficacy was significantly directly and indirectly related to quality of life in CAD patients post PCI, and directly influenced LVEF, symptoms (dyspnea, depression and vitality exhaustion), and functional performance. Kang & Yang (2013) conducted research in 214 CAD patients who performed health behaviors to prevent recurrent cardiac events and reported that self-efficacy was a vital factor for initiating and maintaining health behavior. The previous study on "exercise self-efficacy, habitual physical activity and fear of falling in coronary heart disease patients" among 50 patients admitted to a hospital reported that cardiac self-efficacy was correlated with level of physical function (Lapier et al., 2009).

In addition, Howarter and team investigated the effect of a cardiac rehabilitation program on 133 cardiac rehabilitation patients at follow-ups at 6 months and 2 years. Howarter's team reported that the participants who had high depressive symptoms before participating in the program also had lower level of exercise self-efficacy, significantly evident at 6 months after following the cardiac rehabilitation program (Howarter, Bennett, Barber, Gessner, & Clark, 2013). The recent study also found that the

relationship between LVEF and depression in managing cardiovascular disease risk factors were mediated by self-efficacy and illness perception (Greco et al., 2013)

Previous research found that self-efficacy was a mediator between associated health outcomes (Khuwatsamrit et al., 2006).

Thus, future research is needed to investigate causal relationships between self-efficacy, nursing programs and health outcomes before providing specific nursing interventions.

2. Social support had a significant positive direct effect (0.31, p<.001) on quality of life, and a non-significant indirect effect (0.04, p>.05) on quality of life through LVEF, symptoms and functional performance. Thus, the result supported some part of the hypothesized model. The one social support variable that had a significant negative direct effect (-.15, P<.05) was LVEF, and the four social support paths that had non-significant effects (-.08, p>.05) were angina, (.10, p>.05) dyspnea, (-.07, p>.05) depression, and (.07, p>.05) vitality exhaustion.

Interestingly, the current study's findings revealed that social support did not have a significant indirect effect on quality of life through symptoms or functional performance, but it had a significant positive direct effect on quality of life.

According to epidemiological evidence and reviews, social support has been prospectively associated with adverse CAD (Cohen, Kaplan, & Manuck, 1994; Lett et al., 2005). A systematic review and meta-analysis also confirmed that social support was

important for the prognosis of CAD (Barth, Schneider, & KÄnel, 2010). Furthermore, previous evidence showed that social support occurs on the prognosis of CAD, but that there were differences in the type of social support received by CAD patients (Lett et al., 2005). However, a study of social support among Thai CAD patients reported that social support was an independent variable and that self-efficacy was a mediator in self-care (Khuwatsamrit et al., 2006). The previous studies were consistent with this current study; social support had a direct effect on quality of life.

However, the findings from this study disagree with the previous study in that social support did not influence health-related quality of life in CAD patients (Höfer et al., 2005).

Social support scores were significantly two-path for the modified model on quality of life and LVEF, but non-significantly for symptoms and functional performance. The first path between social support and LVEF confirmed the revised model explanation of the influence of social environment on health outcomes (Ferrans, Zerwic, Wilbur, & Larson, 2005). This finding is relevant to one that reported the relationship between LVEF and depression was mediated by social support, illness perception and self-efficacy (Greco et al., 2013).

Moreover, a study in mainland China with 200 outpatient coronary heart disease patients that evaluated health-related quality of life and perceived social support found that patients with coronary heart disease reported poorer quality of life and lower social support (Wang, Lau, Chow, Thompson, & He, 2013). As a result, the two paths of this study's findings were relevant with the previous study. However, the two paths between

social support and symptoms, and social support and functional performance were non-significant, which was different from the revised model. This is consistent with an investigation of the prognostic impact on depression and lack of social support in 292 women with CAD, which found that women with CAD had more depressive symptoms. The aforementioned investigation also found that lack of social integration can predict the recurrence of cardiac events, and women with no depressive symptoms and more support had good prognosis (Horsten et al., 2000). In comparison, 80.60% of participants in this study exhibited no depressive symptoms and moderate social support, which represented good prognosis. Furthermore, the characteristics of the participants in this study were relevant to the study by Horsten and team (2000), so it may be summarized that the participants in this study had good prognosis and had no recurrence of cardiac events including no chest pain (88.80%), no dyspnea (55.60%), and no depression (80.60%).

The non-significant path between social support and functional performance did not support the hypothesis. In contrast, this finding was not relevant to several studies that reported a relationship between social support and functional status (Sorensen & Wang, 2009). However, one study in 502 older adults with heart disease examining the role of self-esteem, stress and social support in maintenance or improvement in physical and psychological function reported that self-esteem and stress were significantly associated with function, but social support was non-significant (Forthofer, Janz, Dodge, & Clark, 2001).

To summarize these recent findings, social support is one key variable because patients who had all types of high social support– including family, healthcare, and

friends– also had high quality of life. However, nurses could provide support and link social supports especially in healthcare within the system of nursing care for CAD patients. Moreover, nurses can promote family and friend support for CAD patients to improve their quality of life.

In addition, in this study, the research reviewed the symptoms that occurred in CAD patients and found the following four symptoms: 1) angina, 2) dyspnea, 3) depression, and 4) vitality. The details of the results of each variable are discussed as follow:

3. Depression had a significant negative direct effect (-.24, p<.001) on quality of life, and a non-significant indirect effect (-.00, p>.05) on quality of life through functional performance. These results supported one path of the hypothesis model.

According to the study's findings, depression had a significant negative direct effect on quality of life and a non-significant indirect effect on quality of life through functional performance. The previous reviews pointed out that depression had a bidirectional relationship with CAD and that depression was an independent risk factor of CAD (Sullivan et al., 1999; Lett et al., 2004; Lichtman et al., 2008; Khawaja, Westermeyer, Gajwani, & Feinstein, 2009; Davidson, 2012).

A previous study of the structural equation model of quality of life found that depression had a negative indirect effect on quality of life (Höfer et al., 2005), which was not consistent with this study. One possible reason is that the majority of participants

were not depressed (80.60%), which might have affected the variance of this variable. However, this finding also supported the direct effect of the hypothesis model in that CAD patients with high score of depression had low quality of life. Moreover, depression is an important symptom associated as a risk factor in CAD patients, as presented in previous research (Pogosova, 2012; Rutledge, Redwine, Linke, & Mills, 2013; Safdar, Foody, & D'Onofrio, 2010; Summers, Martin, & Watson, 2010).

In addition, clinical researchers have been interested in the role of depression on CAD patients and have developed specific interventions to reduce depression in CAD patients (Koertge et al., 2008; O'Neil et al., 2011). Koertge and colleagues examined the effect of a stress management program on vital exhaustion and depression in female CAD patients, and found that vital exhaustion decreased more in patients who participated in the program than in those who participated in the control group. Further studies must be conducted in Thailand to examine the influence of depression on quality of life.

4. Vital exhaustion had a significant direct effect (0.23, $p<.001$) on quality of life and a non-significant indirect effect (0.07, $p>.05$) on quality of life through functional performance. This result supported the hypothesized model.

This means that CAD patients had greater vitality exhaustion with lower quality of life. Furthermore, this study reported a difference: that CAD patients had high vital exhaustion, which had a significant positive indirect effect (1.71, $p<.05$) on quality of life through functional performance. Accordingly, the study's findings reported that CAD

patients who had more vitality had high scores on quality of life; this finding did not support the hypothesis. Furthermore, a previous study found that vitality was still highly prevalent post-PCI and predicted quality of life (Pederson et al., 2007). It should be noted that this is the first study examining vitality in Thai CAD patients

This is consistent with the study by Horsten and others (2000) in that women with CAD who exhibited more depressive symptoms and lacked social integration were more likely to experience a reccurrence of cardiac events, and women with no depressive symptoms and more support tended to have good prognosis. However, in this study, two symptoms occurring with CAD patients post PCI were depression and vital exhaustion.

This evidence could be useful for advanced practice nurses to create cardiac nursing interventions for managing symptoms to improve quality of life of CAD patients post PCI.

5. LVEF had a non-significant direct effect (.04, p>.05) on quality of life, and a non-significant indirect effect (0.02, p>.05) on quality of life through symptoms and functional performance. This result did not support the hypothesis model.

Self-efficacy and social support had a powerful direct effect on LVEF, the value of standardized path coefficients were .16 and .12, respectively. Hence, CAD patients post PCI who had high self-efficacy and social support also had high LVEF. The revised model clarified that individual characteristics (self-efficacy) and environmental characteristics (social support) act as attributes to increase or decrease health problems.

This study indicated that the first path (LVEF to symptoms, p>.05) was non-significant. Thus, LVEF was not a strong predictor of symptoms status.

In a recent study, LVEF was a non-significant predictor of quality of life in CAD patients with PCI. This finding was inconsistent with a previous study. The study "Multimodality Imaging Evaluation of Functional and Clinical Benefits of Percutaneous Coronary Intervention in Patients with Chronic Total Occlusion Lesion" reported that LVEF in patients with PCI follow-up at 6 months and 1 year increased significantly as quality of life improved (Sun et al., 2012). A previous study in post-MI patients stated that reduced intermediate LVEF was associated with a reduced quality of life score (Pettersen, Kvan, Rollag, Stavem, & Reikvam, 2008). Another recent study reported that the relationship between LVEF and depression was mediated by illness perception (Greco et al., 2013). Nonetheless, the characteristics of participants' LVEF in this study could be better than in previous studies, which included normal LVEF (mean = 55.17, SD = 11.82). Most participants had normal symptoms of angina (88.80%) and depression (80.60%), with half of the participants exhibiting normal dyspnea (55.60%), and low to moderate vital exhaustion (33.00%, 34.32%). Consequently, their symptoms did not effect illness perception. LVEF did not affect quality of life or any other symptoms of CAD patients post PCI in this study.

The present study revealed that LVEF did not have a significant indirect effect on quality of life through symptoms or functional performance. However, a previous study reported that low LVEF occurred in severe CAD patients (Squeri et al., 2012), which is different from this study; the previous study showed that LVEF was a determinant in

reducing HRQOL in CAD patients with a history of myocardial infraction (Pettersen, Kvan, Rollag, Stavem, & Reikvam, 2008).

In addition, the difference in the results may be explained by the variability among LVEF scores: normal LVEF (69.74%) and borderline normal (19.08%).

6. Angina had a non-significant direct effect (0.02, p>.05) on quality of life, and a non-significant indirect effect (.01, p>.05) on quality of life through functional performance. This result did not support the hypothesized model.

The present study revealed that angina did not have a significant indirect effect on quality of life through LVEF, symptoms, or functional performance. It is possible that most participants had no angina (88.0%), while only 1.3% had angina. However, this finding is inconsistent with previous research that showed angina symptoms as the most important factor in predicting worsening CAD, and the angina symptoms as lower after PCI treatment at 3 months' follow-up (Wong & Chair, 2007).

A previous study reported that CAD females with no symptoms of depression and with more support could be predicted to have good prognosis for no recurrence of cardiac events (Horsten et al., 2000), which supported the three non-significant paths in this study. Cardiac events occurring less in this study included no chest pain (88.80%) and no dyspnea (55.60%).

7. Dyspnea had a non-significant direct effect (.03, p>.05) on quality of life, and a non-significant negative indirect effect (-.01, p>.05) on quality of life through functional performance. This result did not support the hypothesized model. However, dyspnea had negative direct effect (-.20, p<.001) on functional performance, which supported one path from the revised Wilson and Cleary model.

Dyspnea had a non-significant negative indirect effect (-1.73, p>.05) on quality of life through functional performance. This finding explains that the characteristic of participants (55.60%) in this study had no dyspnea that might affect quality of life. However, dyspnea had negative direct effect on functional performance that relevant with the revised model and previous research. Hence, almost previous research studied among patients had a problem with pulmonary and diastolic dysfunction (Morgan & Hodge, 1998; Siela, 2003; Nasim, Nadeem, Zahidie, & Sharif, 2013).

Siela (2003) investigated the correlation between self-reports of self-efficacy and dyspnea perceptions to predict functional performance in patients with chronic obstructive pulmonary disease (COPD). She reported that self-efficacy and dyspnea were independent variables that significantly predicted functional performance. Nasim, Nadeem, Zahidie, & Sharif (2013) examined the correlation between diastolic dysfunction and functional capacity and dyspnea, and showed that diastolic dysfunction is significant relationship between impaired function capacity and dyspnea

Then, the current study found the importance evidence that present the relationship between dyspnea and functional performance in CAD patients post PCI. In

order that these relationship needs to be investigate the link between dyspnea and diastolic dysfunction in CAD patients with PCI that may be ignored from system of care and cure.

8. Functional performance had a non-significant direct effect (0.48, p>.05) on quality of life.

The failure to find a significant relationship between functional performance and quality of life might reflect the characteristics of the participants, indicating that most of the participants in this study had a higher functional performance score than the mean score (skewness value = -1.34) and that the quality of life score indicated good quality of life. Consequently, CAD patients post PCI in this study exhibited high competence to perform functions, and no variation in variables affecting quality of life.

The results showed that functional performance had a significant positive direct effect on quality of life. In addition, those CAD patients who had high functional performance also had a greater quality of life score. The revised Wilson and Cleary model (Ferrans et al., 2005) used Leidy's framework function status guide for study, and proposed function on optimization of the functional that remain activity. Leidy defined her framework within four dimensions, including functional capacity, functional performance, functional capacity utilization, and functional reserve (Leidy, 1999).

Functional performance was appropriated for CAD patients and refers to those activities one performs on a day-to-day basis. Functional performance is assessed by the

level of physical activities and energy expended, or by self-reported activities across multiple categories. In the revised model, path-affected quality of life was consistent with a previous study, which found that function had a direct effect on quality of life (Unsar, Sut, & Durma, 2007; Eastwood et al., 2010). However, this finding supported hypothesis.

5.4 Limitations

Several studies had limitation and need to be acknowledged. When applying the finding, the limitations of the study need to be taken into consideration.

When interpreting and using the results of this study's findings, there are limitations that need to be considered. The participants in this study were CAD patients post PCI. In addition, the participants were from three high volume post-PCI CAD regions in Thailand. Therefore, the generalizability of the findings may be limited.

The data collections in this study were collected by interviewer and self-report questionnaire. There are known that using self-report to collect data is less reliable and causes more missing data than the interview method (Guyatt, Feeny & Patrick, 1993). However, this is the one of limitation that researcher and research assistance should be careful to advice the participants.

5.5 Implications for nursing

The results of this study provide further understanding of the process in that the subjective and objective health outcome determinants contribute promoting quality of life

in CAD patients as well as careful consideration of the variables in other populations. The implications of this study focus on the implications for nursing science, nursing practice, and future nursing research.

Implications for nursing science

The current study was conducted based on the revised Wilson and Cleary Health Related Quality of Life model plus a review of literature regarding CAD patients post PCI in terms of quality of life in this population. The revised Wilson and Cleary Health Related Quality of Life model is a concept model for patient outcome that provides necessary specificity for usefulness in research and practice. The present study used these concepts plus a review of literature testing among CAD patients post PCI and contributes to knowledge management and development for the strengthening of nursing science. This finding supports the revised Wilson and Cleary model plus empirical literature and data that self-efficacy, LVEF, angina, dyspnea, depression, vital exhaustion and functional performance affect quality of life in CAD patients post PCI.

Although LVEF, angina, dyspnea, and functional performance were not statistically significant, the empirical data showed a 54% fit of quality of life in the CAD patient post PCI model. In summary, the path model influenced quality of life among CAD patients and showed that functional performance had the strongest effect on quality of life. The results presented the idea that a greater self-efficacy score could generate dyspnea, depression, vital exhaustion, and increase functional performance and quality of life. Depression and vital exhaustion were found to be resources in terms of increasing

quality of life in the CAD patients in this study. However, this model supported the empirical information for CAD patients post PCI.

Implications for nursing practice

The present study provides information on the factors that affect quality of life for CAD patients post PCI, whereby nurses can be creative in using specific nursing interventions for the CAD population. This study found that social support, depression, vital exhaustion, and cardiac self-efficacy had the most powerful effects on quality of life in CAD patients post PCI. Advanced nursing practice could consider these variables to create specific nursing interventions such as promoting social support and supporting programs for reducing depression and vital exhaustion in CAD patients. In nursing practice, knowledge of important factors and quality of life provide more information and could help advanced practice nurses understand differences among patients at each stage of life.

Implications for future nursing research

Some of the socio-demographic variables examined in the current study (age, gender, marital status, and level of education) have been examined thoroughly in previous studies. However, some of the variables have been overlooked and are not often examined in current studies. Hence, the present variables may contain valuable information related to quality of life. Future research examining the predictors of quality of life should test the SEM in cardiovascular disease that is not specific to a sub-group.

Besides these findings, healthcare providers can gather information from this study to tailor interventions that are specific to CAD patients.

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APPENDICES

Appendix A

Approval of dissertation proposal

Dissertation Proposal Approval Form
Faculty of Nursing, Chulalongkorn University

Student's name MS. AEM-ORN SAENGSIRI **Identification Number** 5177979736

Academic year of enrollment 2008

Address 1873 Kunpiphat Dormitory King Chulalongkorn Memorial Hospital
Rama IV Rd. Patumwan Bangkok Thailand 10330 **Phone** 081-648-3748

Title of dissertation (English in capital letters): PREDICTING FACTORS OF HEALTH-RELATED QUALITY OF LIFE AMONG CORONARY ARTERY DISEASE PATIENTS POST PERCUTANEOUS CORONARY INTERVENTION

(Thai) ปัจจัยทำนายคุณภาพชีวิต ผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการขยายหลอดเลือดหัวใจ

Dissertation Advisors

1. Assoc. Prof . Dr. Sureeporn Thanasilp **Phone number** 081-8690-654

Dissertation Co-Advisor

2. Asst. Prof. Dr. Sunida Preechawong **Phone number** 081-3508-836

Student's signature.....Aemorn Saengsiri.....
(Ms. Aem-orn Saengsiri)
Date.....May 4, 2011.....

.....Sureep T.....
Advisor
Date.....4/5/2011.....

.....Sunida Preechawong.....
Co-advisor
Date.....4/5/2011.....

.....Jintana Yunibhand.....
(Assoc. Prof. Dr. Jintana Yunibhand)
Chairperson, PhD program
Date.....April 28, 2011.....

Approved by the doctoral committee at the meeting 6/2554 Date..April 29, 2011
.....Sunida Preechawong.....
(Asst. Prof. Dr. Sunida Preechawong)
Secretary, Ph.D. program

Approved by the faculty of nursing board at the meeting...../2554 Date..May 10, 2011
Ratchaneekorn Kr.
(Dr. Ratchaneekorn Kartchok)
Secretary, Board
Date.....May 10, 2011.....

.....Sureep.....
(Dr. Sureeporn Thanasilp, Assoc. Prof.)
Deputy Dean for Administration
For Dean of Faculty of Nursing
12 May 2011

Appendix B

Instruments

แบบสอบถาม / แบบประเมิน
สำหรับดุษฎีนิพนธ์ นางสาวเอมอร แสงศิริ

☐ 1) The personal data form

☐ 2) Quality of Life Index-Cardiac version IV, Thai version

☐ 3) The Center for Epidemiologic Studies Depression Scale (CES-D), Thai version

☐ 4) Cardiac self-efficacy scale (C-SES), Thai version

☐ 5) The Social Support Quessionnaire (SSQ), Thai version

☐ 6) The Rose Questionnaire for angina, Thai version

☐ 7) The Rose Dyspnea Scale (RDS), Thai version

☐ 8) SF-36: vitality subscale (VT), Thai version

☐ 9) Functional Performance Inventory Short-Form (FPI-SF) Thai version

แบบบันทึกนี้ ให้ผู้ป่วยตอบคำถามทุกข้อให้ตรงกับความเป็นจริงมากที่สุด คำตอบที่ได้ถือเป็นความลับ ผู้วิจัยจะไม่เปิดเผยข้อมูลเป็นรายบุคคลต่อสาธารณชน

<u>คำชี้แจง</u> ให้ผู้ตอบแบบสอบถามกาเครื่องหมาย ☑ ลงในช่องสี่เหลี่ยม และเติมข้อความในช่องว่างให้สมบูรณ์ หรือวงกลมรอบข้อความที่ตรงกับท่านมากที่สุด ท่านสามารถวงกลมได้มากกว่า 1 ข้อ

1. เพศ ☐ 1. ชาย ☐ 2. หญิง

2. สถานภาพสมรส ☐ 1. คู่ ☐ 2. โสด ☐ 3. หม้าย ☐ 4. หย่า / แยก

3. ศาสนาที่ท่านนับถือ ☐ 1. พุทธ ☐ 2. อิสลาม ☐ 3. คริสต์ ☐ 4. อื่นๆ ระบุ .....

4. ระดับการศึกษาสูงสุดของท่าน .....

5. อาชีพของท่าน ☐ 1. ไม่ได้ทำงาน ☐ 2. แม่บ้าน / พ่อบ้าน ☐ 3. เกษตรกรรม ☐ 4. ค้าขาย
☐ 5. รับราชการ/รัฐวิสาหกิจ ☐ 6. รับจ้าง ☐ 7. อื่นๆ .....

6. รายได้ของท่านเฉลี่ยต่อเดือน .....

7. ปัจจุบันท่านออกกำลังกายบ้างหรือไม่

☐ 1. ไม่ออกกำลังกาย

☐ 2. ออกกำลังกาย

- ท่านออกกำลังกายด้วยวิธีใด ☐เดิน ☐วิ่ง ☐ แอโรบิค ☐ อื่นๆ โปรดระบุ .....
- ท่านใช้เวลาในการออกกำลังกายแต่ละครั้ง นานเท่าใด .....
- ในเวลา 1 สัปดาห์ ท่านมีเวลาในการออกกำลังกายกี่วัน ต่อสัปดาห์ .....

8. ท่านมีวิธีการผ่อนคลายความเครียดสำหรับท่านหรือไม่

☐ 1. ไม่มี

☐ 2. มี ด้วยวิธีใด กรุณาวงกลมรอบกิจกรรมที่ท่านปฏิบัติเพื่อผ่อนคลายความเครียด ด้านล่างนี้

การหายใจช้า การผ่อนคลายกล้ามเนื้อ การสร้างจินตภาพ ออกกำลังกายอย่างเบาด้วย โยคะ ชี่กง หรืออื่นๆ โปรดระบุ.....

9. หากท่านมีเวลาว่างท่านมักจะมีกิจกรรมพักผ่อนยามว่าง หรือไม่

☐ 1. ไม่มี

☐ 2. มี กิจกรรมที่ท่านชอบเลือก กรุณาวงกลมรอบกิจกรรมที่ท่านชอบ ด้านล่างนี้

นอนพัก อ่านหนังสือ ฟังเพลง ปลูกต้นไม้ ดูแลสัตว์เลี้ยง ดูโทรทัศน์ ชมภาพยนตร์ ไปสวนสาธารณะ หรืออื่นๆ โปรดระบุ.....

10. ท่านเคยดื่มเหล้า หรือไม่

☐ 1. ไม่เคยดื่มเหล้า

☐ 2. เคยดื่มเหล้า ปัจจุบันเลิกดื่มเหล้าแล้ว - ตอนนี้เลิกดื่มเหล้ามานาน .....ปี/เดือน

☐ 3. ปัจจุบันยังดื่มเหล้าอยู่ วันละ ..... ดื่มมานาน .....ปี/เดือน

INSTITUTIONAL REVIEW BOARD
Faculty of Medicine, Chulalongkorn University
IRB No. 365/54
Date of Approval 12 ก.ค. 2554

แบบสอบถามคุณภาพชีวิต

Quality of life index-cardiac version IV (Ferrans & Power, 1998)

พัฒนาเป็นภาษาไทยโดย เอมอร แสงศิริ (2003)

คำชี้แจง ข้อคำถามต่อไปนี้ แบ่งเป็น 2 ส่วน คือ

ส่วนที่ 1. เป็นข้อคำถามที่ใช้เกี่ยวกับความพึงพอใจต่อเหตุการณ์ในชีวิตของท่าน

ส่วนที่ 2. เป็นข้อคำถามที่ใช้เกี่ยวกับความสำคัญต่อเหตุการณ์ในชีวิตของท่าน

โปรดอ่านข้อความในแต่ละข้อ แล้วทำเครื่องหมาย ✓ ลงในช่องว่าง<u>เพียง 1 ช่อง</u> ในแต่ละข้อ ที่ตรงกับความรู้สึกของท่าน ทั้งด้านความพึงพอใจ และความสำคัญต่อเหตุการณ์ในชีวิตของท่าน ข้อความต่อไปนี้ไม่มีคำตอบที่ถูกหรือผิด คำตอบที่ได้ถือเป็นความลับ ผู้วิจัยจะไม่เปิดเผยข้อมูลของท่านเป็นรายบุคคลต่อสาธารณชน แต่จะนำเสนอโดยภาพรวม

ส่วนที่ 1. ท่านรู้สึกพึงพอใจกับสิ่งต่อไปนี้ มากน้อยเพียงใด

0 หมายถึง ไม่พึงพอใจมาก

1 หมายถึง ไม่พึงพอใจปานกลาง

2 หมายถึง ไม่พึงพอใจเล็กน้อย

3 หมายถึง พึงพอใจเล็กน้อย

4 หมายถึง พึงพอใจปานกลาง

5 หมายถึง พึงพอใจมาก

ข้อความ	ไม่พึงพอใจ			พึงพอใจ		
	มาก 0	ปานกลาง 1	เล็กน้อย 2	เล็กน้อย 3	ปานกลาง 4	มาก 5
1. ท่านรู้สึกพึงพอใจกับภาวะสุขภาพของท่าน						
2. ท่านรู้สึกพึงพอใจในระบบบริการสุขภาพที่ท่านได้รับ						
3. ท่านรู้สึกพึงพอใจกับระดับอาการเจ็บหน้าอกที่มีอยู่ในขณะนี้						
4. ท่านรู้สึกพึงพอใจกับความสามารถในการหายใจได้ดี โดยไม่หอบเหนื่อย						
5. ท่านรู้สึกพึงพอใจกับพละกำลังที่ท่านมี ในการทำกิจกรรมต่างๆในชีวิตประจำวัน						
6. ท่านรู้สึกพึงพอใจกับความสามารถดูแลตนเองได้ โดยไม่ต้องพึ่งพาคนอื่น						
7. ท่านรู้สึกพึงพอใจกับความสามารถในการควบคุมชีวิตตนเองได้ ในระดับนี้						
8. ท่านรู้สึกพึงพอใจในโอกาสที่ท่านมีชีวิตยืนยาว เท่าที่ท่านต้องการ						

แบบทดสอบภาวะซึมเศร้า CES-D ฉบับแปลภาษาไทย

คำชี้แจง: คำถามต่อไปนี้ เป็นความรู้สึกที่อาจจะเกิดกับท่านได้ โปรดอ่านแต่ละข้อ แล้วกาเครื่องหมายถูก ✓ ลงในช่องที่ตรงกับความรู้สึกของคุณมากที่สุด ในรอบสัปดาห์ที่ผ่านมา

คำตอบเหล่านี้ ไม่มีถูก ไม่มีผิด เป็นเพียงการทดสอบเกี่ยวกับความรู้สึกของคุณเท่านั้น

ความรู้สึก	ไม่เลย <1 วัน ต่อ สัปดาห์	นานๆครั้ง 1-2 วัน ต่อสัปดาห์	ค่อนข้างบ่อย 3-4 วัน ต่อสัปดาห์	บ่อยครั้ง 5-7 วัน ต่อสัปดาห์
1. ฉันรู้สึกหงุดหงิดง่าย				
2. ฉันรู้สึกเบื่ออาหาร				
3. ฉันรู้สึกว่า ฉันไม่สามารถขจัดความหม่นหมองออกไปแม้ว่าจะมีคนในครอบครัวหรือเพื่อนคอยช่วยเหลือ				
4. ฉันรู้สึกตนเองมีความดีทัดเทียมคนอื่นๆ				
5. ฉันรู้สึกลำบากในการตั้งสมาธิเพื่อทำสิ่งใดสิ่งหนึ่ง				
6. ฉันรู้สึกหดหู่ใจ				
7. ฉันรู้สึกว่าทุกๆสิ่งที่ฉันกระทำต้องฝืนใจทำ				
8. ฉันรู้สึกมีความหวังเกี่ยวกับอนาคต				
9. ฉันคิดว่าชีวิตฉันมีแต่ความล้มเหลว				
10. ฉันรู้สึกหวาดกลัว				
11. ฉันนอนไม่ค่อยหลับ				
12. ฉันมีความสุข				
13. ฉันพูดคุยน้อยกว่าปกติ				
14. ฉันรู้สึกอ้างว้าง เดียวดาย				
15. ฉันรู้สึกว่าผู้คนทั่วๆไปไม่มีความเป็นมิตร				
16. ฉันรู้สึกว่าชีวิตนี้สนุกสนาน				
17. ฉันมักร้องไห้				
18. ฉันรู้สึกไม่มีความสุข				
19. ฉันรู้สึกว่าผู้คนรอบข้างไม่ชอบฉัน				
20. ฉันรู้สึกท้อถอยในชีวิต				

แบบสอบถามการสนับสนุนทางสังคม

คำชี้แจง โปรดทำเครื่องหมายถูก ✓ ลงในช่องที่ท่านคิดว่าสมาชิกในครอบครัว เจ้าหน้าที่ในทีมสุขภาพ และเพื่อน ได้ให้ความช่วยเหลือท่านภายหลังที่ท่านๆได้รับการวินิจฉัยว่าเป็นโรคหัวใจ ตามข้อความต่อไปนี้มากน้อยเพียงใด โดยให้ระดับคะแนน ดังนี้

0	หมายถึง	ไม่ช่วยเหลือเลย
1	หมายถึง	ช่วยเหลือเล็กน้อย
2	หมายถึง	ช่วยเหลือบ้างบางครั้ง
3	หมายถึง	ช่วยเหลือค่อนข้างมาก
4	หมายถึง	ช่วยเหลือมากที่สุด

สมาชิกในครอบครัว ได้แก่ สามี บิดามารดา บุตร หลาน ญาติพี่น้อง

การช่วยเหลือที่ได้รับ	ไม่ช่วยเหลือเลย 0	ช่วยเหลือเล็กน้อย 1	ช่วยเหลือบ้างบางครั้ง 2	ช่วยเหลือค่อนข้างมาก 3	ช่วยเหลือมากที่สุด 4
1.ให้คำแนะนำและแนวทางในการปฏิบัติตัวที่เป็นประโยชน์					
2.ให้ความมั่นใจว่าเขาจะช่วยเหลือเมื่อท่านต้องการ					
3.ให้กำลังใจเมื่อท่านรู้สึกหดหู่ในระหว่างการเจ็บป่วย					
4.ให้ความห่วงใยในระหว่างการเจ็บป่วย					
5.ให้ความไว้วางใจได้ในระหว่างการเจ็บป่วย					
6.ให้ความช่วยเหลือด้านการเงิน หรือนำส่งโรงพยาบาลในกรณีฉุกเฉินในระหว่างการเจ็บป่วย					
7.ให้ความช่วยเหลือในการทำกิจวัตรประจำวัน					

เจ้าหน้าที่ในทีมสุขภาพ ได้แก่ แพทย์ พยาบาล เภสัชกร นักกายภาพบำบัด ผู้ช่วยพยาบาล

การช่วยเหลือที่ได้รับ	ไม่ช่วยเหลือเลย 0	ช่วยเหลือเล็กน้อย 1	ช่วยเหลือบ้างบางครั้ง 2	ช่วยเหลือค่อนข้างมาก 3	ช่วยเหลือมากที่สุด 4
1.ให้คำแนะนำและแนวทางในการปฏิบัติตัวที่เป็นประโยชน์					
2.ให้ความมั่นใจว่าเขาจะช่วยเหลือเมื่อท่านต้องการ					
3.ให้กำลังใจเมื่อท่านรู้สึกหดหู่ในระหว่างการเจ็บป่วย					
4.ให้ความห่วงใยในระหว่างการเจ็บป่วย					
5.ให้ความไว้วางใจได้ในระหว่างการเจ็บป่วย					
6.ให้ความช่วยเหลือด้านการเงิน หรือนำส่งโรงพยาบาลในกรณีฉุกเฉินในระหว่างการเจ็บป่วย					
7.ให้ความช่วยเหลือในการทำกิจวัตรประจำวัน					

คำแนะนำในการตอบ: ผู้วิจัยจะเป็นผู้สัมภาษณ์ และลงบันทึกในแต่ละข้อ

1. ท่านเคยมีอาการเจ็บแน่น / จุก / อึดอัดบริเวณหน้าอก (หรือกลางหรือคอ) มาก่อนหรือไม่

☐ 1. เคย ☐ 2. ไม่เคย (หยุดถาม)

2. อาการที่ว่านี้เกิดขึ้นขณะรีบเร่ง / ออกกำลังกาย / เดินเร็ว / เดินขึ้นบันไดหรือที่สูงหรือไม่

☐ 1. ใช่ ☐ 2. ไม่ใช่ ☐ 3. ไม่เคยเดินเร็วหรือเดินขึ้นบันได / ที่สูง ☐ 0. ข้ามข้อนี้

3. ท่านเคยมีอาการดังกล่าวเมื่อเดินตามปกติบนพื้นราบหรือไม่

☐ 1. มี ☐ 2. ไม่มี ☐ 0. ข้ามข้อนี้

ถ้าคำตอบข้อ 2. และ 3. ตอบว่า "ไม่ใช่" แล้ว "ไม่มี" ให้หยุดถาม

4. เมื่อเกิดอาการดังกล่าวท่านทำอย่างไรเพื่อให้อาการดีขึ้น

☐ 1. หยุดพักหรือเดินช้าลง / ชะลอ ☐ 2. เดิน / ทำงานต่อในอัตราเดิม

☐ 3. อมยาใต้ลิ้น ☐ 0. ข้ามข้อนี้

ถ้าเดิน / ทำงานต่อในอัตราเดินโดยอมยาใต้ลิ้น ให้ตอบในช่อง 1

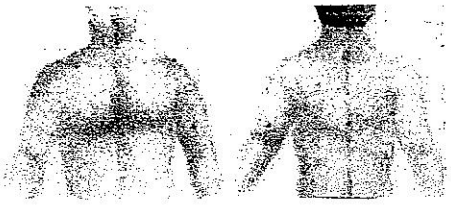
5. เมื่อท่านหยุดพัก (หรือชะลอลงหรืออมยาใต้ลิ้น) อาการดังกล่าวจะ

☐ 1. ดีขึ้น ☐ 2. ไม่ดีขึ้น ☐ 0. ข้ามข้อนี้ไป

6. อาการที่เกิดขึ้นนี้จะมีอยู่นานกี่นาที

☐ 1. เจ็บแปลบชั่วครู่ (ประมาณ 1-2 วินาที)แล้วหายไป ☐ 2. 10 นาทีหรือเร็วกว่านั้น

☐ 3. นานกว่า 10 นาที ☐ 0. ข้ามข้อนี้



7. กรุณาชี้ตำแหน่งที่เกิดอาการเจ็บแน่น / อึดอัด / จุก บันทึกตำแหน่งที่ผู้ให้สัมภาษณ์ชี้

8. อาการเช่นนี้ร้าวไปที่ใดหรือไม่

☐ 1. มี (กรุณาระบุ) .....

☐ 2. ไม่มี ☐ 0. ข้ามข้อนี้

แบบสอบถามภาวะสุขภาพ

SF-36 V.2

คำแนะนำการตอบแบบสอบถาม:

กรุณาตอบแบบสอบถามให้ครบทุกข้อ คำถามบางข้ออาจมีความคล้ายคลึงกันแต่มีความแตกต่างกัน อ่านและตอบคำถามแต่ละข้อให้ถูกต้องตามความเป็นจริงโดยขีดเครื่องหมายถูก ✓ ในช่องที่ท่านเห็นว่าตรงกับลักษณะของท่านมากที่สุด

คำถามต่อไปนี้เกี่ยวข้องกับอารมณ์ความรู้สึกที่เกิดขึ้นกับท่านในช่วง 4 สัปดาห์ที่ผ่านมา กรุณาให้คำตอบที่ตรงกับความรู้สึกของท่านมากที่สุดในแต่ละคำถามเกิดขึ้นบ่อยเพียงใดในช่วง 4 สัปดาห์ที่ผ่านมา?

คำถาม	ตลอดเวลา	ส่วนใหญ่	บางเวลา	ส่วนน้อย	ไม่ใช่
9.1 รู้สึกกระปรี้กระเปร่ามาก					
9.5 รู้สึกเต็มไปด้วยพลัง					
9.7 รู้สึกอ่อนเพลีย ไม่มีกำลัง					
9.9 รู้สึกเบื่อหน่าย					

มาตรวัดอาการหายใจลำบากของ Rose

คำแนะนำในการตอบคำถาม:

ระหว่างที่ท่านตอบคำถามต่อไปนี้ จงนึกถึงอาการ / ความรู้สึกของท่านในช่วงหนึ่งเดือนที่ผ่านมา กรุณาอ่านในแต่ละข้อ และกาเครื่องหมายถูก (√) ในช่องที่ตรงกับอาการ / ความรู้สึก มากที่สุด

คำถาม	ใช่	ไม่ใช่
1. ท่านมีอาการหอบหายใจไม่ทัน		
2. ท่านมีอาการ.....		
3. ท่านมีอาการ.....		
4. ท่านมีอาการ.....		

แบบวัดสมรรถนะผู้ป่วยโรคหัวใจ

คำแนะนำในการตอบคำถาม: กรุณาอ่านในแต่ละข้อ และกาเครื่องหมายถูก (√) ในช่องที่ตรงกับความมั่นใจในตัวเองมากน้อยเพียงใดว่าท่านรู้ หรือ สามารถทำ สิ่งต่อไปนี้

คำถาม	ไม่มั่นใจเลย (0)	มั่นใจเล็กน้อย (1)	มั่นใจปานกลาง (2)	มั่นใจมาก (3)	มั่นใจมากที่สุด (4)
1. ท่านมีความมั่นใจเพียงใดที่จะควบคุมอาการแน่นหน้าอกด้วยการปรับเปลี่ยนระดับของกิจกรรมที่ท่านทำ					
2. ท่านมีความมั่นใจเพียงใดที่จะควบคุมอาการเหนื่อยหอบด้วยการปรับเปลี่ยนระดับของกิจกรรมที่ท่านทำ					
. .					
13.					
14.					

แบบประเมินการทำหน้าที่

คำชี้แจง: กรุณาทำเครื่องหมายวงกลมล้อมรอบตัวเลขที่ตรงกับความรู้สึกของท่าน ว่า การปฏิบัติกิจวัตรประจำวันของท่านมีความยากลำบากทางร่างกายจากสุขภาพของท่านมากน้อยเท่าใด โดย

วงกลม ① หมายถึง ท่านทำกิจกรรมได้อย่างสบาย ไม่มีความยากลำบากทางกายเลย

วงกลม ② หมายถึง ท่านทำกิจกรรมนั้นๆด้วยความลำบากบ้างแต่ไม่มาก

วงกลม ③ หมายถึง ท่านทำกิจกรรมนั้นๆ ด้วยความลำบากมาก

วงกลม ④ หมายถึง ท่านไม่สามารถทำกิจกรรมนั้นๆ ได้เลย เนื่องจากสุขภาพของท่านเอง

วงกลม ⑤ หมายถึง ท่านไม่เคยทำ หรือ เลือกที่จะไม่ทำกิจกรรมนั้นๆด้วยเหตุผลอื่นๆ ที่ไม่เกี่ยวกับสภาพร่างกายของท่าน

กิจกรรม	ทำด้วยความ			ไม่ทำเพราะ	
	ไม่ลำบาก	ลำบากบ้าง	ลำบากมาก	ภาวะสุขภาพ	เลือกที่จะไม่ทำ
การดูแลร่างกาย หรือ กิจวัตรประจำวัน 1. การแต่งตัว และ การถอดเสื้อผ้า	1	2	3	4	5
2. การอาบน้ำ	1	2	3	4	5
3.การทำความสะอาดเท้า	1	2	3	4	5
4. การสระผม	1	2	3	4	5
5. การโกนหนวด หรือ การหวีผม	1	2	3	4	5
6. การเข้าห้องส้วม	1	2	3	4	5
การดูแลบ้าน 7. การเตรียมอาหาร / การทำครัว	1	2	3	4	5
8. การซื้อข้าวของเครื่องใช้ กับข้าว	1	2	3	4	5
9. การหอบหิ้วข้าวของเครื่องใช้	1	2	3	4	5
กิจกรรมภายในบ้านหรือที่พัก 10. การซักผ้า (ด้วยมือ)	1	2	3	4	5
11. การดูดฝุ่น / การกวาดบ้าน / การถูบ้าน	1	2	3	4	5
12. การล้างรถ	1	2	3	4	5
13. การเคลื่อนย้ายเครื่องเรือน เปลี่ยนผ้าปูเตียง หรือเช็ดล้างหน้าต่าง	1	2	3	4	5
14. การทำความสะอาดห้องน้ำ และ / หรือ ขัดพื้นห้องน้ำ	1	2	3	4	5
15. การตัดหญ้า (ด้วยมือ) กวาดใบไม้ หรือ ทำสวน	1	2	3	4	5

Appendix C

Permission document for using the instrument

DATE: November 30, 2012

TO: **Carol Estwing Ferrans** PhD, RN, FAAN
University of Illinois at Chicago
College of Nursing (M/C 802)
845 S. Damen Avenue
7th Floor
Chicago, IL 60612 U.S.A

E-mail: cferrans@uic.edu
Phone: (312) 996-8445

Dear Professor Carol Estwing Ferrans

The Questionnaire: **QUALITY OF LIFE INDEX© CARDIAC VERSION – IV**

The web site: http://www.uic.edu/orgs/qli/questionaires/pdf/cardiacversionIV/Cardiac4english.pdf

Permission is requested to use the questionnaire referenced above. Full credit to the original sources will be given when our work publish. The signed permission approval should be sent directly to my attention at the address indicated below.

Sincerely,

Ms.Aem-orn Saengsiri, MNS, PhD Candidate, APN (Cardiovascular)

PLEASE RETURN TO:

1873 Kunpiphat Building
King Chulalongkorn Memorial Hospital
Rama IV Rd., Pathumwan,
BKK, 10330 THAILAND
E-mail: aemorn.trc@gmail.com

PERMISSION IS GRANTED TO USE THE QUESTIONNAIR REQUESTED

Signed: Carol Estwing

Date: Dec 5, 2012

OPTUMInsight

NON-COMMERCIAL LICENSE AGREEMENT
Office of Grants and Scholarly Research (OGSR)

License Number: QM017854

Effective Date: 02/20/13

Licensee Name: AEM-ORN SAENGSIRI

Licensee Address: Chulalongkorn University 1873 Rama IV Road PATHUMWAN, BANGKOK 10330

Approved Purpose: Non-commercial academic research and/or thesis – Unfunded Student.

Study Name: PREDICTING FACTORS OF HEALTH-RELATED QUALITY OF LIFE AMONG CORONARY ARTERY DISEASE PATIENTS POST PERCUTANEOUS CORONARY INTERVENTION

Royalty Fee: None, because this License is granted in support of the non-commercial Approved Purpose

Other Definitions: As indicated on Appendix B "License Agreement – Details", including without limitation: Licensed Surveys, Modes, Fees, Administrations, Services, Approved Languages and (if applicable) License Term

Licensee accepts and agrees to the terms of this Non-Commercial License Agreement (the "Agreement") from the Office of Grants and Scholarly Research (OGSR) of OptumInsight Life Sciences, Inc. (f/k/a QualityMetric Incorporated) ("OptumInsight") as of the Effective Date.

Subject to the terms of this Agreement, including the OptumInsight Non-Commercial License Terms and Conditions attached as Appendix A: OptumInsight grants to Licensee, and Licensee accepts, a non-exclusive, non-transferable, non-assignable, non-sublicensable worldwide license to use, solely for the Approved Purpose and during the License Term, the Licensed Surveys in the authorized Modes and Approved Languages indicated on Appendix B and to administer the Licensed Surveys only up to the approved number of Administrations (and to make up to such number of exact reproductions of the Licensed Surveys necessary to support such Administrations) in any combination of the specific Licensed Surveys and Approved Languages and Modes and to use any related software provided by OptumInsight.

Capitalized terms used in this Agreement shall have the meanings assigned to them above, or in Appendices A and B attached hereto. Appendices A and B attached hereto are incorporated into and made a part of this Agreement for all purposes.

EXECUTED, as of the Effective Date, by the duly authorized representatives as set forth below.

OptumInsight Life Sciences, Inc. [OptumInsight]	**AEM-ORN SAENGSIRI** [Licensee]
Signature:	Signature:
Name: Michelle White	Name:
Title: Director of Consulting Science	Title:
Date:	Date:

ที่ ศธ 0512.11/1352

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11
ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน
กรุงเทพฯ 10330

20 มิถุนายน 2554

เรื่อง ขออนุญาตใช้เครื่องมือในการทำวิทยานิพนธ์

เรียน คณบดีบัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล

เนื่องด้วย นางสาวเอมอร แสงศิริ นิสิตชั้นปริญญาดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กำลังดำเนินการวิจัยเพื่อเสนอเป็นดุษฎีนิพนธ์ เรื่อง "ปัจจัยทำนายคุณภาพชีวิต ผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการขยายหลอดเลือดหัวใจ" โดยมี รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ ในการนี้ใคร่ขออนุญาตใช้เครื่องมือการวิจัย ดังนี้

1. THE SOCIAL SUPPORT QUESTIONNAIRE จากดุษฎีนิพนธ์ เรื่อง ADHERENCE TO SELF-CARE REQUIREMENTS MODEL: AN EMPIRICAL TEST AMONG PATIENTS WITH CORONARY ARTERY DISEASE ของ กุสุมา คุววัฒนสัมฤทธิ์ สาขาวิชาการพยาบาล คณะพยาบาลศาสตร์ (2549) โดยมี ศาสตราจารย์ ดร. สมจิต หนุเจริญกุล เป็นอาจารย์ควบคุมวิทยานิพนธ์
2. THE FUNCTIONAL PERFORMANCE INVENTORY จากดุษฎีนิพนธ์ เรื่อง FUNCTIONAL STATUS MODEL: AN EMPIRICAL TEST AMONG DISCHARGED ACUTE MYOCARDIAL INFARCTION PATIENTS ของ ศรินรัตน์ ศรีประสงค์ สาขาวิชาการพยาบาล คณะพยาบาลศาสตร์ (2551) โดยมี ศาสตราจารย์ ดร. สมจิต หนุเจริญกุล เป็นอาจารย์ควบคุมวิทยานิพนธ์

จึงเรียนมาเพื่อโปรดพิจารณาอนุญาตให้นิสิตใช้เครื่องมือการวิจัยดังกล่าว คณะพยาบาลศาสตร์หวังเป็นอย่างยิ่งว่าจะได้รับความอนุเคราะห์จากท่าน และขอขอบพระคุณอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ

(รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์)
รองคณบดี
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์

ฝ่ายวิชาการ โทร. 0-2218-1131 โทรสาร 0-2218-1130
อาจารย์ที่ปรึกษา รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์ โทร. 0-2218-1125, 0-2218-1155
ชื่อนิสิต นางสาวเอมอร แสงศิริ โทร 08-1648-3748

บันทึกข้อความ

ส่วนงาน ฝ่ายวิชาการ คณะพยาบาลศาสตร์ จุฬาฯ โทร. 81131 โทรสาร 81130

ที่ ศธ 0512.11/1417 วันที่ 27 มิถุนายน 2554

เรื่อง ขออนุญาตใช้เครื่องมือในการทำวิทยานิพนธ์

เรียน รองศาสตราจารย์ ดร. ธวัชชัย วรพงศธร

เนื่องด้วย นางสาวเอมอร แสงศิริ นิสิตชั้นปริญญาดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กำลังดำเนินการวิจัยเพื่อเสนอเป็นดุษฎีนิพนธ์ เรื่อง "ปัจจัยทำนายคุณภาพชีวิต ผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการขยายหลอดเลือดหัวใจ" โดยมี รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์ เป็นอาจารย์ที่ปรึกษาดุษฎีนิพนธ์ ในการนี้ใคร่ขออนุญาตใช้เครื่องมือการวิจัย คือ แบบวัดความซึมเศร้า CES-D (The center for epidemiologic studies-depression scale) จากรายงานการวิจัย เรื่อง คุณลักษณะความตรงของแบบสอบวัดความซึมเศร้า CES-D วารสารจิตวิทยาคลินิก (2533)

จึงเรียนมาเพื่อโปรดพิจารณาอนุญาตให้นิสิตใช้เครื่องมือการวิจัยดังกล่าว คณะพยาบาลศาสตร์หวังเป็นอย่างยิ่งว่าจะได้รับความอนุเคราะห์จากท่าน และขอขอบพระคุณอย่างสูงมา ณ โอกาสนี้

(รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์)
รองคณบดี
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์

<u>อาจารย์ที่ปรึกษา</u> รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์ โทร. 0-2218-1125, 0-2218-1155

<u>ชื่อนิสิต</u> นางสาวเอมอร แสงศิริ โทร 08-1648-3748

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11
ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน
กรุงเทพฯ 10330

ที่ ศธ 0512.11/ 1477

1 มิถุนายน 2554

เรื่อง ขออนุญาตใช้เครื่องมือในการทำวิทยานิพนธ์

เรียน รองศาสตราจารย์ นายแพทย์ กิตติ จิระรัตนโพธิ์ชัย

เนื่องด้วย นางสาวเอมอร แสงศิริ นิสิตชั้นปริญญาดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กำลังดำเนินการวิจัยเพื่อเสนอเป็นดุษฎีนิพนธ์ เรื่อง "ปัจจัยทำนายคุณภาพชีวิต ผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการขยายหลอดเลือดหัวใจ" โดยมี รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์ เป็นอาจารย์ที่ปรึกษาดุษฎีนิพนธ์ ในการนี้ใคร่ขออนุญาตใช้เครื่องมือการวิจัย คือ แบบสอบถาม SF-36V2 จากรายงานการวิจัย เรื่อง Reliability of the medical outcomes study short form survey version 2.0 (Thai version) for the evaluation of low back pain patients ภาควิชาออร์โธปิดิกส์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น (2548)

จึงเรียนมาเพื่อโปรดพิจารณาอนุญาตให้นิสิตใช้เครื่องมือการวิจัยดังกล่าว คณะพยาบาลศาสตร์หวังเป็นอย่างยิ่งว่าจะได้รับความอนุเคราะห์จากท่าน และขอขอบพระคุณอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ

(รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์)
รองคณบดี
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์

ฝ่ายวิชาการ โทร. 0-2218-1131 โทรสาร 0-2218-1130
อาจารย์ที่ปรึกษา รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์ โทร. 0-2218-1125, 0-2218-1155
ชื่อนิสิต นางสาวเอมอร แสงศิริ โทร 08-1648-3748

ที่ ศธ 0512.11/ 1504

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11
ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน
กรุงเทพฯ 10330

6 กรกฎาคม 2554

เรื่อง ขออนุญาตใช้เครื่องมือในการทำวิทยานิพนธ์

เรียน ศาสตราจารย์ นายแพทย์ นิธิ มหานนท์

เนื่องด้วย นางสาวเอมอร แสงศิริ นิสิตชั้นปริญญาดุษฎีบัณฑิต คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กำลังดำเนินการวิจัยเพื่อเสนอเป็นดุษฎีนิพนธ์ เรื่อง "ปัจจัยทำนายคุณภาพชีวิต ผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการขยายหลอดเลือดหัวใจ" โดยมี รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์ เป็นอาจารย์ที่ปรึกษาดุษฎีนิพนธ์ ในการนี้ใคร่ขออนุญาตใช้เครื่องมือการวิจัย คือ แบบสอบถามอาการเจ็บหน้าอก ภาคภาษาไทย (The Thai version of the rose questionnaire for angina pectoris) จากรายงานการวิจัย เรื่อง Comparison of the Thai version of the rose questionnaire for angina pectoris with the exercise treadmill test สถาบันหัวใจ เพอร์เฟคฮาร์ท โรงพยาบาลปิยะเวท (2543)

จึงเรียนมาเพื่อโปรดพิจารณาอนุญาตให้นิสิตใช้เครื่องมือการวิจัยดังกล่าว คณะพยาบาลศาสตร์หวังเป็นอย่างยิ่งว่าจะได้รับความอนุเคราะห์จากท่าน และขอขอบพระคุณอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ

(รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์)
รองคณบดี
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์

ฝ่ายวิชาการ โทร. 0-2218-1131 โทรสาร 0-2218-1130
อาจารย์ที่ปรึกษา รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์ โทร. 0-2218-1125, 0-2218-1155
ชื่อนิสิต นางสาวเอมอร แสงศิริ โทร 08-1648-3748

Appendix D

List of the experts

List of experts

The content validity of questionnaires were determined by six consulting experts included:

1. Prof. Emeritus Dr. Somchit Hanucharurnkul

   Department of Nursing, Faculty of Medicine, Ramathibodi hospital, Mahidol university.

2. Associate. Prof. Dr. Orasa Panpakdee

   Department of Nursing, Faculty of Medicine, Ramathibodi hospital, Mahidol university.

3. Associate. Prof. Dr. Wilaiporn Rojjanasrirat

   School of Nursing, Graceland University, USA.

4. Associate. Prof. Dr. Linchong Pothiban

   Faculty of Nursing, Chiang Mai University

5. Dr. Wacin Buddhari, MD.

   Faculty of Medicine, Chulalongkorn University

6. Assistant. Prof. Dr. Kusuma Khuwatsamrit

   Department of Nursing, Faculty of Medicine, Ramathibodi hospital, Mahidol university.

Appendix E

Documentary proof of the ethical clearance

COA No. 588/2011
IRB No. 365/54

INSTITUTIONAL REVIEW BOARD
Faculty of Medicine, Chulalongkorn University

1873 Rama 4 Road, Patumwan, Bangkok 10330, Thailand, Tel 662-256-4455 ext 14, 15

Certificate of Approval

The Institutional Review Board of the Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand, has approved the following study which is to be carried out in compliance with the International guidelines for human research protection as Declaration of Helsinki, The Belmont Report, CIOMS Guideline and International Conference on Harmonization in Good Clinical Practice (ICH-GCP)

Study Title : Predicting Factors of Health-Related Quality of Life among Coronary Artery Disease patients post Percutaneous Coronary Intervention

Study Code : -

Study Center : Faculty of Nursing, Chulalongkorn University

Principal Investigator : Miss Aem-Orn Saengsiri

Review Method : Expedited

Document Reviewed :

1. Protocol Version 2.0/Date 31 August, 2011
2. Protocol Synopsis Version 2.0 / 31 Aug 2011
3. Information sheet for research volunteer Version 2.0/Date 31 August, 2011
4. Informed consent form Version 1.0/Date 5 August, 2011
5. Questionnaire / evaluation form Version 1.0/Date 5 August, 2011
   - The personal data form
   - Quality of Life Index-cardiac version IV, Thai version
   - The Center for Epidemiologic Studies Depression Scale (CES-D), Thai version
   - Cardiac self-efficacy scale (C-SES), Thai version
   - The Social Support Quessionnaire (SSQ), Thai version
   - The Rose Questionnaire for angina, Thai version
   - The Rose Dyspnea Scale (RDS), Thai version
   - SF-36: vitality subscale (VT), Thai version
   - Functional Performance Inventory Short-Form (FPI-SF) Thai version

Signature: .....
(Emeritus Professor Tada Sueblinvong MD)
Chairperson of
The Institutional Review Board

Signature: .....
(Associate Professor Sopit Thamaree)
Committee and Secretary of
The Institutional Review Board

Date of Approval : September 12, 2011
Approval Expire Date : September 11, 2012

Approval granted is subject to the following conditions: (see back of this Certificate)

2 PRANNOK Rd. BANGKOKNOI
BANGKOK 10700

Tel. +66 2419 2667-72
Fax. +66 2411 0162

Siriraj Institutional Review Board

Certificate of Approval (Renewal)

COA no. Si 611/2011

Protocol Title : Predicting Factors of Health-Related Quality of Life among Coronary Artery Disease patients post Percutaneous Coronary Intervention

Protocol number : 626/2554(EC3)

Principal Investigator/Affiliation : Miss Aem-orn Saengsiri
Faculty of Nursing, Chulalongkorn University.

Research site : Faculty of Medicine Siriraj Hospital

Approval includes :

1. SIRB Submission Form
2. Proposal
3. Participation Information Sheet
4. Informed Consent Form
5. Questionnaire/ Assessment Form (Thai version) Version 1.0/Date 5 August, 2011
   - The personal data form
   - Quality of Life Index-Cardiac version IV, Thai version
   - The Center for Epidemiologic Studies Depression Scale (CES-D), Thai version
   - Cardiac self-efficacy scale (C-SES), Thai version
   - The Social Support Questionnaire (SSQ), Thai version
   - The Rose Questionnaire for angina, Thai version
   - The Rose Dyspnea Scale (RDS), Thai version
   - SF-36: vitality subscale (VT), Thai version
   - Functional Performance Inventory Short-Form (FPI-SF), Thai version
6. Principle Investigator's curriculum vitae

Renewal date (1st) : November 18, 2012

Expired date : November 17, 2013

This is to certify that Siriraj Institutional Review Board is in full Compliance with International Guidelines For Human Research Protection such as the Declaration of Helsinki, the Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP).

Jarupim Soongswang

(Prof. Jarupim Soongswang, M.D.)
Chairperson

23 JAN 2013
date

Udom Kachintorn

(Clin. Prof. Udom Kachintorn, M.D.)
Dean of Faculty of Medicine Siriraj Hospital

28 JAN 2013
date

2 PRANNOK Rd. BANGKOKNOI
BANGKOK 10700

Tel. +66 2419 2667-72
Fax. +66 2411 0162

Siriraj Institutional Review Board

Certificate of Approval (Renewal)

COA no. Si 611/2011

Protocol Title : Predicting Factors of Health-Related Quality of Life among Coronary Artery Disease patients post Percutaneous Coronary Intervention

Protocol number : 626/2554(EC3)

Principal Investigator/Affiliation : Miss Aem-orn Saengsiri
Faculty of Nursing, Chulalongkorn University.

Research site : Faculty of Medicine Siriraj Hospital

Approval includes :

1. SIRB Submission Form
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   - The personal data form
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   - Cardiac self-efficacy scale (C-SES), Thai version
   - The Social Support Questionnaire (SSQ), Thai version
   - The Rose Questionnaire for angina, Thai version
   - The Rose Dyspnea Scale (RDS), Thai version
   - SF-36: vitality subscale (VT), Thai version
   - Functional Performance Inventory Short-Form (FPI-SF), Thai version
6. Principle Investigator's curriculum vitae

Renewal date (1st) : November 18, 2012

Expired date : November 17, 2013

This is to certify that Siriraj Institutional Review Board is in full Compliance with International Guidelines For Human Research Protection such as the Declaration of Helsinki, the Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP).

Jarupim Soongswang

(Prof. Jarupim Soongswang, M.D.)
Chairperson

23 JAN 2013
date

Udom Kachintorn

(Clin. Prof. Udom Kachintorn, M.D.)
Dean of Faculty of Medicine Siriraj Hospital

28 JAN 2013
date

เอกสารรับรองโครงการวิจัยในมนุษย์
คณะกรรมการจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยนเรศวร

ชื่อโครงการ	ปัจจัยทำนายคุณภาพชีวิต ผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการขยายหลอดเลือดหัวใจ Predicting Factors of Health-Related Quality of Life among Coronary Artery Disease patients post Percutaneous Coronary Intervention.
ชื่อผู้ดำเนินการวิจัย	นางสาวเอมอร แสงศิริ
ชื่ออาจารย์ที่ปรึกษา	รองศาสตราจารย์ ดร.สุรีพร ธนศิลป์
เลขที่โครงการ/รหัส	54 02 03 0005
สังกัดหน่วยงาน/คณะ	พยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
การรับรอง	ขอรับรองโครงการวิจัยดังกล่าวข้างบนนี้ได้ผ่านการพิจารณาและรับรองจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยนเรศวร กลุ่มสาขาวิชาวิทยาศาสตร์เทคโนโลยี และมนุษยศาสตร์ สังคมศาสตร์ ครั้งที่ 11/2554 เมื่อวันที่ 2 พฤศจิกายน 2554
วันสิ้นสุดการรับรอง	วันที่ 2 พฤศจิกายน 2555
ประเภทการรับรอง	รับรองแบบเร่งรัด

ลงนาม

(นายแพทย์สมบูรณ์ ตันสุภสวัสดิกุล)
ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์
กลุ่มสาขาวิชาวิทยาศาสตร์สุขภาพ
มหาวิทยาลัยนเรศวร

Certificate of Approval

No. 426/2011

Name of Ethics Committee : Research Ethics Committee 3, Faculty of Medicine, Chiang Mai University

Address of Ethics Committee : 110 Intavaroros Rd., Amphoe Muang,Chiang Mai, Thailand 50200

Principal Investigator : Aem-Orn Saengsiri

Faculty of Nursing, Chulalongkorn University

Protocol title: Predicting Factors of Health-Related Quality of Life among Coronary Artery Disease patients post Percutaneous coronary Intervention.

Study code : NON CMU-11-743-EX / Research ID: 743

Sponsor : 90th year Chulalongkorn University Fund

Documents filed	Document reference
Research protocol	- Version date 28 October 2011
Information Sheet / Informed Consent Documents	- Version date 19 August 2011
Information sheet for research volunteer	- Version date 19 August 2011
Case Record Form	- Version date 28 October 2011
Principal Investigator Curriculum Vitae	- Version date 28 October 2011

Opinion of the Ethics Committee/Institutional Review Board : PLS. CHECK ONE

__✓__ Approval

_____ Conditional approval (Specify on space below)

...**DECISION :** By expedited review process

Date of Approval : October 28 , 2011 **Expiration Date:** July 27 , 2013

คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล
๒๗๐ ถนนพระราม ๖ แขวงทุ่งพญาไท เขตราชเทวี กทม. ๑๐๔๐๐
โทร. ๐-๒๓๕๔-๗๒๗๕, ๐-๒๒๐๑-๑๒๙๖ โทรสาร ๐-๒๓๕๔-๗๒๓๓

Faculty of Medicine Ramathibodi Hospital, Mahidol University
270 Rama VI Road, Ratchathewi, Bangkok 10400, Thailand
Tel. (+66) 2354-7275, (+66) 2201-1296 Fax (+66) 2354-7233

Documentary Proof of Ethical Clearance
Committee on Human Rights Related to Research Involving Human Subjects
Faculty of Medicine Ramathibodi Hospital, Mahidol University

MURA2011/476

Title of Project	Predicting Factors of Health-Related Quality of Life among Coronary Artery Disease Patients Post Percutaneous Coronary Intervention
Protocol Number	ID 09-54-45
Principal Investigator	Miss. Aem-orn Saengsiri
Official Address	Faculty of Nursing Chulalongkorn University

The aforementioned project has been reviewed and approved by the Committee on Human Rights Related to Research Involving Human Subjects, based on the Declaration of Helsinki.

Signature of Secretary
Committee on Human Rights Related to
Research Involving Human Subjects .....
Prof. Duangrurdee Wattanasirichaigoon, M.D.

Signature of Chairman
Committee on Human Rights Related to
Research Involving Human Subjects .....
Prof. Boonsong Ongphiphadhanakul, M.D.

Date of Approval October 3, 2011

KHON KAEN UNIVERSITY

This is to certify that

The Project Entitled: Predicting Factors of Health-Related Quality of Life among Coronary Artery Disease patients post Percutaneous Coronary Intervention

Investigators:

1. Miss Aem-orn Saengsiri
   Faculty of Nursing, Chulalongkorn University
2. Associate Professor Dr. Sureeporn Thanasilp
   Faculty of Nursing, Chulalongkorn University
3. Assistant Professor Dr.Sunida Preechawong
   Faculty of Nursing, Chulalongkorn University

Documents Acceptance:

1. KKUEC Application form ,version 1.1, dated 15 November 2011
2. Clinical Trial Protocol, version 1.1, dated 15 November 2011
3. Information sheet, version 1.1, dated 15 November 2011
4. Informed Consent Form, version 1.0, dated 1September 2011
5. Case Report Form, version 1.1, dated 15 November 2011
6. Investigator's Curriculum Vitae

Record No. 4.3.01: 33/2011

Reference No. HE541398

Office: 17 th Floor , Room#1704
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Institutional Review Board Number; IRB00001189
Federal wide Assurance; FWA00003418

Have been reviewed by the Khon Kaen University Ethics Committee for Human Research based on the Declaration of Helsinki and the ICH Good Clinical Practice Guidelines. Please submit the progress report every 12 months

Date of Approval: 21 November 2011

Date of Expire: 4 October 2012

(Associate Professor Suchat Areemit, MD.)

Chairman of the Khon Kaen University Ethics Committee for Human Research, Panel 1

Record No. 4.3.01: 33/2011

Reference No. HE541398

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Institutional Review Board Number; IRB00001189
Federal wide Assurance; FWA00003418

Appendix F

Informed consent

Informed consent form

แบบยินยอมเข้าร่วมในโครงการวิจัย

การวิจัยเรื่อง **"ปัจจัยทำนายคุณภาพชีวิต ผู้ป่วยโรคหลอดเลือดหัวใจที่ได้รับการขยายหลอดเลือดหัวใจ"**

วันให้คำยินยอม วันที่.....เดือน.....พ.ศ.....

ข้าพเจ้า นาย/นาง/นางสาว.....

ที่อยู่.....โทรศัพท์.....

ได้อ่านรายละเอียดจากเอกสารข้อมูลสำหรับผู้เข้าร่วมโครงการวิจัยวิจัยที่แนบมาฉบับวันที่ 5 สิงหาคม 2554 และข้าพเจ้ายินยอมเข้าร่วมโครงการวิจัยโดยสมัครใจ

ข้าพเจ้าได้รับสำเนาเอกสารแสดงความยินยอมเข้าร่วมในโครงการวิจัยที่ข้าพเจ้าได้ลงนาม และ วันที่ พร้อมด้วยเอกสารข้อมูลสำหรับผู้เข้าร่วมโครงการวิจัย ทั้งนี้ก่อนที่จะลงนามในใบยินยอมให้ทำการวิจัยนี้ ข้าพเจ้าได้รับการอธิบายจากผู้วิจัยถึงวัตถุประสงค์ของการวิจัย ระยะเวลาของการทำวิจัย วิธีการวิจัย อันตรายที่อาจเกิดขึ้นจากการวิจัย รวมทั้งประโยชน์ที่จะเกิดขึ้นจากการวิจัย ข้าพเจ้ามีเวลาและโอกาสเพียงพอในการซักถามข้อสงสัยจนมีความเข้าใจอย่างดีแล้ว โดยผู้วิจัยได้ตอบคำถามต่าง ๆ ด้วยความเต็มใจ ไม่ปิดบังซ่อนเร้นจนข้าพเจ้าพอใจ

ข้าพเจ้ารับทราบจากผู้วิจัยว่าจะไม่ได้รับความเสี่ยง หรืออันตรายเพิ่มขึ้นจากการวิจัย แต่จะเสียเวลาในการตอบแบบสอบถาม และอาจทำให้รู้สึกไม่สะดวกไม่สบายบ้าง ซึ่งผู้วิจัยได้แสดงความขอบคุณในความเสียสละเวลาเพื่อตอบแบบสอบถามอันจะเป็นประโยชน์ต่อการพัฒนาแนวปฏิบัติการดูแลผู้ป่วยโรคหลอดเลือดหัวใจในอนาคต

ข้าพเจ้ามีสิทธิที่จะบอกเลิกเข้าร่วมในโครงการวิจัยเมื่อใดก็ได้ โดยไม่จำเป็นต้องแจ้งเหตุผล และการบอกเลิกการเข้าร่วมการวิจัยนี้ จะไม่มีผลต่อการรักษาโรคหรือสิทธิอื่น ๆ ที่ข้าพเจ้าจะพึงได้รับต่อไป

ผู้วิจัยรับรองว่าจะเก็บข้อมูลส่วนตัวของข้าพเจ้าเป็นความลับ และจะเปิดเผยได้เฉพาะเมื่อได้รับการยินยอมจากข้าพเจ้าเท่านั้น บุคคลอื่นในนามของผู้สนับสนุนการวิจัย คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน อาจได้รับอนุญาตให้เข้ามาตรวจและประมวลข้อมูลของผู้เข้าร่วมวิจัย ทั้งนี้จะต้องกระทำไปเพื่อวัตถุประสงค์เพื่อตรวจสอบความถูกต้องของข้อมูลเท่านั้น โดยการตกลงที่จะเข้าร่วมการศึกษานี้ข้าพเจ้าได้ให้คำยินยอมที่จะให้มีการตรวจสอบข้อมูลประวัติทางการแพทย์ของผู้เข้าร่วมวิจัยได้

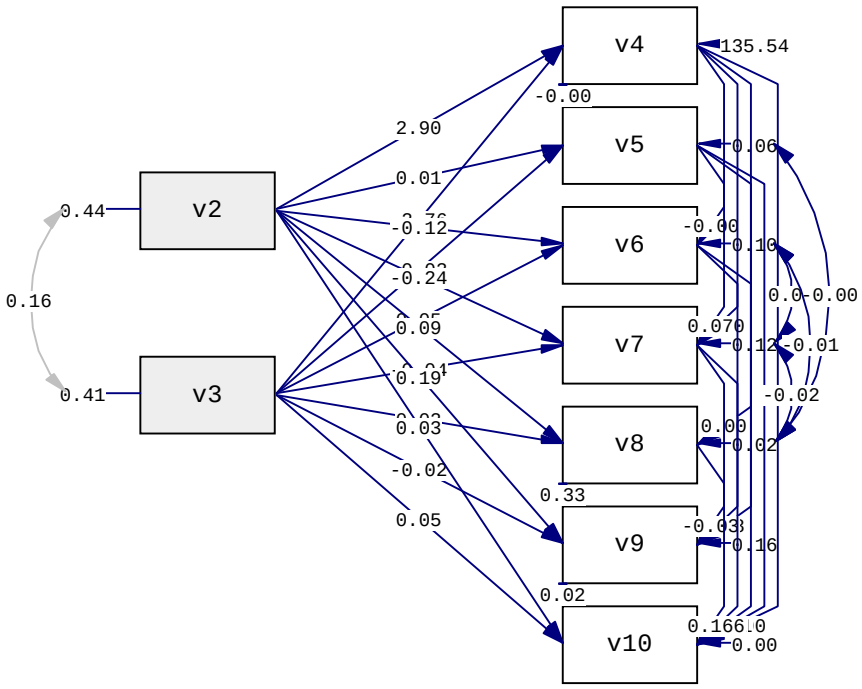
ผู้วิจัยรับรองว่าจะไม่มีการเก็บข้อมูลใด ๆ ของผู้เข้าร่วมวิจัย เพิ่มเติม หลังจากที่ข้าพเจ้าขอยกเลิกการเข้าร่วมโครงการวิจัยและต้องการให้ทำลายเอกสารทั้งหมดที่สามารถสืบค้นถึงตัวข้าพเจ้าได้

ข้าพเจ้าเข้าใจว่า ข้าพเจ้ามีสิทธิ์ที่จะตรวจสอบหรือแก้ไขข้อมูลส่วนตัวของข้าพเจ้าและสามารถยกเลิกการให้สิทธิในการใช้ข้อมูลส่วนตัวของข้าพเจ้าได้ โดยต้องแจ้งให้ผู้วิจัยรับทราบ

INSTITUTIONAL REVIEW BOARD
Faculty of Medicine, Chulalongkorn University
IRB No. 365/54
Date of Approval 12 ก.ย. 2554

Appendix G

LISREL Printout for model testing



Chi-Square=1.90, df=3, P-value=0.59415, RMSEA=0.000

DATE: 5/ 9/2013
TIME: 9:43

L I S R E L 8.72

BY

Karl G. Jöreskog & Dag Sörbom

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The following lines were read from file C:\Users\zelandmon\Desktop\path full.LPJ:

```
TI path full
DA NI=9 NO=303 MA=CM
LA
v2 v3 v4 v5 v6 v7 v8 v9 v10
KM
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0.37951 1.00000
0.10511 -0.08790 1.00000
-0.02029 -0.07027 -0.04060 1.00000
-0.22243 0.00944 -0.10724 0.07599 1.00000
-0.43500 -0.22248 -0.08261 0.07173 0.29414 1.00000
0.44964 0.23156 0.06449 -0.15603 -0.28912 -0.56669 1.00000
0.37954 0.10399 0.04922 -0.00920 -0.30392 -0.26222 0.29907 1.00000
0.54730 0.50235 -0.01092 -0.05621 -0.16877 -0.53510 0.54115 0.30319 1.00000
ME
2.44602 2.92865 55.17442 0.08210 0.23515 0.63597 0.71254 2.53916 0.83077
SD
0.66002 0.63987 11.82162 0.23751 0.32004 0.39217 0.14515 0.44316 0.09809

SE
3 4 5 6 7 8 9 1 2 /
MO NX=2 NY=7 BE=FU GA=FI PS=SY
FI PH(2,1)
FR BE(2,1) BE(3,1) BE(4,1) BE(4,2) BE(5,1) BE(6,2) BE(6,3) BE(6,4) BE(6,5)
FR BE(7,1) BE(7,2) BE(7,3) BE(7,4) BE(7,5) BE(7,6) GA(1,1) GA(1,2) GA(2,1)
FR GA(2,2) GA(3,1) GA(3,2) GA(4,1) GA(4,2) GA(5,1) GA(5,2) GA(6,1) GA(6,2)
FR GA(7,1) GA(7,2)
FR PS(4,3) PS(5,4) PS(5,3) PS(5,2)
PD
OU AM PC RS EF FS SS SC PT MR MI ND=3
```

TI path full

Number of Input Variables 9
Number of Y - Variables 7
Number of X - Variables 2
Number of ETA - Variables 7
Number of KSI - Variables 2
Number of Observations 303

TI path full

Covariance Matrix

	v4	v5	v6	v7	v8	v9
v4	139.751					
v5	-0.114	0.056				
v6	-0.406	0.006	0.102			
v7	-0.383	0.007	0.037	0.154		
v8	0.111	-0.005	-0.013	-0.032	0.021	
v9	0.258	-0.001	-0.043	-0.046	0.019	0.196

v10	-0.013	-0.001	-0.005	-0.021	0.008	0.013
v2	0.820	-0.003	-0.047	-0.113	0.043	0.111
v3	-0.665	-0.011	0.002	-0.056	0.022	0.029

Covariance Matrix

	v10	v2	v3
v10	0.010		
v2	0.035	0.436	
v3	0.032	0.160	0.409

Means

v4	v5	v6	v7	v8	v9
55.174	0.082	0.235	0.636	0.713	2.539

Means

v10	v2	v3
0.831	2.446	2.929

TI path full

Parameter Specifications

BETA

	v4	v5	v6	v7	v8	v9
v4	0	0	0	0	0	0
v5	1	0	0	0	0	0
v6	2	0	0	0	0	0
v7	3	4	0	0	0	0
v8	5	0	0	0	0	0
v9	0	6	7	8	9	0
v10	10	11	12	13	14	15

BETA

	v10
v4	0
v5	0
v6	0
v7	0
v8	0
v9	0
v10	0

GAMMA

	v2	v3
v4	16	17
v5	18	19
v6	20	21
v7	22	23
v8	24	25
v9	26	27
v10	28	29

PHI

v2	v3
30	31

PSI

	v4	v5	v6	v7	v8	v9
v4	32					
v5	0	33				

v6	0	0	34			
v7	0	0	35	36		
v8	0	37	38	39	40	
v9	0	0	0	0	0	41
v10	0	0	0	0	0	0

PSI

	v10
v10	42

ALPHA

v4	v5	v6	v7	v8	v9
43	44	45	46	47	48

ALPHA

	v10
	49

TI path full

Initial Estimates (TSLS)

BETA

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	- -
v5	-0.001	- -	- -	- -	- -	- -
v6	-0.002	- -	- -	- -	- -	- -
v7	-0.001	0.094	- -	- -	- -	- -
v8	0.000	- -	- -	- -	- -	- -
v9	- -	0.053	-0.281	-0.028	0.332	- -
v10	0.000	0.008	0.009	-0.060	0.159	0.016

BETA

	v10
v4	- -
v5	- -
v6	- -
v7	- -
v8	- -
v9	- -
v10	- -

GAMMA

	v2	v3
v4	2.897	-2.758
v5	0.006	-0.030
v6	-0.122	0.049
v7	-0.239	-0.043
v8	0.092	0.017
v9	0.193	-0.022
v10	0.030	0.047

Covariance Matrix of Y and X

	v4	v5	v6	v7	v8	v9
v4	139.751					
v5	-0.114	0.056				
v6	-0.406	0.000	0.102			
v7	-0.383	0.007	0.036	0.154		
v8	0.111	-0.005	-0.013	-0.032	0.021	
v9	0.328	0.001	-0.043	-0.045	0.019	0.197
v10	-0.012	-0.001	-0.005	-0.021	0.008	0.013
v2	0.820	-0.003	-0.047	-0.113	0.043	0.111

v3	-0.665	-0.011	0.002	-0.056	0.022	0.029

Covariance Matrix of Y and X

	v10	v2	v3
v10	0.010		
v2	0.035	0.436	
v3	0.032	0.160	0.409

Mean Vector of Eta-Variables

v4	v5	v6	v7	v8	v9
55.174	0.082	0.235	0.636	0.713	2.539

Mean Vector of Eta-Variables

v10
0.831

PHI

	v2	v3
v2	0.436	
v3	0.160	0.409

PSI

	v4	v5	v6	v7	v8	v9
v4	135.541					
v5	- -	0.056				
v6	- -	- -	0.096			
v7	- -	- -	0.025	0.123		
v8	- -	-0.005	-0.009	-0.020	0.017	
v9	- -	- -	- -	- -	- -	0.156
v10	- -	- -	- -	- -	- -	- -

PSI

	v10
v10	0.004

Squared Multiple Correlations for Structural Equations

v4	v5	v6	v7	v8	v9
0.030	0.007	0.065	0.198	0.207	0.207

Squared Multiple Correlations for Structural Equations

v10
0.538

Squared Multiple Correlations for Reduced Form

v4	v5	v6	v7	v8	v9
0.030	0.005	0.060	0.193	0.207	0.146

Squared Multiple Correlations for Reduced Form

v10
0.401

Reduced Form

	v2	v3
v4	2.897	-2.758
	(0.003)	(0.003)

	885.219	-869.214
v5	0.003	-0.027
	(2.028)	(1.920)
	0.001	-0.014
v6	-0.128	0.055
	(0.443)	(0.393)
	-0.289	0.140
v7	-0.243	-0.041
	(0.472)	(0.424)
	-0.516	-0.097
v8	0.093	0.016
	(1.170)	(1.037)
	0.079	0.016
v9	0.267	-0.032
	(0.417)	(0.372)
	0.640	-0.087
v10	0.062	0.053
	(29.735)	(28.280)
	0.002	0.002

ALPHA

v4	v5	v6	v7	v8	v9
56.165	0.211	0.497	1.419	0.419	1.975

ALPHA

v10
0.519

Behavior under Minimization Iterations

Iter	Try	Abscissa	Slope	Function
1	0	0.00000000D+00	-0.68413213D-03	0.34790249D-02
	1	0.10000000D+01	0.25654460D-04	0.31511254D-02
2	0	0.00000000D+00	-0.38559976D-05	0.31511254D-02
	1	0.10000000D+01	-0.13162828D-06	0.31491315D-02
3	0	0.00000000D+00	-0.12076379D-07	0.31491315D-02
	1	0.10000000D+01	0.93286665D-11	0.31491255D-02
4	0	0.00000000D+00	-0.23831348D-11	0.31491255D-02
	1	0.10000000D+01	0.12333300D-12	0.31491254D-02
5	0	0.00000000D+00	-0.10698215D-13	0.31491254D-02
	1	0.10000000D+01	-0.26142095D-16	0.31491254D-02

TI path full

Number of Iterations = 5

LISREL Estimates (Maximum Likelihood)

BETA

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	- -
v5	-0.001	- -	- -	- -	- -	- -
	(0.001)					
	-0.844					
v6	-0.002	- -	- -	- -	- -	- -

	(0.002)					
	-1.270					
v7	-0.001	0.068	- -	- -	- -	- -
	(0.002)	(0.083)				
	-0.853	0.811				
v8	0.000	- -	- -	- -	- -	- -
	(0.001)					
	0.521					
v9	- -	0.053	-0.281	-0.028	0.332	- -
		(0.097)	(0.076)	(0.074)	(0.202)	
		0.549	-3.693	-0.383	1.644	
v10	0.000	0.008	0.009	-0.060	0.159	0.016
	(0.000)	(0.016)	(0.013)	(0.012)	(0.034)	(0.010)
	-1.000	0.508	0.649	-4.793	4.629	1.615

BETA

	v10
v4	- -
v5	- -
v6	- -
v7	- -
v8	- -
v9	- -
v10	- -

GAMMA

	v2	v3
v4	2.897	-2.758
	(1.101)	(1.135)
	2.632	-2.429
v5	0.006	-0.030
	(0.023)	(0.023)
	0.245	-1.282
v6	-0.122	0.049
	(0.030)	(0.030)
	-4.135	1.623
v7	-0.239	-0.043
	(0.034)	(0.035)
	-7.122	-1.251
v8	0.092	0.017
	(0.012)	(0.013)
	7.460	1.344
v9	0.193	-0.022
	(0.042)	(0.039)
	4.575	-0.565
v10	0.030	0.047
	(0.007)	(0.007)
	4.113	7.074

Covariance Matrix of Y and X

	v4	v5	v6	v7	v8	v9
v4	139.751					

v5	-0.114	0.056				
v6	-0.406	0.000	0.102			
v7	-0.383	0.005	0.037	0.154		
v8	0.111	-0.005	-0.013	-0.032	0.021	
v9	0.328	0.001	-0.043	-0.045	0.019	0.196
v10	-0.012	-0.001	-0.005	-0.021	0.008	0.013
v2	0.820	-0.003	-0.047	-0.113	0.043	0.111
v3	-0.665	-0.011	0.002	-0.056	0.022	0.029

Covariance Matrix of Y and X

	v10	v2	v3
v10	0.010		
v2	0.035	0.436	
v3	0.032	0.160	0.409

Mean Vector of Eta-Variables

v4	v5	v6	v7	v8	v9
55.174	0.082	0.235	0.636	0.713	2.539

Mean Vector of Eta-Variables

v10
0.831

PHI

	v2	v3
v2	0.436	
	(0.031)	
	14.159	
v3	0.160	0.409
	(0.029)	
	14.159	

PSI

	v4	v5	v6	v7	v8	v9
v4	135.541					
	(11.067)					
	12.247					
v5	- -	0.056				
		(0.005)				
		12.247				
v6	- -	- -	0.096			
			(0.008)			
			12.247			
v7	- -	- -	0.025	0.123		
			(0.006)	(0.010)		
			3.848	12.247		
v8	- -	-0.004	-0.009	-0.020	0.017	
		(0.002)	(0.002)	(0.003)	(0.001)	
		-2.506	-3.670	-7.170	12.259	
v9	- -	- -	- -	- -	- -	0.156
						(0.013)
						12.247
v10	- -	- -	- -	- -	- -	- -

PSI

v10

v10	0.004
	(0.000)
	12.247

Squared Multiple Correlations for Structural Equations

v4	v5	v6	v7	v8	v9
0.030	0.007	0.065	0.197	0.208	0.207

Squared Multiple Correlations for Structural Equations

v10
0.537

Squared Multiple Correlations for Reduced Form

v4	v5	v6	v7	v8	v9
0.030	0.005	0.060	0.193	0.207	0.146

Squared Multiple Correlations for Reduced Form

v10
0.401

Reduced Form

	v2	v3
v4	2.897	-2.758
	(1.101)	(1.135)
	2.632	-2.429
v5	0.003	-0.027
	(0.022)	(0.023)
	0.120	-1.174
v6	-0.128	0.055
	(0.029)	(0.030)
	-4.364	1.812
v7	-0.243	-0.041
	(0.033)	(0.034)
	-7.312	-1.197
v8	0.093	0.016
	(0.012)	(0.013)
	7.621	1.283
v9	0.267	-0.032
	(0.039)	(0.040)
	6.887	-0.811
v10	0.062	0.053
	(0.007)	(0.007)
	8.629	7.129

ALPHA

v4	v5	v6	v7	v8	v9
56.165	0.211	0.497	1.425	0.419	1.975
(3.459)	(0.096)	(0.126)	(0.144)	(0.053)	(0.201)
16.239	2.186	3.945	9.888	7.984	9.828

ALPHA

v10
0.519
(0.044)

11.855

Goodness of Fit Statistics

Degrees of Freedom = 3
Minimum Fit Function Chi-Square = 1.902 (P = 0.593)
Normal Theory Weighted Least Squares Chi-Square = 1.897 (P = 0.594)
Estimated Non-centrality Parameter (NCP) = 0.0
90 Percent Confidence Interval for NCP = (0.0 ; 6.010)

Minimum Fit Function Value = 0.00630
Population Discrepancy Function Value (F0) = 0.0
90 Percent Confidence Interval for F0 = (0.0 ; 0.0200)
Root Mean Square Error of Approximation (RMSEA) = 0.0
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.0817)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.811

Expected Cross-Validation Index (ECVI) = 0.320
90 Percent Confidence Interval for ECVI = (0.320 ; 0.340)
ECVI for Saturated Model = 0.300
ECVI for Independence Model = 3.005

Chi-Square for Independence Model with 36 Degrees of Freedom = 883.523
Independence AIC = 901.523
Model AIC = 103.897
Saturated AIC = 90.000
Independence CAIC = 943.947
Model CAIC = 344.297
Saturated CAIC = 302.118

Normed Fit Index (NFI) = 0.998
Non-Normed Fit Index (NNFI) = 1.016
Parsimony Normed Fit Index (PNFI) = 0.0832
Comparative Fit Index (CFI) = 1.000
Incremental Fit Index (IFI) = 1.001
Relative Fit Index (RFI) = 0.974

Critical N (CN) = 1802.601

Root Mean Square Residual (RMR) = 0.0106
Standardized RMR = 0.0122
Goodness of Fit Index (GFI) = 0.999
Adjusted Goodness of Fit Index (AGFI) = 0.979
Parsimony Goodness of Fit Index (PGFI) = 0.0666

TI path full

Fitted Covariance Matrix

	v4	v5	v6	v7	v8	v9
v4	139.751					
v5	-0.114	0.056				
v6	-0.406	0.000	0.102			
v7	-0.383	0.005	0.037	0.154		
v8	0.111	-0.005	-0.013	-0.032	0.021	
v9	0.328	0.001	-0.043	-0.045	0.019	0.196
v10	-0.012	-0.001	-0.005	-0.021	0.008	0.013
v2	0.820	-0.003	-0.047	-0.113	0.043	0.111
v3	-0.665	-0.011	0.002	-0.056	0.022	0.029

Fitted Covariance Matrix

	v10	v2	v3
v10	0.010		
v2	0.035	0.436	
v3	0.032	0.160	0.409

Fitted Means

v4	v5	v6	v7	v8	v9
55.174	0.082	0.235	0.636	0.713	2.539

Fitted Means

v10	v2	v3
0.831	2.446	2.929

Fitted Residuals

	v4	v5	v6	v7	v8	v9	v10
v4	- -						
v5	- -	0.000					
v6	0.000	0.006	0.000				
v7	0.000	0.001	0.000	0.000			
v8	0.000	-0.001	0.000	0.000	0.000		
v9	-0.071	-0.002	0.000	0.000	0.000	0.000	
v10	-0.001	0.000	0.000	0.000	0.000	0.000	
v2	0.000	0.000	0.000	- -	- -	0.000	
v3	0.000	- -	0.000	- -	- -	0.000	

Fitted Residuals

	v10	v2	v3
v10	0.000		
v2	0.000	- -	
v3	- -	- -	- -

Fitted Residuals for Means

v4	v5	v6	v7	v8	v9
- -	0.000	0.000	0.000	- -	- -

Fitted Residuals for Means

v10	v2	v3
0.000	- -	- -

Summary Statistics for Fitted Residuals

Smallest Fitted Residual = -0.071
Median Fitted Residual = 0.000
Largest Fitted Residual = 0.006

Stemleaf Plot

```
- 7|1
- 6|
- 5|
- 4|
- 3|
- 2|
- 1|
- 0|2110000000000000000000000000000000000000000
  0|16
```

Standardized Residuals

	v4	v5	v6	v7	v8	v9	v10
v4	- -						
v5	- -	- -					
v6	0.000	1.346	0.000				
v7	0.000	1.329	0.917	0.123			
v8	0.000	-1.325	-1.267	-0.238	0.325		
v9	-0.267	-1.337	0.789	-0.070	0.268	-0.110	
v10	-0.266	-1.178	-0.237	-0.030	0.057	0.057	
v2	0.000	0.000	0.000	- -	- -	0.000	
v3	0.000	- -	0.000	- -	- -	0.000	

Standardized Residuals

v10	v2	v3

v10	0.011		
v2	0.000	- -	
v3	- -	- -	- -

Summary Statistics for Standardized Residuals

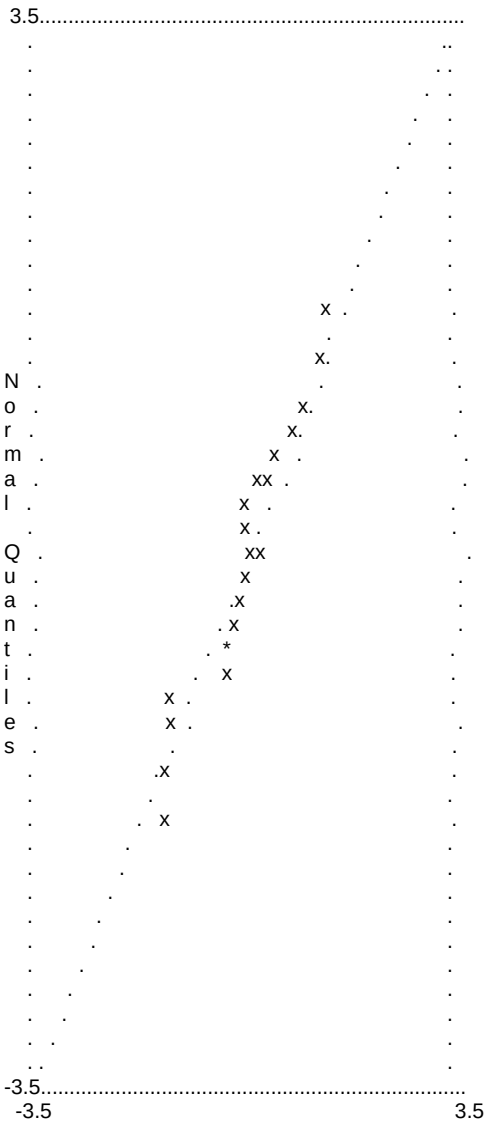
Smallest Standardized Residual = -1.337
Median Standardized Residual = 0.000
Largest Standardized Residual = 1.346

Stemleaf Plot

- 1|3332
- 0|
- 0|33221100000000000000000000000000
0|11133
0|89
1|33

TI path full

Qplot of Standardized Residuals



TI path full

Modification Indices and Expected Change

Modification Indices for BETA

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	0.071
v5	- -	- -	1.813	1.813	1.813	1.884
v6	- -	1.813	- -	1.813	1.813	0.002
v7	- -	- -	- -	- -	- -	0.071
v8	- -	- -	- -	- -	- -	0.071
v9	0.071	- -	- -	- -	- -	- -
v10	- -	- -	- -	- -	- -	- -

Modification Indices for BETA

	v10
v4	- -
v5	1.838
v6	1.882
v7	- -
v8	- -
v9	0.071
v10	- -

Expected Change for BETA

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	-0.457
v5	- -	- -	0.059	0.230	-0.665	-0.187
v6	- -	0.102	- -	1.503	-1.307	0.029
v7	- -	- -	- -	- -	- -	-0.363
v8	- -	- -	- -	- -	- -	-0.603
v9	-0.001	- -	- -	- -	- -	- -
v10	- -	- -	- -	- -	- -	- -

Expected Change for BETA

	v10
v4	- -
v5	-2.291
v6	-13.233
v7	- -
v8	- -
v9	1.582
v10	- -

Standardized Expected Change for BETA

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	-0.087
v5	- -	- -	0.782	2.469	-19.319	-1.774
v6	- -	1.337	- -	11.983	-28.178	0.205
v7	- -	- -	- -	- -	- -	-2.090
v8	- -	- -	- -	- -	- -	-9.391
v9	0.000	- -	- -	- -	- -	- -
v10	- -	- -	- -	- -	- -	- -

Standardized Expected Change for BETA

	v10
v4	- -
v5	-98.342
v6	-421.603
v7	- -
v8	- -
v9	36.390
v10	- -

No Non-Zero Modification Indices for GAMMA

No Non-Zero Modification Indices for PHI

Modification Indices for PSI

	v4	v5	v6	v7	v8	v9

v4	- -					
v5	- -	- -				
v6	- -	1.813	- -			
v7	- -	- -	- -	- -		
v8	- -	- -	- -	- -	- -	
v9	0.071	0.071	0.071	0.071	0.071	- -
v10	- -	- -	- -	- -	- -	- -

Modification Indices for PSI

	v10
v10	- -

Expected Change for PSI

	v4	v5	v6	v7	v8	v9
v4	- -					
v5	- -	- -				
v6	- -	0.006	- -			
v7	- -	- -	- -	- -		
v8	- -	- -	- -	- -	- -	
v9	-0.071	-0.029	-0.028	-0.057	-0.094	- -
v10	- -	- -	- -	- -	- -	- -

Expected Change for PSI

	v10
v10	- -

Standardized Expected Change for PSI

	v4	v5	v6	v7	v8	v9
v4	- -					
v5	- -	- -				
v6	- -	0.075	- -			
v7	- -	- -	- -	- -		
v8	- -	- -	- -	- -	- -	
v9	-0.014	-0.275	-0.201	-0.326	-1.464	- -
v10	- -	- -	- -	- -	- -	- -

Standardized Expected Change for PSI

	v10
v10	- -

Modification Indices for THETA-EPS

	v4	v5	v6	v7	v8	v9
v4	- -					
v5	1.797	0.071				
v6	0.001	1.806	0.071			
v7	0.071	- -	0.071	0.071		
v8	0.071	0.071	0.071	0.071	0.071	
v9	0.071	0.071	0.071	0.071	0.071	- -
v10	- -	- -	- -	- -	- -	- -

Modification Indices for THETA-EPS

	v10
v10	- -

Expected Change for THETA-EPS

	v4	v5	v6	v7	v8	v9
v4	- -					
v5	2.663	0.563				
v6	0.026	0.006	-0.101			
v7	-2.501	- -	-0.168	-2.006		

v8	0.212	0.086	0.115	0.179	0.283	
v9	-0.071	-0.030	-0.028	-0.057	-0.094	- -
v10	- -	- -	- -	- -	- -	- -

Expected Change for THETA-EPS

	v10
v10	- -

Modification Indices for THETA-DELTA-EPS

	v4	v5	v6	v7	v8	v9
v2	0.099	1.840	0.019	0.071	0.071	0.071
v3	0.054	1.789	1.265	0.071	0.071	0.071

Modification Indices for THETA-DELTA-EPS

	v10
v2	- -
v3	- -

Expected Change for THETA-DELTA-EPS

	v4	v5	v6	v7	v8	v9
v2	0.431	0.047	-0.030	0.230	-0.111	0.030
v3	-2.775	-0.114	0.146	-0.676	0.079	-0.026

Expected Change for THETA-DELTA-EPS

	v10
v2	- -
v3	- -

Modification Indices for THETA-DELTA

	v2	v3
v2	0.153	
v3	0.002	1.623

Expected Change for THETA-DELTA

	v2	v3
v2	-0.227	
v3	0.001	-3.055

No Non-Zero Modification Indices for ALPHA

No Non-Zero Modification Indices for KAPPA

Maximum Modification Index is 1.88 for Element (2, 6) of BETA

Covariance Matrix of Parameter Estimates

	BE 2,1	BE 3,1	BE 4,1	BE 4,2	BE 5,1	BE 6,2
BE 2,1	0.000					
BE 3,1	0.000	0.000				
BE 4,1	0.000	0.000	0.000			
BE 4,2	0.000	0.000	0.000	0.007		
BE 5,1	0.000	0.000	0.000	0.000	0.000	
BE 6,2	0.000	0.000	0.000	0.000	0.000	0.009
BE 6,3	0.000	0.000	0.000	0.000	0.000	0.000
BE 6,4	0.000	0.000	0.000	0.000	0.000	0.000
BE 6,5	0.000	0.000	0.000	0.000	0.000	0.003
BE 7,1	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,2	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,3	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,4	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,5	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,6	0.000	0.000	0.000	0.000	0.000	0.000

GA 1,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 1,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 2,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 2,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,2	0.000	0.000	0.000	0.000	0.000	0.000
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	-0.001	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	0.000	0.000	0.000	0.000	-0.003
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Covariance Matrix of Parameter Estimates

	BE 6,3	BE 6,4	BE 6,5	BE 7,1	BE 7,2	BE 7,3
BE 6,3	0.006					
BE 6,4	-0.001	0.005				
BE 6,5	0.002	0.006	0.041			
BE 7,1	0.000	0.000	0.000	0.000		
BE 7,2	0.000	0.000	0.000	0.000	0.000	
BE 7,3	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,4	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,5	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,6	0.000	0.000	0.000	0.000	0.000	0.000
GA 1,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 1,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 2,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 2,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,1	0.000	0.001	-0.002	0.000	0.000	0.000
GA 6,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,2	0.000	0.000	0.000	0.000	0.000	0.000
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000

AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	0.000	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	-0.002	-0.010	-0.028	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Covariance Matrix of Parameter Estimates

	BE 7,4	BE 7,5	BE 7,6	GA 1,1	GA 1,2	GA 2,1
BE 7,4	0.000					
BE 7,5	0.000	0.001				
BE 7,6	0.000	0.000	0.000			
GA 1,1	0.000	0.000	0.000	1.212		
GA 1,2	0.000	0.000	0.000	-0.474	1.289	
GA 2,1	0.000	0.000	0.000	0.000	0.000	0.001
GA 2,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,2	0.000	0.000	0.000	0.000	0.000	0.000
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	-1.575	-2.615	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	0.000	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	0.000	0.000	0.000	0.000	0.000
AL 7	0.000	-0.001	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Covariance Matrix of Parameter Estimates

	GA 2,2	GA 3,1	GA 3,2	GA 4,1	GA 4,2	GA 5,1
GA 2,2	0.001					
GA 3,1	0.000	0.001				
GA 3,2	0.000	0.000	0.001			
GA 4,1	0.000	0.000	0.000	0.001		
GA 4,2	0.000	0.000	0.000	0.000	0.001	
GA 5,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,2	0.000	0.000	0.000	0.000	0.000	0.000
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000

PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	-0.001	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	-0.001	-0.002	0.000	-0.001	0.000
AL 4	0.000	0.000	-0.001	-0.001	-0.003	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	0.000	0.000	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Covariance Matrix of Parameter Estimates

	GA 5,2	GA 6,1	GA 6,2	GA 7,1	GA 7,2	PH 1,1
GA 5,2	0.000					
GA 6,1	0.000	0.002				
GA 6,2	0.000	-0.001	0.002			
GA 7,1	0.000	0.000	0.000	0.000		
GA 7,2	0.000	0.000	0.000	0.000	0.000	
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.001
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	0.000	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	-0.002	-0.003	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Covariance Matrix of Parameter Estimates

	PH 2,2	PS 1,1	PS 2,2	PS 3,3	PS 4,3	PS 4,4
PH 2,2	0.001					
PS 1,1	0.000	122.475				
PS 2,2	0.000	0.000	0.000			
PS 3,3	0.000	0.000	0.000	0.000		
PS 4,3	0.000	0.000	0.000	0.000	0.000	
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	0.000	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	0.000	0.000	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Covariance Matrix of Parameter Estimates

	PS 5,2	PS 5,3	PS 5,4	PS 5,5	PS 6,6	PS 7,7

PS 5,2	0.000					
PS 5,3	0.000	0.000				
PS 5,4	0.000	0.000	0.000			
PS 5,5	0.000	0.000	0.000	0.000		
PS 6,6	0.000	0.000	0.000	0.000	0.000	
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	0.000	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	0.000	0.000	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Covariance Matrix of Parameter Estimates

	AL 1	AL 2	AL 3	AL 4	AL 5	AL 6
AL 1	11.963					
AL 2	0.000	0.009				
AL 3	0.000	0.000	0.016			
AL 4	0.000	0.000	0.004	0.021		
AL 5	0.000	-0.001	-0.001	-0.003	0.003	
AL 6	0.000	0.000	0.000	0.000	0.000	0.040
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Covariance Matrix of Parameter Estimates

	AL 7	KA 1	KA 2
AL 7	0.002		
KA 1	0.000	0.001	
KA 2	0.000	0.001	0.001

TI path full

Correlation Matrix of Parameter Estimates

	BE 2,1	BE 3,1	BE 4,1	BE 4,2	BE 5,1	BE 6,2
BE 2,1	1.000					
BE 3,1	0.000	1.000				
BE 4,1	0.000	0.228	1.000			
BE 4,2	0.000	0.000	0.047	1.000		
BE 5,1	-0.143	-0.215	-0.450	0.000	1.000	
BE 6,2	0.000	0.000	0.000	0.000	0.000	1.000
BE 6,3	0.000	0.000	0.000	0.000	0.000	0.026
BE 6,4	0.000	0.000	0.000	0.000	0.000	0.016
BE 6,5	0.000	0.000	0.000	0.000	0.000	0.140
BE 7,1	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,2	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,3	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,4	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,5	0.000	0.000	0.000	0.000	0.000	0.000
BE 7,6	0.000	0.000	0.000	0.000	0.000	0.000
GA 1,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 1,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 2,1	-0.150	0.000	0.000	0.000	0.021	0.000
GA 2,2	0.139	0.000	0.000	0.000	-0.020	0.000
GA 3,1	0.000	-0.150	-0.034	0.000	0.032	0.000
GA 3,2	0.000	0.139	0.032	0.000	-0.030	0.000
GA 4,1	0.000	-0.034	-0.151	-0.014	0.068	0.000
GA 4,2	0.000	0.032	0.142	0.072	-0.062	0.000
GA 5,1	0.021	0.032	0.068	0.000	-0.150	0.000
GA 5,2	-0.020	-0.030	-0.062	0.000	0.139	0.000
GA 6,1	0.000	0.000	0.000	0.000	0.000	-0.056
GA 6,2	0.000	0.000	0.000	0.000	0.000	0.054
GA 7,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,2	0.000	0.000	0.000	0.000	0.000	0.000
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000

PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	-0.020	-0.417	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.004	0.083	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	-0.684	0.000	0.000	0.000	0.098	0.000
AL 3	0.000	-0.684	-0.156	0.000	0.147	0.000
AL 4	0.000	-0.155	-0.684	-0.122	0.306	0.000
AL 5	0.098	0.147	0.307	0.000	-0.684	0.000
AL 6	0.000	0.000	0.000	0.000	0.000	-0.148
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Correlation Matrix of Parameter Estimates

	BE 6,3	BE 6,4	BE 6,5	BE 7,1	BE 7,2	BE 7,3
BE 6,3	1.000					
BE 6,4	-0.151	1.000				
BE 6,5	0.130	0.426	1.000			
BE 7,1	0.000	0.000	0.000	1.000		
BE 7,2	0.000	0.000	0.000	0.047	1.000	
BE 7,3	0.000	0.000	0.000	0.063	0.021	1.000
BE 7,4	0.000	0.000	0.000	0.033	0.017	-0.141
BE 7,5	0.000	0.000	0.000	0.007	0.142	0.107
BE 7,6	0.000	0.000	0.000	0.000	-0.032	0.208
GA 1,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 1,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 2,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 2,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,1	0.109	0.200	-0.235	0.000	0.000	0.000
GA 6,2	-0.128	0.059	-0.055	0.000	0.000	0.000
GA 7,1	0.000	0.000	0.000	-0.106	-0.050	0.043
GA 7,2	0.000	0.000	0.000	0.136	0.059	-0.108
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	0.000	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	-0.131	-0.662	-0.682	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	-0.452	-0.122	-0.219
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Correlation Matrix of Parameter Estimates

	BE 7,4	BE 7,5	BE 7,6	GA 1,1	GA 1,2	GA 2,1
BE 7,4	1.000					
BE 7,5	0.422	1.000				
BE 7,6	0.022	-0.094	1.000			
GA 1,1	0.000	0.000	0.000	1.000		

GA 1,2	0.000	0.000	0.000	-0.380	1.000	
GA 2,1	0.000	0.000	0.000	0.000	0.000	1.000
GA 2,2	0.000	0.000	0.000	0.000	0.000	-0.392
GA 3,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 3,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 4,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 5,1	0.000	0.000	0.000	0.000	0.000	-0.143
GA 5,2	0.000	0.000	0.000	0.000	0.000	0.056
GA 6,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,1	0.183	-0.202	-0.254	0.000	0.000	0.000
GA 7,2	0.064	-0.056	0.032	0.000	0.000	0.000
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	-0.414	-0.666	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	-0.196
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	0.000	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.028
AL 6	0.000	0.000	0.000	0.000	0.000	0.000
AL 7	-0.538	-0.488	-0.440	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Correlation Matrix of Parameter Estimates

	GA 2,2	GA 3,1	GA 3,2	GA 4,1	GA 4,2	GA 5,1
GA 2,2	1.000					
GA 3,1	0.000	1.000				
GA 3,2	0.000	-0.392	1.000			
GA 4,1	0.000	0.228	-0.089	1.000		
GA 4,2	0.000	-0.089	0.227	-0.392	1.000	
GA 5,1	0.056	-0.215	0.084	-0.450	0.176	1.000
GA 5,2	-0.143	0.084	-0.215	0.177	-0.449	-0.392
GA 6,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 6,2	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,1	0.000	0.000	0.000	0.000	0.000	0.000
GA 7,2	0.000	0.000	0.000	0.000	0.000	0.000
PH 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.006	-0.030	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	-0.001	0.006	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	-0.576	0.000	0.000	0.000	0.000	0.028
AL 3	0.000	-0.196	-0.576	-0.045	-0.131	0.042
AL 4	0.000	-0.044	-0.130	-0.192	-0.579	0.087
AL 5	0.082	0.042	0.124	0.088	0.259	-0.196
AL 6	0.000	0.000	0.000	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Correlation Matrix of Parameter Estimates

GA 5,2	GA 6,1	GA 6,2	GA 7,1	GA 7,2	PH 1,1

GA 5,2	1.000					
GA 6,1	0.000	1.000				
GA 6,2	0.000	-0.312	1.000			
GA 7,1	0.000	0.000	0.000	1.000		
GA 7,2	0.000	0.000	0.000	-0.319	1.000	
PH 1,1	0.000	0.000	0.000	0.000	0.000	1.000
PH 2,2	0.000	0.000	0.000	0.000	0.000	-0.144
PS 1,1	0.000	0.000	0.000	0.000	0.000	0.000
PS 2,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 3,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 4,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,2	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,4	0.000	0.000	0.000	0.000	0.000	0.000
PS 5,5	0.000	0.000	0.000	0.000	0.000	0.000
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.082	0.000	0.000	0.000	0.000	0.000
AL 3	0.124	0.000	0.000	0.000	0.000	0.000
AL 4	0.257	0.000	0.000	0.000	0.000	0.000
AL 5	-0.576	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	-0.221	-0.374	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	-0.005	-0.363	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Correlation Matrix of Parameter Estimates

	PH 2,2	PS 1,1	PS 2,2	PS 3,3	PS 4,3	PS 4,4
PH 2,2	1.000					
PS 1,1	0.000	1.000				
PS 2,2	0.000	0.000	1.000			
PS 3,3	0.000	0.000	0.000	1.000		
PS 4,3	0.000	0.000	0.000	0.314	1.000	
PS 4,4	0.000	0.000	0.000	0.052	0.314	1.000
PS 5,2	0.000	0.000	-0.205	0.000	0.000	0.000
PS 5,3	0.000	0.000	0.000	-0.300	-0.480	-0.143
PS 5,4	0.000	0.000	0.000	-0.064	-0.284	-0.585
PS 5,5	0.000	0.000	0.020	0.046	0.133	0.203
PS 6,6	0.000	0.000	0.000	0.000	0.000	0.000
PS 7,7	0.000	0.000	0.000	0.000	0.000	0.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.000	0.000	0.000	0.000	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	0.000	0.000	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Correlation Matrix of Parameter Estimates

	PS 5,2	PS 5,3	PS 5,4	PS 5,5	PS 6,6	PS 7,7
PS 5,2	1.000					
PS 5,3	0.000	1.000				
PS 5,4	0.000	0.290	1.000			
PS 5,5	-0.195	-0.294	-0.574	1.000		
PS 6,6	0.000	0.000	0.000	0.000	1.000	
PS 7,7	0.000	0.000	0.000	0.000	0.000	1.000
AL 1	0.000	0.000	0.000	0.000	0.000	0.000
AL 2	0.000	0.000	0.000	0.000	0.000	0.000
AL 3	0.000	0.000	0.000	0.000	0.000	0.000
AL 4	0.051	0.000	0.000	-0.010	0.000	0.000
AL 5	0.000	0.000	0.000	0.000	0.000	0.000
AL 6	0.000	0.000	0.000	0.000	0.000	0.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Correlation Matrix of Parameter Estimates

	AL 1	AL 2	AL 3	AL 4	AL 5	AL 6
AL 1	1.000					
AL 2	0.000	1.000				
AL 3	0.000	0.000	1.000			
AL 4	0.000	0.000	0.226	1.000		
AL 5	0.000	-0.143	-0.215	-0.447	1.000	
AL 6	0.000	0.000	0.000	0.000	0.000	1.000
AL 7	0.000	0.000	0.000	0.000	0.000	0.000
KA 1	0.000	0.000	0.000	0.000	0.000	0.000
KA 2	0.000	0.000	0.000	0.000	0.000	0.000

Correlation Matrix of Parameter Estimates

	AL 7	KA 1	KA 2
AL 7	1.000		
KA 1	0.000	1.000	
KA 2	0.000	0.380	1.000

TI path full

Covariances

TI path full

Factor Scores Regressions

Y

	v4	v5	v6	v7	v8	v9
v4	1.000	0.000	0.000	0.000	0.000	0.000
v5	0.000	1.000	0.000	0.000	- -	0.000
v6	0.000	0.000	1.000	0.000	0.000	0.000
v7	0.000	0.000	0.000	1.000	0.000	0.000
v8	0.000	0.000	0.000	0.000	1.000	0.000
v9	0.000	0.000	0.000	0.000	0.000	1.000
v10	0.000	0.000	0.000	0.000	0.000	0.000

Y

	v10	v2	v3
v4	0.000	0.000	- -
v5	0.000	0.000	0.000
v6	0.000	0.000	0.000
v7	0.000	0.000	0.000
v8	0.000	0.000	0.000
v9	0.000	0.000	0.000
v10	1.000	0.000	0.000

X

	v4	v5	v6	v7	v8	v9
v2	0.000	0.000	0.000	0.000	0.000	0.000
v3	0.000	0.000	0.000	- -	0.000	0.000

X

	v10	v2	v3
v2	0.000	1.000	- -
v3	0.000	- -	1.000

TI path full

Standardized Solution

BETA

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	- -
v5	-0.049	- -	- -	- -	- -	- -
v6	-0.072	- -	- -	- -	- -	- -

v7	-0.045	0.041	- -	- -	- -	- -
v8	0.027	- -	- -	- -	- -	- -
v9	- -	0.029	-0.203	-0.025	0.109	- -
v10	-0.040	0.020	0.028	-0.239	0.235	0.071

BETA

	v10
v4	- -
v5	- -
v6	- -
v7	- -
v8	- -
v9	- -
v10	- -

GAMMA

	v2	v3
v4	0.162	-0.149
v5	0.015	-0.080
v6	-0.252	0.099
v7	-0.403	-0.071
v8	0.419	0.075
v9	0.287	-0.032
v10	0.205	0.307

Correlation Matrix of Y and X

	v4	v5	v6	v7	v8	v9
v4	1.000					
v5	-0.041	1.000				
v6	-0.107	0.001	1.000			
v7	-0.083	0.056	0.291	1.000		
v8	0.065	-0.142	-0.280	-0.566	1.000	
v9	0.063	0.008	-0.305	-0.262	0.298	1.000
v10	-0.010	-0.050	-0.167	-0.535	0.541	0.302
v2	0.105	-0.020	-0.222	-0.435	0.450	0.379
v3	-0.088	-0.070	0.009	-0.223	0.232	0.104

Correlation Matrix of Y and X

	v10	v2	v3
v10	1.000		
v2	0.547	1.000	
v3	0.502	0.380	1.000

PSI

	v4	v5	v6	v7	v8	v9
v4	0.970					
v5	- -	0.993				
v6	- -	- -	0.935			
v7	- -	- -	0.197	0.803		
v8	- -	-0.127	-0.185	-0.359	0.792	
v9	- -	- -	- -	- -	- -	0.793
v10	- -	- -	- -	- -	- -	- -

PSI

	v10
v10	0.463

Regression Matrix Y on X (Standardized)

	v2	v3
v4	0.162	-0.149
v5	0.007	-0.073
v6	-0.264	0.110
v7	-0.410	-0.067

v8	0.423	0.071
v9	0.397	-0.047
v10	0.417	0.344

TI path full

Total and Indirect Effects

Total Effects of X on Y

	v2	v3
v4	2.897	-2.758
	(1.101)	(1.135)
	2.632	-2.429
v5	0.003	-0.027
	(0.022)	(0.023)
	0.120	-1.174
v6	-0.128	0.055
	(0.029)	(0.030)
	-4.364	1.812
v7	-0.243	-0.041
	(0.033)	(0.034)
	-7.312	-1.197
v8	0.093	0.016
	(0.012)	(0.013)
	7.621	1.283
v9	0.267	-0.032
	(0.039)	(0.040)
	6.887	-0.811
v10	0.062	0.053
	(0.007)	(0.007)
	8.629	7.129

Indirect Effects of X on Y

	v2	v3
v4	- -	- -
v5	-0.003	0.003
	(0.004)	(0.003)
	-0.804	0.797
v6	-0.006	0.005
	(0.005)	(0.005)
	-1.144	1.126
v7	-0.004	0.002
	(0.006)	(0.006)
	-0.743	0.384
v8	0.001	-0.001
	(0.002)	(0.002)
	0.511	-0.510
v9	0.074	-0.010
	(0.022)	(0.012)
	3.340	-0.833
v10	0.031	0.006
	(0.005)	(0.004)
	6.077	1.488

Total Effects of Y on Y

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	- -

v5	-0.001	- -	- -	- -	- -	- -
	(0.001)					
	-0.844					
v6	-0.002	- -	- -	- -	- -	- -
	(0.002)					
	-1.270					
v7	-0.002	0.068	- -	- -	- -	- -
	(0.002)	(0.083)				
	-0.892	0.811				
v8	0.000	- -	- -	- -	- -	- -
	(0.001)					
	0.521					
v9	0.001	0.051	-0.281	-0.028	0.332	- -
	(0.001)	(0.098)	(0.076)	(0.074)	(0.202)	
	1.138	0.528	-3.693	-0.383	1.644	
v10	0.000	0.005	0.004	-0.060	0.164	0.016
	(0.000)	(0.017)	(0.013)	(0.013)	(0.034)	(0.010)
	-0.536	0.297	0.318	-4.809	4.782	1.615

Total Effects of Y on Y

	v10
v4	- -
v5	- -
v6	- -
v7	- -
v8	- -
v9	- -
v10	- -

Largest Eigenvalue of B*B' (Stability Index) is 0.209

Indirect Effects of Y on Y

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	- -
v5	- -	- -	- -	- -	- -	- -
v6	- -	- -	- -	- -	- -	- -
v7	0.000	- -	- -	- -	- -	- -
	(0.000)					
	-0.585					
v8	- -	- -	- -	- -	- -	- -
v9	0.001	-0.002	- -	- -	- -	- -
	(0.001)	(0.006)				
	1.138	-0.346				
v10	0.000	-0.003	-0.004	0.000	0.005	- -
	(0.000)	(0.005)	(0.003)	(0.001)	(0.005)	
	0.731	-0.604	-1.480	-0.373	1.152	

Indirect Effects of Y on Y

	v10
v4	- -

v5	- -
v6	- -
v7	- -
v8	- -
v9	- -
v10	- -

TI path full

Standardized Total and Indirect Effects

Standardized Total Effects of X on Y

	v2	v3
v4	0.162	-0.149
v5	0.007	-0.073
v6	-0.264	0.110
v7	-0.410	-0.067
v8	0.423	0.071
v9	0.397	-0.047
v10	0.417	0.344

Standardized Indirect Effects of X on Y

	v2	v3
v4	- -	- -
v5	-0.008	0.007
v6	-0.012	0.011
v7	-0.007	0.004
v8	0.004	-0.004
v9	0.110	-0.015
v10	0.212	0.037

Standardized Total Effects of Y on Y

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	- -
v5	-0.049	- -	- -	- -	- -	- -
v6	-0.072	- -	- -	- -	- -	- -
v7	-0.047	0.041	- -	- -	- -	- -
v8	0.027	- -	- -	- -	- -	- -
v9	0.017	0.028	-0.203	-0.025	0.109	- -
v10	-0.024	0.012	0.013	-0.240	0.242	0.071

Standardized Total Effects of Y on Y

	v10
v4	- -
v5	- -
v6	- -
v7	- -
v8	- -
v9	- -
v10	- -

Standardized Indirect Effects of Y on Y

	v4	v5	v6	v7	v8	v9
v4	- -	- -	- -	- -	- -	- -
v5	- -	- -	- -	- -	- -	- -
v6	- -	- -	- -	- -	- -	- -
v7	-0.002	- -	- -	- -	- -	- -
v8	- -	- -	- -	- -	- -	- -
v9	0.017	-0.001	- -	- -	- -	- -
v10	0.016	-0.008	-0.014	-0.002	0.008	- -

Standardized Indirect Effects of Y on Y

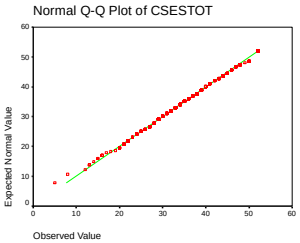
	v10
v4	- -
v5	- -
v6	- -
v7	- -
v8	- -
v9	- -
v10	- -

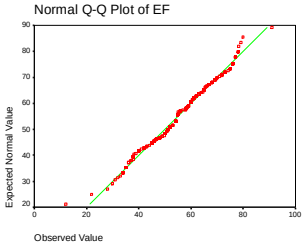
Time used: 0.047 Seconds

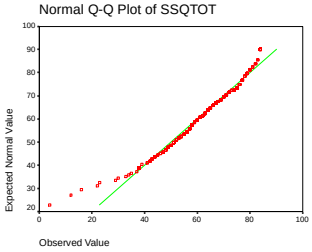
Appendix H

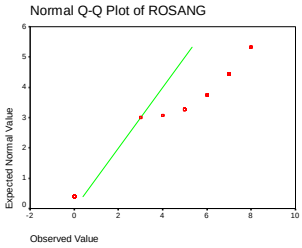
LINEARITY TEST & Q-Q PLOT TEST

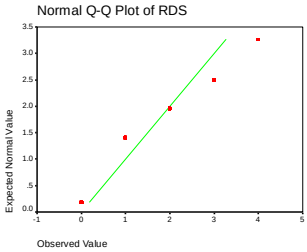
Q-Q PLOT TEST

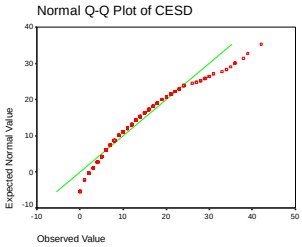

Normal Q-Q Plot of CSESTOT
Expected Normal Value
Observed Value

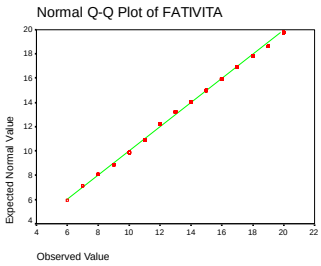

Normal Q-Q Plot of EF
Expected Normal Value
Observed Value

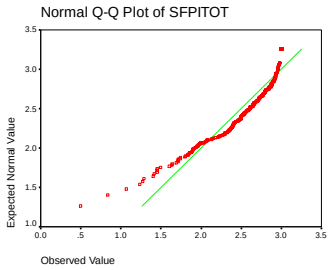

Normal Q-Q Plot of SSQTOT
Expected Normal Value
Observed Value

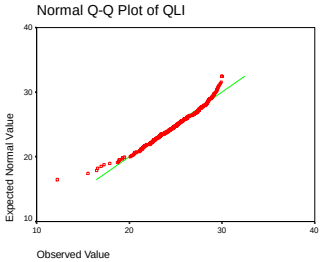

Normal Q-Q Plot of ROSANG
Expected Normal Value
Observed Value


Normal Q-Q Plot of RDS
Expected Normal Value
Observed Value

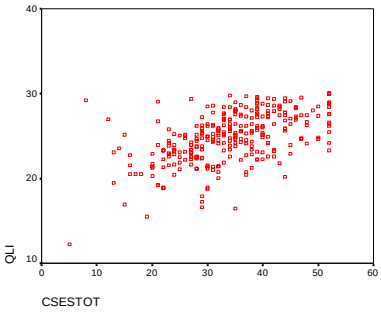

Normal Q-Q Plot of CESD
Expected Normal Value
Observed Value

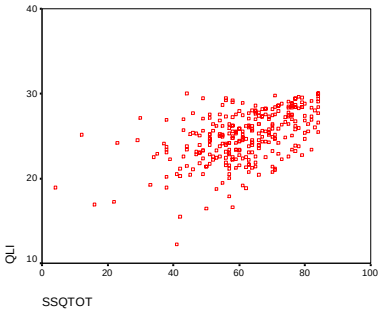

Normal Q-Q Plot of FATIVITA
Expected Normal Value
Observed Value

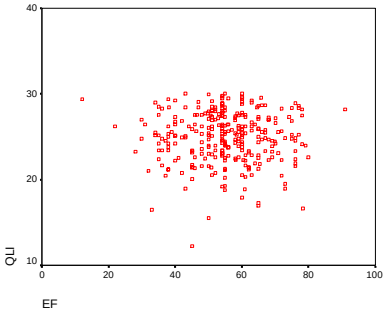

Normal Q-Q Plot of SFPITOT
Expected Normal Value
Observed Value

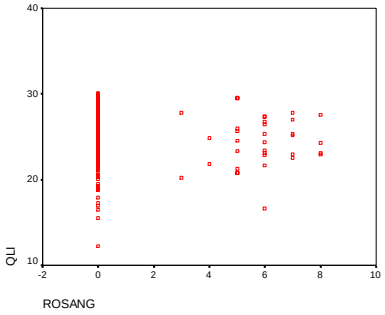

Normal Q-Q Plot of QLI
Expected Normal Value
Observed Value

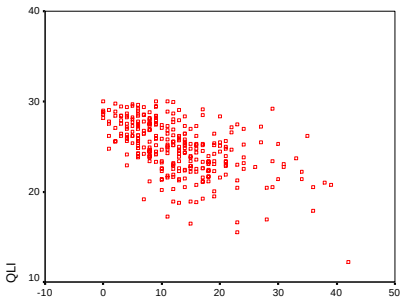
LINEARITY TESTING

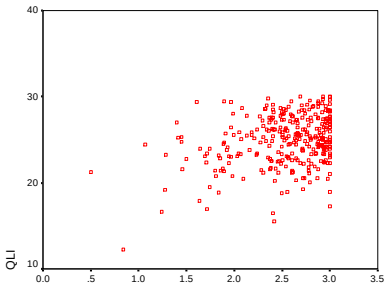


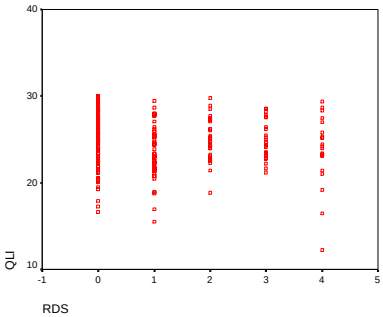


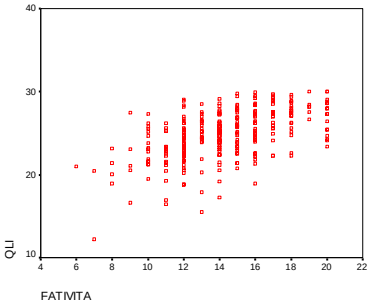












Appendix 1

Table summarized data 303 case in each hospital

Appendix I Table summarized data 303 case in each hospital

Hospital	IRB		Time line								Among case	
			2011	2012						2013		
	Approve	non	Nov-Dec	Jan-Feb	Mar-April	May-June	July-Aug	Oct-Sep.	Nov-Dec	Jan-Feb	recruited	completed
1. King Chulalong Memorial Hospital	✓		✓	*	*	✓	✓	✓	✓	✓	123	100
2. Siriraj Hospital	✓		*	*	*	✓				✓	9	8
3. Ramathibody Hospital	✓										0	0
4.Maharajnakornchiangmai Hospital.	✓		✓	✓							27	26
5. Srinagarind Hospital	✓										0	0
6. Naresuan University Hospital	✓		✓	*	*	✓	✓	✓	✓	✓	61	57
7.Songklanagarind Hospital	✓										0	0
8. Suratthani hospital	✓		✓	✓	*	✓	✓	✓	✓	✓	114	113
Total											**334**	**303**

Remark:

✓ : data collection was done

* : stop data collection because of flooding situation at 2011.

: Data collection not done

Appendix J

Table of among number and percent of variables

Appendix J Among number and percent of variables

Variables	Number	Percentage
LVEF		
Normal	212	69.74
Borderline normal	58	19.08
Mild systolic dysfunction	31	10.20
Moderate systolic dysfunction	2	0.65
Severe systolic dysfunction	1	0.32
BMI		
Underweight	7	2.30
Normal weight	171	56.25
Over weight	101	33.22
Obesity	25	8.22
Depression		
Normal	245	80.60
Indicating depression	59	19.40
Dyspnea		
No dyspnea	169	55.60
Angina		
No chest pain	270	88.80
Borderline chest pain	30	10.30
Indicating chest pain	4	1.30

Appendix K

Table the interpretation of the variables

Appendix K Table the interpretation of the variables

Variables	No. of items	Interpretation
quality of life	70	High score indicating as good quality of life
Angina	8	0 -1 presenting no chest pain, 2-7 borderline chest pain 8 indicating chest pain
Dyspnea	4	0 indicating no dyspnea with activity score increasing indicated more limitations due to dyspnea
Depression	20	0-18 normal ≥ 19 depression
Vital exhaustion	4	Higher values indicating more vitality that less fatigue 4-12 low 13-15 moderate ≥ 16 high
Social support	21	The higher score show the higher level of social support
Cardiac self-efficacy	14	Higher scores indicate a greater level of cardiac self-efficacy to maintain function.
Functional performance	40	Higher scores indicate greater functional status
BMI	Subjective measure	< 18.5 underweight 18.5-24.9 normal ≥ 25 over weight ≥ 30 obesity
LVEF		> 50% normal 40-50% borderline normal 30-39% Mild systolic function 20-29% moderate systolic function <20% severe systolic function

BIOGRAPHY

My name is Aem-orn Saengsiri. I was born on August 12, 1971, Bangkok, Thailand. I graduated from 1) The Thai Red Cross College of Nursing, Thailand, B. Sc. (Nursing & Midwifery), 1989-1993, 2) School of Nursing Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Thailand, M.N.S. (Adult Nursing), 2000-2003, and 3) Nursing Faculty, Chulalongkorn University, Thailand, PH. D., 2008-2013. My workplace, King Chulalongkorn Memorial Hospital, is a tertiary referral hospital in Bangkok. I received a scholarship from King Chulalongkorn Memorial Hospital for my Ph.D. program and for one year of study abroad at College of Nursing, University of Illinois at Chicago, United State. I received the 90th anniversary of Chulalongkorn university fund: Ratchadaphiseksomphot endowment fund, for granting throughout this study.

My abstract titled “Symptom clusters in cardiovascular disease: A systematic review” was accepted for a poster presentation at the Dimensions in Cardiac Care 2012 Conference in Cleveland, Ohio, on September 23-25, 2012. The second abstract titled “ Predicting factors of Health-Related Quality of Life among coronary artery disease patients post Percutaneous Coronary Intervention: Preliminary analysis” was accepted for a poster presentation at the 16 EAFONS “Developing International Networking for Nursing Research” on February 21–22, 2013 Bangkok, Thailand.

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