PSYCHOSOCIAL CORRELATES OF CARDIAC RECOVERY

by

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DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Nursing

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA

San Francisco

PSYCHOSOCIAL CORRELATES

OF CARDIAC RECOVERY

Abstract

PSYCHOSOCIAL CORRELATES OF CARDIAC RECOVERY

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The purpose of this study was to determine the relationship between coping strategies, self-efficacy beliefs, and perceived social support and physical and psychosocial functioning during the first 6 weeks after cardiac surgery. A model of recovery was developed and tested with a convenience sample of 81 patients between the ages of 40 and 70 from 3 northern California community hospitals. The sample was 80% male, 83% Caucasian, 77% married, and 49% employed, with a mean age of 58.8 years. Data were obtained through preoperative interviews and questionnaires, telephone interviews at Weeks 2 and 6 postoperatively, and mailed questionnaires at Week 6.

Psychosocial variables and symptoms during recovery were assessed with the Brief Symptom Inventory (BSI), the Multidimensional Scale of Perceived Social Support, the Jenkins Self-Efficacy and Activity Scales, the Jalowiec Coping Scale, New York Heart Association (NYHA) symptom status, and an investigator developed Recovery Support Scale. An interview guide was used to assess recovery demands and coping resources.

In this sample of cardiac surgery patients, greater NYHA symptom status and recovery demands correlated with higher psychological distress and lower self-reported activity. No interactive effects among coping, social support, or self-

efficacy were detected, although the interview data suggest such an effect.

Self-efficacy beliefs predicted self-reported walking, general activity, resumption of roles, and maintenance of health at Weeks 2 and 6 ($p<.001$). Return to work was best predicted by Week 2 work activity ($p<.001$) and perioperative complications ($p<.05$). Self-efficacy and activity for walking, general activity, work, and roles increased from 2 to 6 weeks ($p<.01$), as did health activity ($p<.05$).

Lower social support ($p<.001$), higher total coping ($p<.001$), and higher emotive coping strategies ($p<.001$) correlated with greater psychological distress (BSI) at Week 6. Confrontive coping was the most frequently reported coping strategy, but did not enter any statistical regression. Perceived social support decreased at Week 2 and increased at Week 6. Informational support at Week 2 correlated with self-efficacy beliefs and self-reported activities at Weeks 2 and 6. No buffering effects were detected for social support or coping.

Dedication

This dissertation is dedicated to Kelly Therese Doordan, my daughter, and Ryan Patrick Doordan, my son, whose love, patience, and support provided encouragement throughout the process.

Acknowledgements

I am grateful for the support, encouragement, and mentoring from numerous faculty, colleagues, family, and friends during this dissertation project.

First, I would like to express my sincere appreciation to Dr. Susan Gortner, the Chair of my dissertation committee, for her continuing guidance and assistance during my doctoral studies. She has been my mentor, generously sharing her expertise in research with cardiac patients.

My respect and appreciation are extended to my other committee members, Dr. Sally Rankin and Dr. Leonard Pearlin. Dr. Rankin has provided continuing insight and feedback throughout my doctoral studies and in the development of this research project. Dr. Pearlin inspired me to pursue stress and coping theory as the model for my research and provided valuable assistance with the initial development of the Recovery Support Instrument.

I am grateful to Dr. Steven Paul and Dr. Robert Slaughter for their patient assistance with the statistical analyses in this study. I am also thankful to Dr. Margaret Jacobson for her critique and suggestions during the writing of the dissertation.

The generous cooperation and support of the community hospitals, staff nurses, cardiac surgeons and their helpful office staff, made this project possible. I am extremely grateful to the patients and their families who participated in this study. Their willingness to share personal

experiences and insight enriched the study beyond the initial research questions.

My family, especially my children, provided the love and encouragement which enabled me to complete the study. The endless support and encouragement of my husband, parents, extended family, and friends are appreciated. Feedback from fellow doctoral students, particularly Lou Ellen Barnes, and continuing support from my colleagues at San Jose State University were extremely helpful. All of these family, friends, and colleagues have enabled me to surmount the challenges, maintain a healthy perspective, and continue on the path to completion of my program.

This research was supported in part by the National Institute of Health, National Research Service Award #NRO6535 from the National Center for Nursing Research, Century funds from the UCSF School of Nursing, and funding from the Graduate Division. Additional assistance was provided by a San Jose State University Faculty Development Assigned Time Award and a Post-Bacccalaureate Faculty Fellowship, Department of Health and Human Services.

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CHAPTER 1

THE STUDY PROBLEM

Nearly 5 million Americans have cardiovascular disease, and coronary artery disease continues to be the leading cause of death in the United States despite technological advances to prolong life (American Heart Association, 1988). Coronary bypass surgery is believed to be more effective than medical treatment of ischemic heart disease in pain relief, activity tolerance, and higher survival rates, especially in patients with more severe disease and poor preoperative prognostic indicators, such as old age, severe angina, or left ventricular dysfunction (Califf et al., 1989; Kaplan, 1988). Overall cardiac mortality rates have declined 40% over the past 20 years, although the prevalence of heart disease has increased as the population ages (Feinleib et al., 1989). Approximately 230,000 coronary artery bypass surgeries are performed annually (American Heart Association, 1988). From 1979 to 1986 the number of bypass surgeries doubled and the number of coronary angioplasty procedures increased from 2,000 to 133,000 annually (Feinleib et al., 1989).

Statement of the Problem

The term recovery implies return of physical health, psychological well-being, and resumption of social roles. Although the majority of individuals receiving medical or surgical treatment for heart disease experience significant improvement in physical health status, a number of persons

have a difficult recovery from acute cardiac events such as surgery or myocardial infarction, and subsequently experience continuing physical, psychological or social problems. Residual disability may result from social and psychological factors impinging upon recovery and the underlying chronic, progressive disease process (Wilson-Barnett, 1981). For example, poor psychological adjustment and emotional distress, despite improvement in physical health, have been reported in 25 to 40% of open heart surgery patients (Jenkins, Stanton, Savaneau, Denlinger, & Klein, 1983; Magni et al., 1987; Mayou, 1986; O'Connor, 1983; Zyzanski et al., 1981).

The results for postoperative psychological adjustments are varied. The Jenkins group of researchers noted postoperative improvement in a number of psychological indicators such as anxiety, depression, vigor, sleep disturbances, and well-being, although a significant number of patients reported depression, anxiety, anger, and resentment (Jenkins et al., 1983). Horgan and associates (1984) found no correlation between psychological distress and physical outcome of surgery in the 30% of their patients reporting psychological distress 1 year after bypass surgery. These patients reported anxiety, depression, and some deterioration in psychosocial function. As early as 1981, Wilson-Barnett noted the importance of examining multiple physical problems, psychological reactions, functional activity levels, information and support, and the patient's

report of the success of the surgery along with the physiological benefits and improved longevity following surgery. However, there is limited longitudinal information on the early postoperative recovery period, especially the first 6 weeks at home, and on the psychosocial factors influencing recovery during this period of most rapid change in recovery status.

Purpose of the Study

The purpose of this study was to determine the relationship of 3 psychosocial factors, coping, self-efficacy, and social support, to variance in recovery outcome during the early recovery period, i.e. the first 6 weeks after surgery. Recovery outcomes examined in this study were psychological distress, symptom status, walking, general activity, return to work, health maintenance activity, and resumption of social roles. Stress and coping theory provided the theoretical framework for this research. Coping and appraisal of stress affect the interrelated adaptational outcomes of social functioning, morale, and somatic health. Self-efficacy beliefs related to resumption of activity and social roles were explored. Social support from family and others was examined for its effect on recovery, coping and self-efficacy beliefs. The interrelationships of coping, self-efficacy beliefs, and social support were also studied. Three dimensions comprise cardiac recovery outcome in this study: physical (return to prior physical activity levels, freedom from pain or other physical symptoms); psychological

well-being (freedom from depression or distress subsequent to the surgery); and social (resumption of prior roles, general and work activities).

Study Aim

The aim of the study is to answer the question: Do differences in coping behaviors, self-efficacy beliefs, and/or social support explain differences in return of physical and psychosocial functioning after cardiac surgery?

Study Questions

The specific study questions are as follows.

1. What is the effect of different types of coping behaviors used during recovery on recovery outcomes?

2. Are self-efficacy expectations at 2 and 6 weeks postoperatively positively related to resumption of activities at 2 and 6 weeks?

3. Are self-efficacy expectations and confrontive coping behaviors positively related to recovery outcomes?

4. Is social support positively related to recovery outcomes?

5. Do patients with higher social support and higher self-efficacy expectations have more positive recovery outcomes?

6. Do patients with higher social support and confrontive coping behaviors have more positive recovery outcomes?

Questions 1, 2, and 4 relate to the direct effects of coping, self-efficacy, or social support on recovery, while

questions 3, 5, and 6 examine two way interactions of these variables on recovery outcomes.

Study Design and Procedures

A prospective, longitudinal, cohort design was used to examine coping, social support, self-efficacy expectations, recovery demands, and the outcome variables of psychological distress, physical symptoms, and resumption of activities, in patients recovering from cardiac surgery. Data collection techniques included preoperative interviews and written questionnaires, 2 week and 6 week postoperative telephone interviews, and 6 week mailed questionnaires. The convenience sample consisted of 81 first time or repeat cardiac valve or bypass surgery patients from 3 northern California community hospitals.

The data from the standardized measures were scored and statistically analyzed. The qualitative data from the interviews were content analyzed and summarized with descriptive statistics, and used in the interpretation of the quantitative results.

Significance of the Study

The potential significance of this study is threefold. First, the research primarily focuses on the early recovery period. Little research has been conducted on this period of most rapid change in health status. Better understanding of this rapid transition process will provide insight into subsequent recovery outcomes. Information was gathered at 2

postoperative points during the first 6 weeks in addition to the preoperative assessment.

Second, this research considers a unique combination of variables: coping, self-efficacy, and social support. Examination of personal and social factors specific to recovery is anticipated to enhance our understanding of the early recovery process.

Third, measurement of social support, coping behavior, and self-efficacy along with individual interviews offers unique insight into individual recovery and variation in individual recovery. The combination of quantitative and qualitative measures allows for statistical analyses of specific variables and the opportunity to explain statistical results with the individual interview data.

The anticipated benefit of the study is improved understanding of patient responses during recovery which may affect recovery outcomes. This knowledge may serve as a basis for identification of individuals at risk for a poor recovery outcome and development of interventions to improve recovery.

CHAPTER II

REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK

Recovery is a multidimensional process which encompasses interrelated physiological and psychosocial components. This chapter begins with a review of cardiac recovery literature; then presents a review of the theory and cardiac research literature for stress and coping, self-efficacy and social support; and concludes with the conceptual framework for the study.

Cardiac Recovery

Early cardiac research focused on prevention of mortality or physical complications for persons with disease, or management of hospital based care of patients (Foster, Kloner, & Stengrevics, 1984; Jillings, 1978; Razin, 1982; Yarcheski, 1986). More recently, research efforts have included psychosocial factors affecting recovery after discharge from the hospital (Kos-Munson, Alexander, Hinthorn, Gallagher, & Goetze, 1988; Nicklin, 1986; Wilson-Barnett, 1988).

Three phases of recovery have been discussed in the literature: recovery in the hospital, recovery at home, and long term recovery and rehabilitation. With the current trend towards a shortened hospital stay, patients may be discharged home before many physical and emotional concerns are resolved. Approximately 80% of bypass surgeries are elective and patients are hospitalized the day prior to

surgery; the other 20% are emergent or urgent procedures (CASS Principal Investigators and their Associates, 1983). Today, patients may stay in the hospital less than 1 week postoperatively.

During home recovery, which lasts from 6 weeks to 3 months, the majority of physical functions are recovered, although problems can delay physical recovery up to 1 year (Wilson-Barnett, 1981). The first 1 to 2 weeks at home are the most labile in terms of physical and emotional health. By the 4th to 6th week a more stable pattern and sense of wellness emerge, although the person is not fully recovered (Doordan, 1976; King & Parrinello, 1988; Nicklin, 1986; Wilson-Barnett, 1981). During this period of stabilization, patients experience incisional and musculoskeletal discomfort, fatigue, loss of appetite, weakness, mood swings, and occasional insomnia, gastrointestinal distress, problems with medications, and other symptoms, that generally resolve by 6 to 12 weeks postoperatively (Gilliss, Gortner, Shinn, & Sparacino, 1989; King & Parrinello, 1988; Tack & Gilliss, 1990; Wilson-Barnett, 1981).

After the first 3 months most patients resume work, home, and social activities, although they may experience lingering problems. In a retrospective study of 60 patients 1 year after coronary bypass surgery, Wilson-Barnett (1981) found that although the majority rated their recovery as good (34) to fair (19), one third of the total number of patients had residual emotional changes, physical problems, and work

or activity limitations which affected individual quality of life.

A multidimensional patient perspective on the recovery experience helps to explain individual variation at each phase of recovery and recovery outcome. Recovery outcomes in addition to morbidity and mortality include dimensions such as physical health (physiological indicators: cardiac output, EKG status, angina, wound healing; physical activity: walking, daily activities, self care); social outcomes (quality of life, return to work, sexual activity, leisure activities, resumption of roles and relationships); and psychological status (mood state, depression, anxiety, distress) (Gilson et al., 1975; Kaplan, 1988).

Physical Health

Prior physical health status affects ultimate recovery potential. Urgent surgery for unstable angina, older age, decreased left ventricular ejection fraction, and previous bypass surgery increase the risk for mortality and complications, such as myocardial infarctions, low-output syndrome, and persistent neurological deficit (Christakis et al., 1989). Recent myocardial infarction, congestive failure, angina, or coexisting chronic conditions, such as diabetes, arthritis, pulmonary disease, or other health problems may delay physical recovery. The majority of cardiac symptoms improve after surgery, although surgical success alone does not predict optimal rehabilitation outcome. At least 25% of the 60 patients that Wilson-Barnett

(1981) interviewed 1 year after bypass surgery experienced problems with wound healing, sternal or leg pain, emotional changes, or other problems that delayed resumption of prior role and activities. Surgical techniques have improved over the past decade although patients continue to report long term physical and psychosocial problems.

In a prospective study of 79 male bypass patients using interviews, medical record data, and standardized instruments to assess mood, cognition, and activity levels, Mayou and Bryant (1987) found that psychosocial outcomes, variation in reported quality of life, and individual rehabilitation needs were better predicted by preoperative psychosocial factors, not medical indicators.

Magni and associates (1987) reported similar results in a prospective study of 99 male and female bypass and valve surgery patients. At 1 year, over 92% of the patients reported an improved physical condition. Twenty-five percent of the total number of patients reported some form of poor psychosocial adjustment after 1 year. No preoperative biological or psychological variables correlated with physical outcome, and no correlation was found with surgical success and psychological distress or quality of life. Postoperative psychological distress was best predicted by preoperative psychological variables, such as hypochondriasis, irritability, anxiety, depression, and global symptom distress. These findings are congruent with results in other studies demonstrating that although there is

improvement in physical health for the majority of the subjects, there are significant deviations in psychosocial recovery that affect physical and psychosocial functioning (Horgan, Davies, Hunt, Westlake, & Mullerworth, 1984; Jenkins, Stanton, Savageau, Denlinger, & Klein, 1983).

Social Outcomes

A more comprehensive research approach to recovery outcomes including return to work, adjustment, and quality of life, has emerged in addition to the study of improved cardiac function, relief of angina, and prolonged life (Jenkins et al., 1983; LaMendola & Pellegrini, 1979; McIntosh & Garcia, 1978). Jenkins and associates (1983) advocated a systematic evaluation of physical, psychological, social, and economic outcomes, as important for policy making decisions regarding the use of limited resources and for personal decisions to have surgery.

Outcome expectations and quality of life. Quality of life, a multidimensional concept including physical, social, and emotional domains and subjective well-being, has become increasingly important as an outcome measure in cardiac recovery (Packa, 1989). An optimal rehabilitation outcome depends upon the patient's perception of illness and potential, and the values and meanings attached to rehabilitation outcomes, such as satisfaction with social adjustment, occupational adjustment, social and family relationships, hobbies and leisure activities, and

satisfactory sexual activity (Kos-Munson et al., 1988; Krantz & Deckel, 1983).

In an extensive review of psychosocial outcomes of coronary artery surgery, Mayou (1986) examined predictors of return to work, resumption of activity, sexual relations, social life and mental health, and concluded that any specific outcome is best predicted by preoperative measures of functions and expectations specific to the outcome. The predictors for quality of life outcomes were more difficult to determine because of variation in the definition of quality of life. Despite health problems problems, there was consistent evidence that most patients expressed satisfaction with the benefits of surgery and with the achieved activity level (Mayou, 1986).

Achievement of recovery expectations is significantly related to satisfaction. Perception of health correlates with perception of recovery and adjustment, independent of differences in physical health status (Flynn & Frantz, 1987; Krantz & Deckel, 1983). The direction of causality has not been determined empirically: poor health may cause poor perception and recovery outcome, or poor perception and limited expectations may actually limit recovery of physical health. Most likely it is a bidirectional process.

In a study of 46 coronary artery bypass and valve replacement surgery patient's preoperative expectations and postoperative realized benefits, Gortner and associates (1985) found that 83% of the patient's expected benefits from

cardiac surgery were realized. The greatest percentage of expected benefits that were realized were prolonged life, relief of pain, improved quality of life, and increased activity tolerance, in that order. Only a few patients preoperatively cited expectations of return to work, travel, or former activities. Persons not realizing expected benefits had more severe preoperative angina. Severity of heart disease, complications, infections, and depression also were found in the case histories of persons not realizing expected benefits from the surgery (Gortner, Gilliss, Moran, Sparacino, & Kenneth, 1985).

In a follow-up study of expectations in a clinical trial with a group of 67 bypass and valve patients, Gortner and associates (1989) reported similar findings with a ratio of realized to expected benefits of 84%. The expected benefits of prolonged life and improved quality of life were most often realized. No differences were found related to treatment group or severity of illness. The best predictors of unrealized benefits were younger age, female gender, and continuing symptoms.

Return to work. Return to work has been studied extensively in cardiac patients. In a prospective study of 92 coronary artery bypass patients, Kos-Munson, Alexander, Hinthorn, Gallagher, and Goetze (1988) examined preoperative perceptual, cognitive, and demographic variables, and self-perceived level of rehabilitation at 6 and 12 months. In the multiple regression analysis, lower pre-angiography

depression and higher income significantly predicted satisfactory rehabilitation, with valuing of work approaching significance. Although only 16% of the sample were women, a comparison of overall rehabilitation scores noted that men had a better rehabilitation than women, except in regard to social interaction. Men were less depressed, had higher self-actualization scores, and had higher incomes than women. Depression correlated highly with negative results in return to work, disturbance in sleep and rest, social interaction, alertness behavior, and recreation pastimes.

Stanton et al. (1983) found that 73% of their cardiac patients returned to work within 1 year, and that higher income predicted higher levels of rehabilitative functioning. Of those individuals not working, 7% had reasons unrelated to health, 16% retired due to actual and perceived poor health, and 4% were not working or retired because of poor health.

The return to work results in studies of surgical patients are similar to results with myocardial infarction patients. Maeland and Havik (1987) conducted a prospective study of 249 patients to identify psychological predictors for return to work 6 months after a myocardial infarction. At 6 months, 72.7% of the patients had returned to work. In-hospital expectation of work capacity was a strong predictor for work resumption. Early illness perceptions and affective reactions, including in-hospital anxiety and depression, plus insufficient cardiac lifestyle knowledge, were related to

failure to return to work. Demographic, work-related, or medical factors were not predictors.

Until recently, most studies of work resumption have been retrospective or based on concurrent data, and have not adequately controlled for the multiple demographic, health and work factors in studies of the psychological predictors of return to work (Kinchla & Weiss, 1985; Maeland & Havik, 1987). In a randomized clinical trial with 201 men recovering from a myocardial infarction, experimental patients received an occupational work evaluation 3 weeks after infarction (Dennis et al., 1988). Their perception of physical capacity improved and they returned to work at a median of 51 days compared to 75 days for patients receiving usual care. The intervention consisted of treadmill testing, counseling, and a recommendation to the primary physician that the patient return to work within 2 weeks.

Perception of illness, physicians' recommendations, and return to work expectations are the strongest predictors of work resumption (Clancey, Wey, & Guinn, 1984; Gundle, Reeves, Raft, & McLaurin, 1980; Kos-Munson et al., 1988; Stanton, Jenkins, Savageau, & Thurer, 1984). Persons under the age of 55, men rather than women, and persons with higher preoperative income are more likely to return to work, although the findings vary across studies (Allen, 1990). Less conclusive is the research on other predictors of return to work including physical work demands, health status, and educational attainment (Doerhman, 1977; Fitzgerald, 1989;

Garrity, 1981; Kos-Munson et al., 1988; Stanton et al., 1983). Conflicting findings of predictors of return to work suggest that psychosocial personal and situational factors mediate the effects of cardiac disease in the decision to return to work (Fitzgerald, 1989). In view of our cultural emphasis on work and productivity, the value of work and self identity associated with work, cannot be overlooked when considering predictors and outcomes of recovery (Kos-Munson et al., 1988).

Resumption of sexual activity. Anticipated functional benefits after surgery include reduction in physical restrictions, improved sexual activity, and resumption of role functions in work, social, and leisure activities (Stanton et al., 1984). However, in interviews of 134 patients 7 to 34 months after bypass surgery, the average time for resuming sexual activity was 7.8 weeks postoperatively, and 39% of the patients reported a decreased frequency in resumption of sexual activity, 17% of the patients and 35% of their partners expressed fear, and 23% of the patients had cardiac symptoms during sexual activity (Papadopoulos, Shelley, Piccolo, Beaumont, & Barnett, 1986).

Similar results were reported by Gilliss and Rankin (1988) in a 6 month follow up of cardiac surgery patients. A sample of 52 patients reported a significant increase for social activities after 3 months, but for the 45 patients reporting on sexual activities, 26.7% of the patients

reported reduction in sexual activity compared to 6.6% of the patients reporting increased activity by 6 months.

Myocardial infarction patients also report diminished sexual activity related to decreased desire, depression, anxiety, fear of death or spousal concern (Doehrman, 1977). A prospective study of rehabilitation during the 6 months subsequent to myocardial infarction found that return to work, exercise, leisure and sexual activity were influenced by symptoms of pain, breathlessness, fatigue, anxiety, and depression (Trelawny-Ross & Russell, 1987). The extent of the myocardial infarction did not have a consistent effect on outcome.

Psychological Function.

Cognitive deficits, depression, and mood alteration are frequently reported in the first few months after surgery (Newman et al., 1989; Raymond, 1988). Newman et al. (1989) conducted a battery of neuropsychological tests, the Beck Depression Inventory, state-trait anxiety tests, and interviews for perceived cognition on 62 male and female bypass surgery patients before surgery and 1 year after surgery. Patients reporting cognitive deficits did not show deterioration or change on the neuropsychological tests, but tended to have higher depression and state anxiety results at 1 year.

Mayou and Bryant (1987) conducted a prospective study of 79 male bypass surgery patients before surgery and at 3 and 12 months after surgery using a combination of interviews,

medical record data, standardized mood and cognitive function tests, and investigator developed activity and social function tests. Improved physical activity, relief of angina, decreased dyspnea, general satisfaction, improved mental state and family life were found for the majority of patients. However, up to 1 year after surgery many patients reported physical symptoms, neurological deficits, chest and leg pain, and decline in employment, in sexual activity, and in social relationships. One fifth of the patients reported a diminished or unchanged quality of life, unrelated to their physical health status, which, in general had improved. Previously Mayou (1986) had noted that although cardiac patients commonly experience transient neuropsychiatric impairment, persistent neurological or cognitive deficits, affective symptoms or other health problems, the majority of postoperative patients were satisfied with their achieved activity level (Mayou, 1986).

Psychological intervention. There is an abundance of research on the effects of psychological intervention or teaching on recovery. A review of 34 controlled studies to evaluate the effects of psychological intervention on recovery from cardiac events, demonstrated that patients who are given information or emotional support do better in terms of physical complications and emotional distress during recovery (Mumford, Schlesinger, & Glass, 1982). Increasing the sense of mastery or control assisted patients in coping and management of care. Further, these authors suggest that

personal coping preferences should be assessed in order to individualize recovery interventions. Also, across all studies, patients receiving psychological interventions in the hospital were hospitalized approximately 2 days less than control patients. These studies support the benefits of increased knowledge, less anxiety, lower rehospitalization rates, and improved compliance during early home recovery in patients receiving supportive educational programs after surgery (Beckie, 1989; Marshall, Penckofer, & Llewellyn, 1986; Steele & Ruzicki, 1987).

In an experimental study in Canada with 461 men postmyocardial infarction, highly stressed men who participated in a 1 year program of stress monitoring and nursing intervention in the home demonstrated significant reduction of cardiac mortality (p=.006) and recurrence of infarction (p=.004) compared to patients with low stress or highly stressed patients receiving regular care (Frasure-Smith, 1991. Mortality over 5 years was tripled and reinfarction rates were increased by 1.5 for high stress patients receiving routine care. Patients with high stress were able to be identified in the hospital prior to discharge.

Summary

The research focus has shifted towards understanding the early recovery period, the family/social context of recovery, and viewing recovery as a multidimensional process and outcome. There are numerous conceptualizations of the

physical and psychosocial variables and methods of measurement. Earlier studies of cardiac recovery had cross sectional or retrospective designs with small, convenient, nonrandom samples at single sites, limiting generalizability and threatening validity (Cook & Campbell, 1979). Recall bias, use of instrumentation without attempts to establish validity or reliability, lack of support for statistical conclusions, and quasi-experimental designs, further limit the conclusions of these studies (Clancy, Wey, & Guinn, 1984; Cohen & Cohen, 1983; Jenkins et al., 1983; Morrell, Rectanus, & Watson, 1985; Zyzanski et al., 1981).

The more recent studies include multiple methods of measuring the concepts utilizing instruments with established validity and reliability, unlike the earlier descriptive studies. Use of interviews along with more objective measures strengthen understanding of individual differences in recovery. More recent studies include assessment within the first weeks after surgery, the period of more rapid change, and at multiple times along the recovery trajectory, viewing recovery more as a process as well as an outcome.

The lack of a single conceptualization of recovery makes comparison between individual studies difficult. However, there is general agreement in studies with related concepts. There is also support for the importance of examining multiple biopsychosocial variables along the recovery trajectory. Given potential for physical recovery, it appears that patient's perceptions and expectations are among

the strongest predictors of recovery. Lingering physical symptoms may influence perception of health and lead to emotional distress. In addition to recovery of physical health, quality of life, and return to optimal psychosocial functioning must be considered. The majority of patients report an improvement in all areas of health, but a significant number of persons are troubled by continuing symptoms and health problems.

Stress and Coping

Stress and coping theory provided the conceptual framework for this study (Lazarus & Folkman, 1984; Pearlin & Schooler, 1978). Psychological stress is an event that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being (Lazarus & Folkman, 1984). Personal factors and the context of the broader social network influence the individual appraisal process. Coping is the cognitive and behavioral effort to manage the problem situation and regulate the emotional responses to the problem or alter the meaning of the situation to make it less threatening. Coping and appraisal affect 3 interrelated adaptational outcomes: social functioning, morale, and somatic health (Cohen & Lazarus, 1979; Lazarus & Folkman, 1984). Primary appraisal distinguishes whether the event is irrelevant, benign-positive, or stressful. Stressful transactions between the person and the environment are appraised either as a challenge, threat, or event involving harm or loss.

Concurrently, a secondary appraisal process examines coping options. Personal factors, such as beliefs and commitments, and situational factors, such as timing and uncertainty, influence both appraisal processes. It is difficult to measure the ongoing process of appraisal and to separate it from antecedent, mediating, and consequent events.

The three interrelated adaptational outcomes, social functioning, morale, and somatic health are viewed in context of the society: its demands and resources, social relationships, and social change (Lazarus & Folkman, 1984). The primary focus is on individual coping and adaptation. Coping is process-oriented, not based on personal traits. Person and environment interact bidirectionally. The process is dynamic and reciprocal, versus static, linear, or unidirectional.

Pearlin and Aneshensel (1986) developed a stress process paradigm that includes antecedent stressors leading to health behaviors or illness, consequent stressors, and illness behavior, recovery and adjustment. Coping and social support are mediators to the development of consequent stressors and to the health outcome. This model can be adapted into a framework by which to organize the interacting variables influencing the process of recovery in a stress process paradigm. The predictable, generally positive linear recovery trajectory portrayed in the model may not apply to each individual patient. Traditionally, patients are given

preparation for this more predictable, positive recovery path.

The surgery and immediate recovery period can be viewed as a set of stressors or events with a desired outcome of resumption of prior health or functional improvement. The surgery itself is a stressful life event with potentially deleterious psychological consequences particularly when it is unscheduled or unpredicted, offering little control during the acute stage (Pearlin, 1982). Cardiac illness has both acute and chronic components and occurs in the context of other stressful life experiences impinging upon recovery. Each patient brings a unique composite of personal history, understanding, and resources to the surgical situation. Life experiences shape expectations and availability of resources, accounting for differences in outcomes often ascribed to age, gender, or socioeconomic status.

Secondary stressors are the strains or demands consequent to the surgery, such as depression, physical complications, change in roles, family dysfunction, or financial difficulties, which alter the expected recovery course and outcome (Pearlin, 1982). Physical symptoms such as loss of appetite, weakness, fatigue, pain, fever, infection or other complications, can exceed the ability of the patient and family to manage care. These symptoms influence perception of health and self care ability, and can eventually alter recovery outcome and increase vulnerability

to experiencing symptoms of stress, such as depression (Pearlin, Lieberman, Managhan, & Mullan, 1981).

The diagnosis of heart disease and surgery may bring about a series of chronic stressors and strains (Thoits, 1983). The stress of surgery may exacerbate concurrent problems, bringing about a state of dysfunction. The development, magnitude, and outcome of secondary strains are influenced by the mediators of coping and social support. The more common secondary stressors appear to be physical complications; psychological distress and depression; cognitive disorders; interpersonal problems with caregivers, family, or health care workers; social isolation; or strains related to other roles or responsibilities, such as housework, employment, or financial strain from the expense of surgery and changing work status (Kos-Munson et al., 1988; Mayou, 1986; Mayou & Bryant, 1987; Wilson-Barnett, 1981). Many of these problems are quickly resolved, while other problems become part of the long term outcome.

Mediators of Stress

Interpersonal social relationships and intrapersonal psychological resources act as mediators of stress and enhance recovery (Krantz, Grunberg, & Baum, 1985; Lazarus & Folkman, 1984; Pearlin & Aneshensel, 1986). Better understanding of the mediators may help to explain variation in recovery outcome and identify points in the process where specific interventions are needed. For example, early in recovery the patient may need specific information, support,

and physical help to manage his/her care, but later on may need emotional support and counselling, rather than advice and information (Wilson-Barnett, 1988).

Social support is the network of interpersonal resources and relationships including family, friends, supportive relationships, and affiliations, that provides emotional and instrumental support and assistance that generally has a positive effect on health and enhances recovery (Krantz, Grunberg, & Baum, 1985; Lazarus & Folkman, 1984; Pearlin & Aneshensel, 1986). Social support can have a direct effect and a mediating effect at each phase of the recovery process (Pearlin & Aneshensel, 1986). Stressful experiences can have a negative effect on support resources. Social support will be discussed more fully later in this chapter.

Personal psychological resources, such as positive self-esteem or other self concepts, influence coping and reduce distress (Pearlin & Schooler, 1978). Perceived control and mastery mediate and reduce physical and psychological symptoms of stress and facilitate recovery (Krantz, Grunberg, & Baum, 1985). Patient interpretation of illness, expectations, and psychological coping during recovery are important determinants of the outcome (Krantz & Decker, 1983). The concept of self-efficacy as a personal resource will be discussed in more detail later in this chapter.

Pearlin and Schooler (1978) evaluated coping efficacy related to life-strains, psychological resources, coping responses, and emotional stresses experienced. They found

that coping efforts are effective in lessening the stressful impact on life-strains when the problem is perceived as being within personal coping control. Self-reliance was more effective than seeking help in reducing stress in the more personal roles of marriage and parenting. The authors speculate that effective copers may have the ability to receive help without directly seeking it. Similarly, cardiac patients may identify self reliance as being more effective than receiving support, at certain points along the recovery trajectory. Pearlin and Schooler also found that coping responses were more effective than coping resources in reducing marital and parenting strains, but the reverse was true for strains related to household economics and occupational strains.

The next sections will present the theoretical constructs and related empirical support for the relationship of coping, self-efficacy, and social support to cardiac recovery. At the conclusion of this chapter these factors will be incorporated into a model for recovery within the framework of stress and coping theory.

Coping

There are four modes of coping: (a) direct action, (b) inhibition of action, (c) information searching, and (d) cognitive coping (Lazarus & Folkman, 1984). Coping functions to manage the problem causing distress (problem-focused) and to regulate the emotional response to the problem (emotion-focused). Problem focused and emotion focused coping

mutually influence one another, and are empirically difficult to separate. Problem-focused coping includes cognitive functions and behaviors to problem solve, such as generating alternate solutions, gathering information, or planning. Many of the stressful interpersonal conflicts that arise during illness are difficult to recognize or change without causing additional distress. Emotion-focused coping includes behavior such as seeking social support, distancing, avoidance, acceptance, taking a positive stance, changing the meaning of the problem, or self blame (Lazarus & Folkman, 1984; Pearlin & Schooler, 1978).

Coping depends on personal resources, and personal or environmental restraints on utilizing those resources (Lazarus & Folkman, 1984). Personal resources include health, beliefs, problem-solving skills, or other personal factors. Personal restraints include internal factors such as cultural beliefs that prevent one from utilizing resources. External factors, such as institutions or agencies, may also restrain the utilization of resources (Cohen & Lazarus, 1979).

Different ways of coping may be more effective than others at specific stages of recovery. Levine and associates (1987) found that cardiac patients with high denial scores had shorter intensive care stays and less cardiac dysfunction during hospitalization, but at 1 year they were less compliant, adapted more poorly, and had higher rehospitalization rates than patients with low denial scores.

The scores were not associated with differences in severity of illness or risk factors. Denial may be effective in coping with immediate stress, but may be less effective in long term problem-solving behavior (Lazarus & Folkman, 1984; Levenson, Mishra, Hamer, & Hastillo, 1989). In an exploratory study to determine coping behavior, bypass patients used information seeking most often and found it to be most helpful (King, 1985). Post-operatively, patients used a variety of coping strategies including direct action, turning to others, vigilance, and used less avoidance coping. Positive thinking was unchanged. Although exploratory, the study demonstrates the complex variety of coping strategies utilized by patients in response to differing concerns during early recovery.

Stanton, Jenkins, Savageau, Harken, and Aucoin (1984) conducted a 6 month follow-up of 249 cardiac surgery patients with interviews regarding adequacy of preparation for recovery, patient fears and worries, adjustments encountered during recovery, and measures of anxiety and hypochondriasis. Patients with better physical and emotional health reported fewer fears and adjustments, but they still needed additional information and encouragement in coping with recovery.

Miller and associates (1990) conducted a cross-sectional correlational study of 136 patient-spouse pairs within 1 year of cardiac surgery to examine health behavior for compliance, marital responsibility, marital functioning, state-trait anxiety, and coping. Confrontive coping strategies and

spouse trait anxiety were predictive of marital functioning. State anxiety and patient compliance contributed to spouse marital functioning, and patient marital functioning was predicted by compliance and shared responsibility for compliance.

Christman and associates (1988) used the Jalowiec Coping Scale (JCS) (1988) and found that myocardial infarction patients using greater emotive coping behaviors had higher levels of emotional distress, and that confrontive coping might be associated with greater activity levels while palliative coping might be associated with lower levels of activity 1 month post-infarction. This study suggests that confrontive, problem-oriented coping behaviors might be linked to better outcomes after the initial crisis period. This would be consistent with the idea that emotive or palliative coping behaviors may allow the person time to reappraise the situation or otherwise manage the situation or distress, but eventually certain situations must be confronted. Keckeisen and Nyamathi (1990) also used the JCS and found that patients who used more problem-focused coping than emotion-focused coping had better social and psychologic adjustment one month after myocardial infarction.

Uncertainty contributes to problems in psychosocial adjustment and influences cardiac recovery (Christman et al., 1988; Krantz, 1980; Mischel, 1984; Lazarus & Folkman, 1984; Mullen, 1978). In a longitudinal exploratory study of 70 myocardial infarction patients, uncertainty was associated

with emotional distress as measured with the Profile of Mood States (Christman et al., 1988). Uncertainty explained 21% of the variance in emotional distress prior to discharge, 16% at 1 week after discharge, and 26% at 4 weeks after discharge. Greater uncertainty was associated with greater amounts of emotional distress and greater use of emotive coping behaviors. Provision of information decreases uncertainty, but patients may experience more distress when their experience differs from this information. Uncertainty has a dual nature when it minimizes emotional distress, especially in situations of severe illness or complications, in the support of hope and minimization of threat (Christman et al., 1988; Lazarus & Folkman, 1984; O'Malley & Menke, 1988).

There is empirical support for the relationship of coping behaviors and recovery outcomes. Coping appears to have both a direct and indirect effect on recovery. The timing and type of coping changes as recovery progresses. The interaction effect of coping behaviors and other biopsychosocial variables is not thoroughly understood and may be one of the keys to understanding variance in recovery outcome.

Self-Efficacy

As part of the secondary appraisal process, self-efficacy influences whether one believes one can effectively cope with environmental demands. Self-efficacy theory provides the theoretical framework to examine the patient's

confidence in performing recovery behaviors. Self-efficacy theory, a social cognitive theory, emphasizes both the importance of social origins of thought and action, and the influence of cognitive thought processes on motivation, affect, and action (Bandura, 1977a, 1977b, 1986). The three elements of the model, environmental events, personal factors, and behavior, interact reciprocally in determining behavior (Bandura, 1986). According to the theory, perceived self-efficacy, which is the judgement of one's capabilities to act, affects how one behaves. Self-efficacy theory has been applied and tested in diverse clinical and laboratory situations to explain the relationship between knowledge or acquisition of skills, and performance outcomes (Bandura, 1986). Self-efficacy offers one explanation for individual variation in recovery outcome in patients with the prerequisite knowledge and physical capacity.

In the theory, behavior is a function of both outcome expectations and efficacy expectations (Bandura, 1977a). An outcome expectation is the person's belief that a given behavior will lead to a given outcome, while an efficacy expectation is the belief that one can successfully perform the behavior that produces the outcome (Bandura, 1977a; Bandura, 1977b; Bandura, 1986). A microanalytic approach is necessary to study individual perceptions or beliefs related to specific behaviors in the context of particular situations, unlike study of a personality characteristic or a global trait. Perceived self-efficacy is a judgement of

ability to organize actions and perform at a certain level, and the capability to utilize skills and abilities (Bandura, 1986). Outcome expectations are the consequences of such behaviors or acts, not the act itself. Outcome expectations are generally dependent upon self-efficacy expectations in addition to the perception that the behavior may lead to the desired outcome (Bandura, 1986). That is, outcome expectations are based upon self-perceptions of ability to perform at the required level. Self-efficacy expectations influence which actions are undertaken. Outcome expectations range from personal satisfaction, sense of well-being, or other intrinsic rewards to extrinsic prizes or rewards for performance (Bandura, 1986).

Realistic goal setting is important in development of self-efficacy expectations (Shunk & Carboni, 1984). Mastery of goals increases self-efficacy. Self monitoring of positive progress towards goals enhances the perception of self-efficacy (Bandura, 1982). Self regulation of behavior includes self monitoring, self evaluation, and self reinforcement or reward (Shunk & Carbonari, 1984). In some cases, continuing behaviors, such as adherence to an exercise program, may be improved if expectations of outcome are lowered and self-efficacy expectations are enhanced for persons likely to discontinue the behavior (Desharnais, Bouillon, & Godin, 1986). Properties of the goals, namely specificity, achievable level, and close proximity of the

goal, positively influence self-efficacy (Shunk & Carbonari, 1984).

Dimensions of Efficacy

There are three dimensions of efficacy expectations: magnitude, generality, and strength (Bandura, 1977a). Magnitude refers to the level or ordering of difficulty of the task within a domain, from ability to perform simple behaviors to mastery of the most difficult. Generality refers to the extent expectations remain circumscribed to a specific situation or generalize to other situations or domains. Most studies, such as the present investigation, focus on assessment of variations in strength of efficacy expectations. Weak expectations are easily eliminated by failure, while strong expectations endure an occasional failure.

According to Bandura (1986), self-efficacy expectations influence choice of behavior, effort expenditure and persistance, thought patterns, and emotional reactions. In choosing behavior, people tend to avoid situations or discontinue activities perceived to be beyond their capabilities, and to pursue behaviors or situations where they perceive they are efficacious (Bandura, 1977b). Serious misjudgements of efficacy are deleterious. Avoidance of activities due to falsely perceived inefficacy limits opportunities for growth. Overestimation of efficacy can lead to failure or harm. Slight overestimates of self-

efficacy generally contribute to growth and challenge (Bandura, 1986).

Self-efficacy expectations determine how much effort will be expended and how long people will persist in the presence of difficulties (Bandura, 1977a; Bandura, 1986). Stronger efficacy beliefs result in persistence and greater effort in achieving performance. Weak or inefficacious beliefs lead people to abandon their efforts. A degree of uncertainty regarding self-efficacy expectations can lead an individual to increase efforts to prepare and to achieve; whereas persons with high self-efficacy beliefs may invest less effort in a task considered easy (Bandura, 1986).

Self-efficacy beliefs also influence thought patterns and emotional reactions in coping with environmental demands (Bandura, 1986; Lazarus & Folkman, 1984). Persons who believe they are unable to meet demands and cope, focus on their deficiencies and become distressed (Lazarus & Folkman, 1984). In the secondary appraisal of stress, the person identifies coping options, the likelihood that the coping option will accomplish the outcome and whether one can effectively use the coping strategy selected. Persons with high efficacy perceptions increase efforts to cope with the demands of the situation. Individuals with high efficacy perceptions attribute failure to insufficient effort, and increase efforts to succeed, accomplish, and meet new challenges; whereas persons with lower efficacy beliefs attribute failure to their deficiencies and are more likely

to become distressed, lower their expectations, or abandon their efforts (Bandura, 1986).

The relationship of self-efficacy to action also depends on other factors, such as whether the individual possesses the necessary skills, resources, and opportunity to perform (Bandura, 1986). Changing or ambiguous performance requirements or situational circumstances may alter efficacy beliefs or ability to perform.

Sources of Efficacy Expectations

There are four sources of efficacy expectations: (a) enactive attainment, (b) vicarious experience, (c) verbal persuasion, and (d) physiological state (Bandura, 1986). The person weighs and integrates the information from various sources before forming efficacy judgments.

Enactive attainment. Performance accomplishment is the most influential source of efficacy information (Bandura, 1986). Actual performance mastery and success raise and strengthen efficacy expectations, failure lowers them. An occasional failure in the midst of frequent success may be attributed to situational factors, insufficient effort, or poor strategies (Bandura, 1977a, Bandura, 1986). Ability to overcome a failure may enhance efficacy expectations and belief in ability to master other difficulties. Well established self-efficacy tends to generalize to other similar situations.

Cognitive processing of efficacy information is also influenced by attributions regarding the difficulty of the

task, amount of effort required, amount of external assistance needed, situational circumstances, and the temporal pattern of success and failure (Bandura, 1986). Efficacy and performance function reciprocally. For example, successful participation in physical activities, such as walking or treadmill exercise, raises efficacy expectations regarding ability and promotes future performance of exercise (Taylor, Bandura, Ewart, Miller, & DeBusk, 1985).

Vicarious experience. Seeing or visualizing similar persons successfully perform or model the behavior raises the self-efficacy appraisal of the observer (Bandura, 1986; Rosenthal & Bandura, 1978). Likewise, observation of similar persons experiencing failure lowers efficacy expectations. Efficacy appraisal is based on ones similarity to the characteristics in the model which are assumed to relate to competency. Observation of diversified models overcoming difficulties increases efficacy expectations and enhances ideas of perseverance for eventual success. Modeling techniques to cope with difficult situations enhances predictability and controllability.

Certain conditions, such as uncertainty, increase sensitivity to vicarious information (Bandura, 1986). Models teaching better methods can raise efficacy expectations for persons already competent. Vicarious experience, although not as strong as personal experience, can enhance perceived self-efficacy in persons actually experiencing failure and influence persistence in attempting the behavior. Vicarious

experience of inefficacy can lead persons to behave in ineffectual ways, confirming inability to perform (Bandura, 1986).

Social persuasion. Suggestions, exhortations, instruction, and interpretive treatments from knowledgeable or credible persons influence self-efficacy expectations (Ajzen & Fishbein, 1977; Bandura, 1977a). Persuasive information and coaching during recovery has been shown to enhance efficacy expectations (Gilliss, Gortner, Shinn, & Sparacino, 1989; Gortner et al., 1988; Gortner & Jenkins, 1990). Social persuasion and encouragement can enhance efficacy and increase persistence in persons who already have some belief that they can be successful. Verbal persuasion results in weaker efficacy expectations than those obtained by actual experience and they are more easily weakened by disconfirming experience. If unrealistic competency beliefs are raised and failure in performance results, the persuader is discredited and perceived self-efficacy is diminished (Bandura, 1986). Persons who are persuaded of their inefficacy will be less likely to attempt difficult tasks or to persist when meeting a challenge, thereby not testing assumptions of their inefficacy, leading to failure and validation of their inefficacy expectations.

Physiological cues. Physiological cues and emotional arousal influence personal efficacy beliefs (Bandura, 1986). Autonomic arousal in stressful or difficult situations may generate fear or emotional distress resulting in inability to

perform, thereby lowering efficacy expectations. Interventions aimed at reduction of emotional distress and fear enhance self-efficacy beliefs and improve performance. Moderate arousal facilitates action, but high levels of arousal inhibit action. Emotional arousal is generally less effective than performance accomplishments or vicarious experience in influencing efficacy expectations.

Emotional arousal cues are often ambiguous and difficult to interpret. Cognitive processing of emotion includes meaning, appraisal of the source of the arousal, level of activation, circumstances, and past experience of the effect of arousal on performance (Bandura, 1986). Emotional arousal and mood states affect cognitive processing of experience and efficacy perceptions (Kavanagh & Bower, 1985). Despondent mood states promote dwelling on failures and lower self-efficacy expectations; whereas positive mood fosters recall of accomplishments and raises efficacy expectations. The effect of mood on efficacy is believed to be general and widespread, with strong moods having a greater effect than weaker mood states (Kavanagh & Bower, 1985).

Perceptions of physical ability are also influenced by cognitive processing of physiological cues, such as fatigue, dyspnea, or discomfort (Taylor, Bandura, Ewart, Miller, & DeBusk, 1985). Such cues may be interpreted as signs of inefficacy or as markers of success. Physiological cues facilitate self-monitoring of progress and provide mastery feedback (Bandura, 1982).

Related Theoretical Concepts

Understanding the role of self influencing behavior has been the subject of much debate in social psychology (Covington, 1985; Hales, 1985). Self-efficacy, although similar to other self-referent concepts, differs in perspective, origin, and role as a mediator between knowledge and behavior (Bandura, 1986; Shunk & Carbonari, 1984). In self-efficacy theory, thought, environment and behavior influence one another in triadic reciprocity in contrast to behavioral models or psychological models which assume the environment causes behavior or that behaviors cause cognitions (Bandura, 1986; Bandura, 1989).

Self concept is a more global composite of self perception formed and influenced by environmental and social interactions, experience, reinforcements, and perceptions of causes of behavior (Gecas, 1982; Markus & Wurf, 1987). Self concept lacks consistent predictive power and ability to explain variance in behavior and situations, although a positive self concept might make one more efficacious (Bandura, 1986; Shunk & Carbonari, 1984). Self-esteem is an evaluation of self worth, dependent on how the culture values one's attributes and perceived ability to match perceived standards (Bandura, 1986). Self-efficacy is based on perception of capabilities, separate from personal or cultural sense of worth, although people generally pursue behaviors that contribute to a sense of esteem or worth.

Locus of control is a general measure of belief in the causal relationship of behavior and outcome, wherein outcome is determined by internal or external forces (Lefcourt, 1979; Rotter, 1966). Internal or external locus of control is viewed more as a trait and general characteristic, in contrast to the dynamic, specific perception of personal self-efficacy and belief that one's behavior produces the expected outcome.

Measurement of Self-Efficacy

Measurement of self-efficacy requires a microanalytic approach (Bandura, 1986). Self-efficacy scales generally list behaviors from the least difficult to the most difficult, complex, stressful, or other dimension specific to the domain of interest. The individual rates which behavior he can perform and the degree of confidence he has in his ability to perform the specific behavior. Then the corresponding actions or behaviors are measured. Self-efficacy scores are computed either as an aggregate score of self-efficacy and performance, as a percentage score representing congruence of self-efficacy and behavior specific to the task, or a microanalytic score of probability of behavior as a function of the strength of self-efficacy expectations (Bandura, 1986).

Self-efficacy beliefs are stable in the absence of interventions, but do change according to personal and situational circumstances (Bandura, 1986). Test-retest

reliability would not be applicable in situations where efficacy is expected to fluctuate.

Tests of general self-efficacy scales have demonstrated satisfactory construct validity with personality measures such as locus of control, self-esteem, social desirability, and criterion validity in studies of vocational, educational, and military success (Sherer et al., 1982). For example, the Ryckman group (1982) conducted a factor analysis of a global self-efficacy instrument and identified two subscales for physical ability and presentation confidence. Test-retest and alpha coefficients were satisfactory. Construct validity was established with correlations with locus of control, self-esteem, less inhibition or social anxiety, and performance on three performance tasks consistent with expectations. During a pilot test of a diabetes self-efficacy scale with 48 diabetic adults, Crabtree (1986) found test-retest reliability of .87 after a 10 day interval, internal consistency reliability of .79, and moderate correlation (r=.50, p<.001) of self-efficacy and self-esteem.

Greater specificity in measurement enhances the predictability of the score. The specificity of measuring self-efficacy beliefs for a given behavior in context of a given situation and the dynamic nature of self-efficacy perceptions create difficulty for measurement reliability in traditional psychometric terms (Kaplan, Atkins, & Reinsch, 1984).

Self-Efficacy Research

Empirical data from diverse health and nonhealth programs of research provide convergent evidence to support the mediating effect of self-efficacy on various types of behavior (Bandura, 1986). Self-efficacy is generally the strongest predictor of successful behavior in smoking cessation (Condiotte & Lichtenstein, 1981; DiClemente, 1981; Nicki, Remington, & MacDonald, 1985; Strecher, Devellis, Becker, & Rosenstock, 1986), weight control (Chambliss & Murray, 1979), contraceptive behavior (Gilchrist & Schinke, 1983), and alcohol abstinence (Rist & Watzi, 1983).

The findings from diverse studies on pain management support the role of self-efficacy as a common mechanism underlying successful management of pain (O'Leary, 1985). Rheumatoid arthritis patients receiving a cognitive-behavioral treatment for enhancement of self-efficacy had proportionately higher self-efficacy and better outcomes in terms of pain reduction, joint inflammation, and psychosocial functioning than control patients (O'Leary, Shoor, Lorig, & Holman, 1988). Persons with higher self-efficacy were better able to control pain in these and other pain studies (Bandura, 1986; Bandura, Cioffi, Taylor, & Brouillard, 1988).

Self-efficacy was a predictor of self-care behavior in Crabtree's (1986) prospective study with 143 diabetic adults testing 4 theoretical self-care models derived from Bandura's self-efficacy theory. Self-efficacy beliefs predicted self-care behavior for diet, exercise, and general diabetes self-

care better than demographic variables, disease-related variables, perceived social support, and the interaction between social support and self-efficacy.

In an experimental study with 60 persons with chronic obstructive pulmonary disease, Kaplan, Atkins, & Reinsch (1984) investigated the mediation of exercise behavior change using generalized locus of control and specific self-efficacy measures. After 3 months, groups given specific training for walking significantly increased exercise behavior when compared to an attention only control group. Perceived self-efficacy for walking mediated walking behavior and changes in activities similar to walking. Efficacy expectations for the nontarget behaviors of tolerance of anger or tension did not change. The generalized health locus of control measure was less clearly associated with behavior change than self-efficacy. Self-efficacy perceptions regarding physical activity tended to be correlated with internal locus of control but not external locus of control.

Cardiac Related Self-Efficacy Research

Gortner and associates (1988) conducted a 6 month follow-up randomized clinical trial with 67 patient/spouse pairs to test a nursing intervention to enhance self-efficacy after heart surgery. They assessed self-efficacy related to activity, work, diet, and tolerance of emotional stress and anger using self-efficacy measures from the Stanford Return to Work Trial (Ewart, Taylor, Reese, & DeBusk, 1983). At 3 months there were statistically significant differences for

experimental subjects in self-efficacy for lifting and tolerance of emotional distress (Gortner, 1988). There was also a trend towards increased activity and return to work at 3 months for experimental subjects. At 6 months there were no differences. Exploratory analyses of the subscales of the Profile of Mood States and self-efficacy scales found "vigor mood state" positively correlated with self-efficacy and a negative correlation of "tension/anxiety mood state" with work interactions (Gortner, Jenkins, Miller, & Taylor, 1986).

A follow-up clinical trial (Gilliss, Gortner, Shinn, & Sparacino, 1989) testing a psychoeducatonal intervention with 149 patient/spouse pairs found significant differences in experimental patients' self-efficacy for walking through 12 weeks, as well as higher levels of self-reported walking, lifting, climbing, and general activity between 4 and 8 weeks (Gortner & Jenkins, 1990). Self-efficacy was assessed more frequently with measurement before surgery, before discharge, and at 1, 2, 3, and 6 months. Perceived efficacy increased for walking, climbing, lifting, and general exertion for both groups early in the recovery period. Vigor and fatigue on the POMS were correlated with self-efficacy expectations at each reporting period although the direction of the influence was unclear. New York Heart Association functional status, treatment status, and general self-efficacy at 8 weeks all predicted activity at 12 weeks. The findings highlight the dynamic changes in efficacy during early recovery. It is unknown if the content or the presence of coaching

contributed to the success of the intervention (Gortner & Jenkins, 1990).

In a nonintervention study to describe the manifestation of efficacy expectations during recovery, Jenkins (1985) studied 40 hospitalized myocardial infarction patients twice prior to discharge and at 1 and 4 weeks after discharge. The strength of self-efficacy expectations increased significantly over time for the 2 psychomotor behaviors of walking and lifting, and the 3 nonpsychomotor behaviors of resting after meals, following a dietary restriction, and tolerating a disagreement with the significant other (Jenkins, 1987). The repeated measures of self-efficacy may have influenced reporting of efficacy, although an increase in efficacy would be expected during recovery.

The effects of treadmill exercise testing on self-efficacy and physical activity were evaluated in 40 men 3 weeks after uncomplicated myocardial infarction (Ewart, Taylor, Reese, & DeBusk, 1983). Self-efficacy perceptions for the psychomotor behaviors of walking, running, climbing stairs, sexual intercourse, and lifting were measured prior to the exercise test, immediately after the test, and again after the results of the test were explained to the patient by a physician and nurse. Self-efficacy for activities similar to treadmill exercise (walking, stair climbing, and running) increased after the test. Self-efficacy for the dissimilar activities of sexual intercourse and lifting were greatest after the treadmill test results were explained to

the subjects. Perceived self-efficacy was a better predictor of an active life and physical activity at home than treadmill assessment of cardiac capacity. Persons experiencing angina during testing tended to have low self-efficacy scores after testing. In this instance, physiological cues appeared to be a major source of efficacy information.

Treadmill exercise testing was also utilized as an intervention to enhance wives' confidence in their husbands' cardiac capability 3 weeks after acute myocardial infarction (Taylor, Bandura, Ewart, Miller, & DeBusk, 1985). Wives' perceptions of the husbands' cardiac and physical capability were significantly higher for the 10 wives who both observed and actually participated in the treadmill test, than for the 10 wives who did not observe the test or the 10 wives who only observed the test. Only wives who participated in the treadmill test had efficacy ratings reaching the level of the husband's self-efficacy ratings. Efficacy ratings were significantly correlated with treadmill performance at 11 and 26 weeks. Participation in the treadmill testing was seen as an effective method to reassure wives about the safety of resumption of physical exercise after myocardial infarction. High congruence of husband's and wife's perceptions of efficacy resulted in increased levels of resumption of activity.

Summary

Correlational and experimental studies with diverse populations support the application of self-efficacy theory in treatment and behavior change. Although the investigators developed different instruments to measure specific perceptions of efficacy, the degree of convergence of results is striking. Cardiac research has shown that self-efficacy increases during recovery and that interventions to increase self-efficacy and activity during recovery can be effective. There is a limited amount of cardiac research on the relationship of self-efficacy and other variables such as mood states, functional status, coping, physiological symptoms, outcome expectations, or specific social support, during periods of change in health status. The relationship of self-efficacy to these other factors may account for individual variation in recovery outcome.

Social Support

The third variable included in this study of recovery was social support. An individual's social environment can provide support or be a source of stress, influencing susceptibility to illness and recovery of health (Bramwell, 1988; Davidson, 1987; Fries & Taff, 1986). This section will discuss social support theory, measurement and the relationship of social support to health, illness, and recovery.

Numerous definitions of social support emerged from early research on the impact of social support on health

during the 1970s. The research developments of the 1960s provided the theoretical underpinnings for conceptualization of social support as a moderator of stress (Gottlieb, 1983). It was noted that individuals primarily seek help and emotional support from family, close friends, and trusted individuals within religious or health institutions in the community.

In reviews of stress research, two epidemiologists, John Cassel (1973, 1976) and Sydney Cobb (1976), proposed that social support acted as a buffer or moderator for persons experiencing stress, hence preventing or lessening the negative consequences of stress on health. Lack of supportive feedback from the social environment because of social disorganization, rapid social change, and population density, was believed to cause a state of emotional and physiological arousal, which in turn increased susceptibility to illness (Cassel, 1973). Caplan (1974) classified types of support as emotional support and task-oriented assistance occurring in natural primary relationships. This support helps the individual mobilize psychological resources, master emotional burdens, share tasks, and it provides supplies and cognitive guidance.

Cobb (1976) defined support as information that one is cared for, loved, and esteemed, as part of a network of mutual obligation. He proposed that social support protects people in crisis by enhancing coping during transitional crises. Social support functions as an important component

of the therapeutic process and recovery through both direct and indirect effects.

Weiss (1974) recognized the multidimensionality and specificity of social support. He identified six categories of provisions associated with social relationships, specific to particular types of relationships, and unable to be substituted with one another: attachment, social integration, opportunity for nurturance, reassurance of worth, sense of reliable alliance, and guidance in stressful situations.

James House (1981) identified four components of supportive behaviors or acts: (a) emotional support in terms of esteem, affect, trust, concern, listening; (b) appraisal support with affirmation, feedback, and social comparison; (c) informational support with advice, suggestion, directives, and information; and (d) instrumental support as aid in kind, money, labor, time, and modification of the environment. He proposed that social support affects stress and health through both main effects on stress and health, and buffering effects on the relationship between stress and health. It is this conceptualization of social support that was used in this recovery study.

Refinement in Conceptualization of Support

The emphasis of social support research in the last decade has been to refine the specificity of support and to understand how different types of support work in specific situations. First, the functional aspect of social support was differentiated from social networks, the structural

aspect of support (Cohen & Syme, 1985). Functional social support is given and received in interpersonal relationships that are generally close and occur regularly. The structure or social network is comprised of persons known by the individual at work, home, and in the community, including close friends and family, and more casual acquaintances. Functional social support has a greater impact on health than merely the presence of a network, although the network is necessary in order for support to exist.

Individual perceptions of support relate to health more than either empirical indicators of network size or provision of support as measured by other person's perceptions of one's support (Broadhead et al., 1983; Cohen, 1988; O'Reilly, 1988; Sarason, Shearin, Pierce, & Sarason, 1987). Sarason and associates (1987) examined different orientations and definitions of the support construct using questionnaires and interviews. Perceived support, measured as belief that one is accepted, loved, and involved in a relationship, was not strongly related to either network size or received support, regardless of definition or measurement method.

Barrera (1986) identified three categories of support: (a) social embeddedness, such as social ties, participation in organizations, or relationships with family, friends, or social network; (b) perceived social support identified as the cognitive appraisal of connectedness to others, and the availability and adequacy of support; and (c) enacted support or actions performed by others to assist the individual.

Embeddedness focuses on the amount of contact and does not explicate the mechanisms through which social support operates during stress. Perceived support fits well with appraisal models of stress and coping.

Barrera (1986) noted that researchers confound measures of perceived stress and distress, and that longitudinal studies provide evidence that perceived support has a negative relationship to distress and that stress decreases support resulting in increased stress. Stress and social support have an inverse reciprocal relationship. Enacted support is most often cited in retrospective studies of acute stress. Stress situations mobilize support and perceived/received support overlaps with measures of enacted support. It is difficult to control the bias and confounding of the closely related concepts (Barrera, 1986).

Support does not have an exclusively positive effect on health and well being (Antonucci, 1985; Antonucci & Jackson, 1987; Bruhn & Philips, 1984; Rook, 1984). A supportive act may be perceived as helpful but overprotective or result in a negative feeling of indebtedness. Although the direction of causality is unclear, continued need for unreciprocated support may diminish the availability of support or decrease the network size (Antonucci & Jackson, 1987). Chronic health conditions may decrease the availability of support, create caregiver burden, or strain relationships in the attempt to balance perceived benefits over the costs and constraints of support (Coyne & DeLongis, 1986). It is more difficult to

elicit support in a poor quality relationship (Thoits, 1982). Past transactions influence the appraisal of support availability. Consideration of the history and the circumstances of the particular situation creates the context for the success of the specific support transaction (Coyne, 1982).

Life Span Variations in Support

Kahn and Antonucci (1980) examined social support from a life span developmental framework and identified substantive, spatial, and temporal dimensions of support. They defined social support as interpersonal transactions that express a positive affect, respect or love; affirm or acknowledge another person's behavior or perceptions; or give symbolic or material aid to another person.

Kahn and Antonucci (1984) used the metaphor of a convoy accompanying one through the life cycle to explain the set of people or the network of family, friends, and others one relates to by the giving or receiving of social support. The convoy changes during the transitions of the life-course, influenced by personal and situational properties. The convoy was illustrated as a set of three concentric circles around the person. The inner circle is comprised of close family and friends that stay relatively stable over time. In the middle circle are other friends and relatives that are more likely to be role-related and change over time. The outermost circle is composed of neighbors, co-workers, supervisors, distant family, and professionals, such as

health professionals, that are members of the convoy through their specific role relationship, and are likely to change as the role or life situation of the person changes.

Social support is present in everyday situations with an increased need for support during crisis situations (Bruhn & Philips,1984). The ability to utilize and to offer reciprocity of support varies, and persons may learn to cope in the presence of differing levels of support.

Family may be perceived as an expected reciprocal source of support throughout the lifespan. Friends may be perceived as having a choice in continuing a supportive relationship in a particular situation when the cultural norm of reciprocity would be impaired (Antonucci & Jackson, 1987). Support may not be conceptualized as support, but an expectation of the role or relationship (Thoits, 1985). Women are believed to benefit more from relationships with family and friends, often of the same sex, and men benefit from relationships with women (House, Landis, & Umberson, 1988). Role expectations may account for some of these differences. The individual must be able to mobilize and utilize the available support as circumstances change.

Timing

Support needs change over time as circumstances change (Pearlin, 1985). Continuous appraisal and reappraisal of individual demands produce variation in the types of coping and support needed to achieve balance (Lazarus & Folkman, 1984). Different supports and ways of coping are needed in

anticipation of a potentially stressful event, during the event, and after the event. During transitions the individual learns new meanings and ways of thinking about the world. There are differences in how long the transition phase lasts, but patterns emerge across individuals and settings.

The correct type of support must be offered at the right time; out of phase support is ineffective (Jacobson, 1986). For example educational support may be given at the time emotional support is needed and the person will not receive the information. In reality, during most life transitions and stresses, numerous stressful situations often overlap creating a precarious balance of demands and resources. Additional change or inappropriate timing may precipitate a crisis. Emotional support addresses a fundamental human need for attachment and is always needed, especially during periods of stress (House, 1981; Pearlin, 1985; Weiss, 1976). Emotional support is believed to have a main effect in the absence of a stressor, and a buffering effect on stress through reduction of distress or assistance with the transition resulting from crisis (Jacobson, 1986).

Mechanisms

Cohen and McKay (1984) refined the buffering hypothesis and proposed a model of stressor-buffer specificity whereby stress experiences are categorized in terms of coping requirements for specific forms of support (tangible, appraisal, self-esteem, or belonging). Only those

interpersonal relationships providing the appropriate forms of support will be effective. Support may attenuate the appraisal of stress, prevent a stress response to a stressful event, or it may reduce or eliminate the onset of a pathological outcome after the experience of stress.

More recently, Cohen (1988) postulated possible mechanisms through which social support influences health using 3 categories of models. In the generic model, support influences behavior that alters risk for disease, influences biological response that influences disease, or influences both behavior and biological response that influence disease. The stress centered models can be either the stress-buffering model in which support protects the person from the negative effects of stressful events, or the main effect model, in which social support has direct beneficial effects, not an interaction effect on the stress. The psychosocial process models specify the biopsychological processes implied in the generic models. Cohen (1988) hypothesized that social integration is the primary cause of main effects, and that perceived availability of support is the primary cause of stress-buffering effects. He proposed that information, identity and self esteem, social influence and tangible resources are the pathways for main effects and the stress-buffering effects of social support on health.

Coping assistance. Social support can be reconceptualized as coping assistance in buffering stress (Thoits, 1986). In addition to efficacious types of support,

empathic understanding between the provider and recipient of support is crucial. Significant others provide support and assistance to help the individual manage stress and cope (Lazarus & Folkman, 1984; Pearlin & Aneshensel, 1986; Pearlin & Schooler, 1978; Thoits, 1986). Problem focused coping is enhanced with instrumental support to change or manage the situation. Emotion focused coping and emotional support help the individual ameliorate negative emotions or feelings. Perception focused coping and informational support help the individual alter the meaning of the situation to lessen the perception of stress.

Based upon the stress theories of Lazarus and Pearlin, Thoits (1986) further states that social support enhances a sense of mastery and control. The person alters behaviors or cognitions to change the situation or emotional response to the stress. Behaviors to change a situation might include avoidance or preparation for the situation; whereas cognitions may alter the interpretation of the threat. For example, comparison with others less fortunate or devaluation of the importance of the problem may help the person cope with uncontrollable situations, those he lacks the ability or resources to change. Emotion focused coping behaviors include controlling physiological sensations with drugs, exercise, distracting behaviors, and changing gestures and expressions of the emotion. Emotion focused cognitions include reintrepretation of feeling, desensitization, or renaming feelings, such as stating one is tired instead of

being depressed. The essence of social support is that others offer alternatives and assist the individual with coping efforts to manage distress. Supportive others offer information, coaching, tangible assistance to decrease demand, empathy or other help to alter the situation and/or emotional response to the stress. The challenge is to offer the correct type, amount, and timing of support to preserve the sense of mastery and efficacy in the individual receiving assistance. Support parallels individual coping efforts.

Efficacy enhancement. Antonucci and Jackson (1987) propose interpersonal self-efficacy enhancement as the mechanism through which social support influences health. The beliefs of supportive others increase the individual's self-efficacy beliefs regarding ability to perform a behavior. Effective supportive behavior of others increases perceived ability to enact the desired behavior. The supportive other forms beliefs and is motivated to communicate these beliefs based on prior social interactions with the individual. The target persons perception of support increases self-efficacy beliefs and behaviors, setting up a reciprocal interaction between supportive behavior and self-efficacy beliefs. The perception and adequacy of support theoretically becomes more predictive than the structural and functional aspects of support. In this model both the recipient's and provider's perception of support are considered. Supportive relationships enhance

perception of control, self esteem, mastery and sense of personal competence.

Measurement Issues

Measurement of social support ranges from quantitative descriptors of network persons to more specific measurement of types of support perceived and received based upon multiple definitions and conceptualizations of support. O'Reilly (1988) raised several important issues in his critique of 33 instruments used to measure social support in health related research. There is conceptual ambiguity and confusion between the behavioral and structural components of support within studies and instruments. Instrument validity and reliability are frequently not reported or items are extracted from instruments without attempts to revalidate the subset. Reported divergent, convergent, or predictive validity is often modest or weak. Confounding of social support measures and other study variables compromises interpretation and generalization of results.

Bruhn and Phillips (1984) likewise noted considerable differences in the aspects of support measured in an analysis of 14 support instruments. They noted that attempts to quantify preceded adequate definition of the construct. They proposed a paradigm for future studies which includes consideration of the dynamic and interactive aspects of support present in everyday life and during stress, recognition of multiple factors clustering around the concept of support, examination of the positive and negative aspects

of support, and evaluation of the importance of specificity or cultural variation to the specific study.

Social Support and Cardiac Illness

Epidemiological studies reported an association between social support and morbidity or mortality from cardiac disease. Berkman and Syme (1979) conducted a 9 year follow-up of 6,928 residents in Alameda County, California. Men and women of all ages who lacked social and community ties had 2 to 3 times higher mortality from ischemic heart disease and all causes than persons with more extensive social contacts as measured with a Social Network Index. After statistically controlling for the effects of positive health practices and pre-existing illnesses, the association of mortality with decreased social ties was still found. Similar epidemiological findings were reported in Tecumseh, Michigan (House, Robbins, & Metzner, 1982), in a 10 year prospective study with 2754 adults. Mortality rates from all causes were lower for men who were married or involved in group activities or women involved in church activities. Persons with coronary heart disease and fewer social relationships had a slightly higher tendency for mortality.

In Durham County, North Carolina, 30 month mortality in a prospective study of 331 elders was more highly associated with decreased perceived available support than with frequency of interactions with friends and family, or available roles and attainments in marital or family relationships (Blazer, 1982). A Swedish study reported that

cardiovascular mortality rates were increased after 9 years in persons with few or infrequent social contacts, when age, baseline health status, and sociodemographic factors were controlled (Welin et al., 1985).

Several large multifactorial longitudinal cardiovascular disease studies have reported an association of stress, social support, and heart disease. The specific components of social support were not the primary variables in these studies, but low support and high stress are associated with increased incidence of cardiac disease and symptoms.

In the classic Framingham study, 142 female clerks with nonsupportive supervisors were noted to have higher incidence rates for cardiovascular disease over a period of 8 years independent of other risk factors and psychosocial factors (Haynes & Feinleib, 1980). This relationship was not found for other employed men or women. One possible explanation given was that the perceived lack of control over the job situation contributed to stress for these clerks. Higher rates of cardiovascular disease have also been found in a Swedish study of persons who perceive high work stress and low ability to control the working environment (Karasek, Baker, Marxer, Ahlbom, & Theorell, 1981). An association between a lower incidence of angina and higher spousal love and support was found in a 5 year prospective study of 10,000 Israeli men who experienced high levels of life stress (Goldbourt, Medalie, & Neufeld, 1975).

Using a retrospective self-assessment of support prior to development of chest pain, Seeman and Syme (1987) found that network instrumental support and feelings of being loved were negatively associated with coronary atherosclerosis in a study of 159 men and women referred for coronary angiography. After controlling for other risk factors, the authors concluded that low levels of functional social support were more predictive of coronary artery disease in comparison to high levels of support, regardless of network size.

Although other studies have shown a similar association between higher morbidity and lower social connections, the Honolulu Heart Study (Reed, McGee, Yano, & Feinleib, 1983) begun in 1965 and sampled in 1971 and 1978, found no significant association between marital status, number of children, and frequency of close family contact and the incidence of cardiovascular disease in 7,639 Japanese men in Hawaii. However, there was a positive association when prevalence of heart disease was examined. The social affiliation scales included social activities which would be limited by health status. Therefore, prevalence, but not incidence, was affected (Berkman, 1984).

Social support has also been associated with the outcome of cardiac events. In the Beta-Blocker Heart Attack Trial (Ruberman, Weinblatt, Goldberg, & Chaudhary, 1984) postmyocardial infarction men with both high life stress and social isolation had mortality rates 4 times higher than men with low stress and high social integration. The link of

social support to mortality was an adjunct finding in this study. There were no pre-illness data on psychosocial variables specific to support precluding causal association for disease.

A 10 year follow-up study of 150 Swedish men either with or without heart disease, reported higher mortality from heart disease for men with either ventricular arrhythmias or social isolation, above all other risk factors (Raymond, 1988). Pending further investigation, possible explanations for the association of social isolation and cardiac mortality were differences in health habits, hormone or behavior differences, neuroendocrine response differences, or decreased use of medical services by persons more isolated.

Social support and the controversial risk factor of type A behavior may be related in that these behavior patterns are less conducive to the development of supportive relationships, and persons with type A hurried behavior may be less likely to take the time and energy to develop supportive relationships (Syme, 1987). In an 8 1/2 year prospective study, men with type A behavior pattern were found to be twice as likely to develop heart disease as men without such behavior (Rosenman, Brand, & Jenkins, 1975).

In a study of 113 patients undergoing angiography for suspected coronary artery disease Blumenthal and associates (1987) found an inverse relationship between perceived social support and coronary artery disease in individuals with type A behavior. This relationship did not occur with type B

individuals, although type A and B individuals did not differ in level of perceived social support. Social support may moderate the effects of type A behavior in the development of coronary disease, demonstrating an interaction effect rather than a main effect of support. The authors speculate that support may buffer the neuroendocrine and cardiovascular effects of stress response in type A individuals. One unexpected finding was that type B individuals with high perceived family support had higher levels of coronary disease. The cross-sectional design limits clarification as to whether the presence of disease increased support, if higher family support influenced development of disease in type B individuals, if there was a difference between type A and B individuals with heart disease in ability to perceive family social support, or other explanation (Blumenthal et al., 1987; Cohen & Matthews, 1987).

In a multifactorial 3 year German study of adaptation and recovery from a myocardial infarction, persons with type A behavior were found to be more likely to have chronically stressful social environments, marital strains, and emotional distress (Waltz, Badura, Pfaff, & Schott, 1988). Other type A behavior studies report conflicting findings and current research has focused on specific components of type A behavior, such as hostility, anger, and control, rather than global type A behavior (Benner & Wrubel, 1988; Williams et al., 1980). The interaction effect of social support and type A behavior patterns on the development of ischemic heart

disease or cardiac recovery has not been examined in prospective studies. This relationship may be similar to the idea of a rival hypothesis of social competence explaining adjustment and social support as suggested by Heller (1979).

House, Landis, and Umberson (1988) reviewed recent theoretical and empirical evidence for the causal relationship of social support and health and concluded that there is not clear evidence for the causal linkages between social support and mortality or morbidity. It is unknown whether the lack of relationships causes poor health, or if unhealthy people tend to have fewer social relationships. A third alternative is that another factor could account for both poor health and the diminished social relationships, such as the example of type A behavior cited above. Poor health could alter perception of social relationships or drive supportive persons away, especially over the long term (Wortman & Conway, 1985).

Management of Illness and Recovery

Social support has also been associated with psychological adjustment to illness and physical recovery (DiMatteo & Hays, 1981; Kulik & Mahler, 1989; Wallston et al., 1983). In a sample of 72 male coronary-bypass patients married men with more frequent hospital visits by the spouse took less pain medication and recovered more quickly, but the perceived quality of the relationship was not significantly related to length of hospitalization, anxiety, or use of pain medications (Kulik & Mahler, 1989). Possible explanations

for less pain medication and shorter hospitalization are more effective coping, encouragement, more opportunity to attain support, or that patients with a visiting spouse were perceived to have an available caregiver, therefore discharged sooner.

Alteration in family functioning and social relationships have been reported following surgery, particularly affecting the spouse (Gilliss, 1984; O'Connor, 1983; Rankin, 1988; Sirles & Selleck, 1989; Stanley & Frantz, 1988). Surgery can lead to family disorganization, fear, depression, anxiety, as well as alteration in roles, economic status, and care-giving demands. In a descriptive study of spouses of bypass patients 4 to 10 weeks after surgery, Stanley and Frantz (1988) found that 19 of the 26 spouses reported increased vigilance, change in economics, anxiety, fear, or depression, and 40% of the spouses were less than satisfied with their social activity.

However, Langeluddecke and associates (1989) found that 84% of the 89 patients in their prospective study of bypass patients reported significant improvement in their marital relationships. In patients with psychosocial impairment, spouses social and psychological morbidity was positively correlated with the patient's postoperative psychological morbidity.

Husband and wife perceptions of support differ. Hilbert (1985) found no significant correlation of support behavior as rated by 60 spouses, on myocardial infarction patients'

reports of compliance and that patient compliance with activity was negatively correlated with spouse support as rated by the spouse. In a pretest of the instrument to measure support for myocardial patients, husband and wife perceptions of wife's supportive behavior correlated only at .54.

Social support may play a unique role in recovery from cardiac illness. For example, of the 34 studies found a 30 year review of studies of social support and serious illness, 8 were studies of cardiac illness (DiMatteo & Hays, 1981). In general social support was associated with better recovery and coping with illness, improvement in rehabilitation, longevity, compliance, and control of illness. Only 3 of the 34 studies reviewed reported a negative impact of support on outcome, and these 3 were studies of family support and vocational adjustment, social disability, and return to work. Numerous factors used to explain the negative results, such as disruption of family function, decreased self esteem, devaluation of rehabilitation programs, stigma or burden, could apply to the other illnesses studied, such as cancer, stroke, hypertension, renal dialysis, or mastectomy. Families and spouses of cardiac patients were perceived to be overprotective or overly concerned (Garrity, 1973). Possibly cardiac illness has other meanings for these families or patients which influence social adjustment and recovery. Wishnie, Hackett, and Cassem (1971) noted that hypervigilant

behavior exhibited by wives had a negative impact on the husband's recovery and adjustment to myocardial infarction.

Fontana, Kerns, Rosenberg, and Colonese (1989) followed 73 medical and surgical patients from hospitalization to 3, 6, and 12 months to develop a longitudinal causal model of the relationship of social support, stress, distress, and cardiac symptoms. Support was measured as the patient's perception of acceptance and positive evaluation, and rating of support on a loneliness scale which conceptualized support as the opposite of loneliness. Social support had a stronger influence during the first 6 months of recovery, and stress increased at 12 months. Perceived threat increased distress, dyspnea, and angina. Intimacy was believed to decrease these symptoms and their effects.

Derenowski (1988) reported that social support correlated positively with wellness motivation at all phases of recovery, although highest in the hospital, with a total of 106 myocardial infarction patients selected from hospital, outpatient, or longterm recovery settings.

Lack of an adequate social network may foster an early return to independence, but not provide the emotional assistance needed during recovery. Individual or group support by lay volunteers who themselves have successfully recovered from heart surgery has been reported as a beneficial form of emotional or informational support that might be helpful to persons without an adequate support system (Meagher, Gregor, & Stewart, 1987).

Intervention Studies

Wallston, Alagna, DeVellis and DeVellis (1983) found evidence for the relationship of support and adherence with recommended health regimen in their analysis of reports of experimental and correlational studies of social support and adherence, although there are some contradictory results. The intervention studies, more positive in general, were consistently positive for professional interventions combining information, assistance, and emotional support.

Naturally occurring support from families and friends was found to have a generally positive effect on adaptation and recovery from a variety of conditions, including myocardial infarction (Finlayson, 1976). Family perception of recovery has been shown to influence perception of health (O'Conner, 1983). The results of intervention studies involving the family in medical and surgical cardiac recovery have been positive, due to reduction of negative family behavior and promotion of recovery enhancing reinforcement from the family (Burgess et al., 1987; Stanley & Frantz, 1988). Chatham (1979) conducted a study with 20 patients receiving an intervention of family involvement immediately after surgery, and found a reduction in the rate of postcardiotomy psychosis. Burgess and associates (1987) conducted an experimental study with 180 patients and families to test a home visit intervention with followup between 3 and 13 months after myocardial infarction. Experimental patients had a more rapid return to work,

shorter recovery, and reported less distress, social network strain, and reliance on the family than control subjects. The researcher did not differentiate professional support from family support.

Gilliss and associates (1989) found no significant differences between experimental and control couples in perceived or network social support measured at 1 and 3 months, in a controlled study to test a recovery intervention with 149 couples after cardiac surgery. The patients receiving the nursing intervention of education and support had higher caregiver reports of improved family functioning during recovery and improved patient report of activity. Using the same short scale for support in 117 couples, Rankin (1988) found support for male caregivers was perceived as high preoperatively and decreased at 3 months, while female caregivers initially reported low support which increased over time. The short scale assessed who was perceived as helpful and how helpful during recovery, but not the type of support that was most helpful along the recovery trajectory.

Emotional support, information, or psychological interventions are generally believed to enhance recovery. A meta-analysis of 34 experimental studies to evaluate the effects of psychological intervention on recovery from general surgical procedures and cardiac events, demonstrated that patients who are given information or emotional support, have fewer physical complications, shorter hospital stay, and decreased emotional distress during recovery (Mumford,

Schlesinger, & Glass, 1982). Psychological interventions included preoperative teaching groups or films, relaxation training, psychiatric visits, reassurance, and general supportive actions. The effect sizes for all 210 outcome indicators averaged +.49. This finding of superior outcome for the experimental group was consistent across studies, with only 31 of the 210 outcomes in the negative direction. Of note, one of the 5 cardiac studies accounted for 8 of the 31 negative findings subsequent to psychiatric intervention (Surman, Hackett, & Silverberg, 1974). The intervention may have actually increased awareness and reporting of physical and emotional discomfort in these patients.

Summary

The recovery experience places demands on the social environment, and the social environment influences individual recovery. There is evidence that social support generally has a positive effect on health and adjustment, and some influence on recovery (Davidson, 1987). Supportive interpersonal relationships have a positive effect on compliance with risk factor modification and rehabilitation programs (Fries & Taff, 1986; Gianetti, Reynolds, & Rehn, 1985; Wallston, Alagna, DeVellis, & DeVellis, 1983). Perception of spousal and family support enhances maintenance of rehabilitation behaviors (Bramwell, 1988; O'Reilly & Thomas, 1989). Informational support to patients and families improves patient outcome (Mumford, Schlesinger, & Glass, 1982).

The exact mechanism for support has not been identified. Social support may decrease the negative effects of stress and improve physiological recovery, influence positive recovery behaviors, influence compliance, or most likely, social support has a multifactorial reciprocal dynamic effect during the recovery process. The effect of specific types of support along the recovery trajectory has not been studied. Studies of support often lack specific valid and reliable measures of support, and generally have cross-sectional or retrospective designs, limiting information on causality and the direction of relationships (Barrera, 1986; Broadhead et al., 1983; Norbeck, 1981). Improved understanding of social support and cardiac recovery will form a basis for interventions to provide appropriate support to patients.

Cardiac Recovery Model

Figure 2.1 presents a recovery model drawn from stress and coping theory (Bandura, 1986; Lazarus & Folkman, 1978; Pearlin & Aneshensel, 1986; Pearlin & Schooler, 1978) and the research with recovering cardiac patients (Gortner & Jenkins, 1990; Gortner, Miller & Jenkins, 1988; Rankin, 1988). The model shows the hypothesized predictors, mediators, and outcomes in this study of recovery from cardiac surgery.

The antecedents are the causal factors identified in the literature as having a direct effect on recovery outcome. Coping and social support are factors that have a mediating effect on the stresses created by the surgery and recovery experience and a direct effect on the recovery outcome.

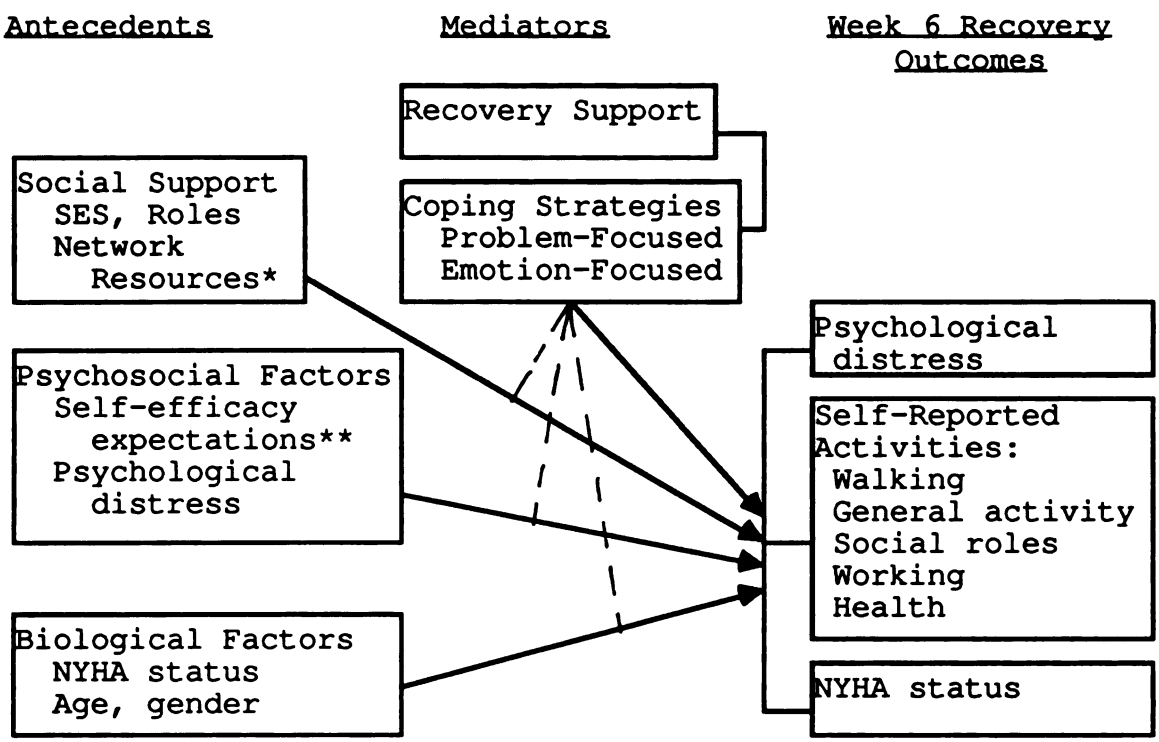

Figure 2.1. Cardiac Surgery Recovery Model (Operationalized from Surgery to 6 Weeks).

* = Not tested
** = Measured at 2 weeks postoperatively
Dotted line = modifying effect
Solid line = direct effect

Recovery outcome is conceptualized as interrelated social, psychological, and physiological functioning. In this study the recovery outcomes were walking, resumption of general activity and social roles, return to work, activity to maintain health, psychological symptom distress, and New York Heart Association symptom status. The relationships among the outcomes and the variables of coping, self-efficacy, and

social support were examined preoperatively, and at 2 and 6 weeks postoperatively.

The model is displayed in a linear time format, but there a dynamic reciprocity exists among the variables along the recovery trajectory. For example, weakness and fatigue may decrease mobility, lead to depression, and potentiate perception of fatigue and mobility restriction. Immobility and depression can influence social relationships, work, education, and social functioning leading to physical decline, psychological depression, or social isolation (Roberts, 1989). Therefore, a model must reflect the dynamic reciprocal relationships inherent in the recovery process.

The transactional view of stress and coping presented by Lazarus is consistent with nursing's interactive view of man and enables one to study individual coping with illness and the biopsychosocial outcomes of illness (Lyon & Werner, 1987). Pearlin's broader perspective enables the researcher to relate constructs and to maintain a sense of the broader context of life necessary to understand illness of a multifaceted nature. Self-efficacy is a specific measure of intrapersonal resources and social support represents interpersonal resources that enable one to cope with the demands and stresses of recovery. Within the model there are areas of overlap due to the reciprocal and dynamic nature of the relationships. This model is conducive to testing and continued theory building utilizing qualitative and

quantitative methodologies to achieve the goal of understanding and improving individual recovery.

Summary

The theoretical constructs and related empirical support for the relationship of coping, self-efficacy, and social support to cardiac recovery were presented in this chapter. A conceptual model from adapted from stress and coping theory was presented as a franework for research on cardiac recovery. The next chapter presents the methodology that was used in this study.

CHAPTER THREE

METHODOLOGY

This chapter first describes the design, setting, and sample selection criteria. Then the instrumentation for data collection will be described followed by a review of the data collection procedures. The chapter will conclude with the plan for the analysis of the data.

Research Design

A prospective, cohort design was proposed to study recovery for the individual patient. Data points for interviews and administration of instruments are listed on the Data Collection Plan in Appendix A. Data collection times were chosen to provide baseline preoperative information and information from 2 transition points during early recovery, Week 2 and Week 6. Patients have usually been home for 1 week at 2 weeks after surgery, and at 6 weeks they have generally completed a 1 month postoperative visit to the surgeon and have begun to resume some preoperative activities (Doordan, 1976; King & Parrinello, 1988; Nicklin, 1986; Tack & Gilliss, 1990; Wilson-Barnett, 1981).

Study Sites

Patients were recruited from 3 community hospitals in the South San Francisco Bay area. Study participants were the patients of surgeons in 4 separate private practice groups.

Site Access

Access to Hospital A was obtained initially by contact with the chair of the Nursing Research Committee. Following submission of copies of a nursing research request form and a proposal packet consisting of an abstract, the proposal, the instruments, and the investigator's curriculum vita, the Nursing Research Committee granted tentative approval. After each head nurse agreed to the study and a meeting with a member of the Nursing Research Committee, final nursing approval was given. The investigator then submitted another set of research packets to the Committee on Human Research and attended the review meeting to answer questions, whereupon final approval was granted.

Copies of the proposal packet were submitted to the chair of the Nursing Research Committee at Hospital B. The researcher presented an overview of the research to the committee and approval was granted. The proposal packet was then submitted to the Institutional Review Committee. Following attendance at the committee meeting to answer questions regarding the proposal, final approval was given.

The investigator submitted the proposal packet to the Director of Nursing at Hospital C subsequent to an initial personal contact. Expedited approval was granted after the director discussed the proposal with key nursing and hospital administrative personnel.

Simultaneously, the surgical groups conducting cardiac surgery at each of the three hospitals were contacted by a

letter explaining the study accompanied by a copy of the proposal packet. Physicians from all the groups wrote letters of support. Additionally, a nurse or office staff member volunteered or agreed to be a contact person for the researcher to obtain names of patients scheduled for surgery. The physicians, nursing staff, and office staff at all three sites were exceptionally helpful throughout the study.

Description of the Sites

The 3 data collection sites were all community hospitals served by physicians in private practice. Hospital A is licensed for 464 beds, Hospital B has 410 beds, and Hospital C has a total of 225 beds. Annually, over 200 major cardiac surgeries are performed by the surgeons at Hospital A, over 550 are performed at Hospital B, and less than 200 at Hospital C. The surgeons at Hospital C also conduct surgery at other area hospitals. All 3 hospitals primarily serve patients in the South San Francisco Bay area, although Hospital B also draws cardiac patients from other states and countries. Differences in patient population by site are part of the analysis.

Sample Size and Selection Criteria

The convenience sample was recruited from patients scheduled for first time or repeat cardiac bypass or valve surgery at any of the 3 hospitals. Patients from both diagnostic groups were included in order to assure an adequate sample size. Gortner et al. (1986) found no statistically significant differences between bypass and

valve surgery patient's recovery in a previous study. The criteria for sample selection were persons between 40 and 70 years of age, able to speak and read English, and available by telephone after surgery. The age criterion was used to yield an adult sample scheduled for surgery, with exclusion of the elderly and young adults with potentially different recoveries. Subjects had to be able to speak and read English to participate in the interviews and complete the questionnaires. Being available by telephone was essential to the telephone interviews postoperatively. Additionally, the investigator checked with the nursing staff prior to contacting patients to assure that the patient was physically and emotionally stable enough to be able to participate in the study.

Human Subjects Assurance

The proposal was reviewed and approved by the Committee on Human Research at the University of California San Francisco, Hospital A's Committee on Human Research, Hospital B's Institutional Review Board, and the administrative staff at Hospital C. Written informed consent was obtained using the consent forms approved by the specific institution (see Appendix B). The investigator verbally presented an overview of the study to patients after they were admitted to the hospital, usually the day prior to surgery. The patient was given time to read the consent and ask questions before signing the consent. The investigator signed the consent and gave a copy to the patient. Patients were reminded that they

could refuse to answer any question or withdraw from the study at any time without influencing their care.

All information from the patients was coded by number without names or other identifying information and kept in locked files to assure confidentiality. Postoperative interview data and mailed materials were also number coded. Materials completed in the hospital were returned directly to the investigator or placed in sealed envelopes to be picked up by the investigator.

Data Collection Methods

A variety of standardized measures and interviews were used to collect both qualitative and quantitative data. All data were collected directly by the investigator using personal interviews, chart reviews, and instruments preoperatively, and telephone interviews 2 and 6 weeks after surgery. Six weeks after surgery questionnaires were sent to the patient to return to the investigator in a self-addressed, stamped envelope. Names of potential subjects were obtained from the surgeons' offices, supplemented by information from the hospitals. A total of 87 patients were inducted into the study, with 81 patients completing the 6 week follow-up.

Following informed consent, the patients were interviewed by the investigator in the hospital the day prior to surgery. The interview focused on demographic and health information on the Patient Profile (Appendix C) and the Activity Checklists (Jenkins, 1989). The investigator

obtained additional information from the medical record while the patient completed the Jalowiec Coping Scale, the Derogatis Brief Symptom Inventory (BSI), and the Recovery Support Scale (Appendix D). The hospital interview lasted approximately 15-20 minutes, and the forms completion another 25 minutes. After surgery the medical record was reviewed to complete information on postoperative progress.

At Week 2 and Week 6 after surgery the patient was interviewed by telephone during which the investigator completed the Self-Efficacy and Activity Checklists and the Recovery Demands and Coping Resources questionnaire (Appendix E). At Week 2 the Recovery Support Scale was also administered. At Week 6 the patient completed and returned by prepaid mail the Jalowiec Coping Scale, the BSI, the Multidimensional Scale of Perceived Social Support (Blumenthal et al, 1987), and the Recovery Support Scale. The telephone interviews lasted 15-20 minutes and the forms required another 30 to 45 minutes to complete at a time convenient to the patient. A few patients received an additional call to assist in completion of the forms. Patients reporting problems requiring medical intervention were counselled to contact their primary physician.

Measures were taken to assure a high mailed response rate. During the Week 6 call the patient was asked if he/she had received the questionnaire packet which was mailed the previous week and if there were any questions at that time. If the packet was not returned within 10 days, a follow-up

call was made to query if the packet had been sent or if the patient had any questions or problems completing it. A second set of instruments was sent to 2 patients who had misplaced the packet. One subject preferred to answer the questions verbally because of visual and writing limitations. Each packet was examined for completion upon return.

Instruments

Demographic variables to describe the sample and baseline measures of psychosocial functioning were made preoperatively, and recovery outcomes were examined at 2 and 6 weeks postoperatively using the following measures. The data collection plan appears in Appendix A. A pilot study was conducted with the first 5 patients to test the interview guide and the instrument packet.

The Patient Profile. The Patient Profile (Appendix C) for demographic and baseline cardiac information was developed by the investigator based upon an extensive review of the cardiac recovery research literature for factors pertinent to cardiac physical and psychosocial recovery (Doordan, 1976; Gortner et al., 1988; King & Parrinello, 1988; Rankin, 1988; Wilson-Barnett, 1981) and items adapted from the profile used in the study by Gilliss and associates (Gilliss, Gortner, Shinn, & Sparacino, 1989). These factors include age, gender, marital status, socioeconomic status, usual social and leisure activities, plus information from the medical record including symptoms prior to surgery, medication and health history. The Patient Profile also

includes the New York Heart Association (NYHA) symptomatic status with activity report, a standard measure of functional status in cardiac patients (Criteria Committee of the New York Heart Association, 1984). The patient profile was used to gather baseline information in the hospital from the patient and the medical record.

Self-Efficacy Expectations and Activity Check Lists. The Self-Efficacy Expectations and Activity Check Lists (Jenkins, 1989) for the 5 domains of walking, general activity, work, health, and resuming roles were administered at Weeks 2 and 6 by telephone interview. The activity scales were also administered preoperatively. Based on Bandura's conceptualization of self-efficacy, Jenkins (1989) developed these scales to measure one's level of confidence in ability to perform activities in each domain. Self-efficacy is rated on a scale from 0, definitely cannot do, to 10, definitely can do. The 15 item walking scale, the 17 item general activities scale, and the 14 item work scale contain activities of increasing levels of difficulty. The 8 item health scale and 12 item scale on resuming roles list items in those domains. The corresponding activity scales measure self reported activity in each domain. In a study of recovery from heart surgery the alphas for self-efficacy ranged from .96 to .86, and for the activity scales, alphas ranged from .98 to .85 (Gilliss, Gortner, Shinn, & Sparacino, 1989). Jenkins noted good correlations between the activity

scales and the PAIS in a recent myocardial infarction rehabilitation study (personal communication, May 25, 1990).

Recovery Support Scale. The Recovery Support Scale (Appendix D) was developed by the investigator to examine recovery specific support according to the theoretical dimensions of support postulated by House (1981): emotional support, appraisal support, informational support, and instrumental support. The 38 items were derived from a theoretical matrix of problems or demands and the components of perceived support to address these demands. Because emotional and appraisal items frequently overlapped, the final instrument combined the two categories under emotional support. Items were scored according to frequency of occurrence in the past week. No standardized instrument was available to assess instrumental or informational support behavior specific to recovery. Available instruments measuring perceived emotional support were too global, lengthy, or measured multiple dimensions of support beyond the aims of this study of recovery. The recovery support items were summarized for comparison across the sample and included both positive and negative relationships to avoid response bias. The tool was piloted with lay volunteers. The items were analyzed for internal consistency and test-retest reliability. It was intended that a recovery specific standardized scale could be developed from this preliminary work, to aid future recovery research.

Jalowiec Coping Scale. The Jalowiec Coping Scale (Jalowiec, 1988) was administered in the hospital and at Week 6 to establish concurrent validity for the interview and for standardized assessment of coping. This 40 item scale measures confrontive, emotive, and palliative coping methods on a 5 point Likert scale for frequency of use. The items originally were classified into problem or affective-oriented behaviors. The scale has been used extensively in patients with cardiac and other health problems, with alpha reliabilities ranging from .75 to .86, test-retest reliability of .78 to .91, and construct validity for the three factors determined by LISREL confirmatory factor analysis. Jalowiec reports alphas for the three factors as .85, .70 and .75. Proportional scores or total scores can be determined for each factor.

Brief Symptom Inventory (BSI) The BSI is a 53 item instrument derived from the 90 item Hopkins Symptom Checklist SCL-90 to assess psychological well-being (Derogatis & Spencer, 1982). Subjects rate the severity of their symptoms in 9 major symptom categories: somatization, obsessive-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Three global indices can be computed: global severity index, a positive symptom distress index, and a positive symptom total. The number and intensity of symptoms can be calculated for each subscale and for the total. Cronbach's alphas for reliability of each subscale range from

.71 to .85. Test-retest reliability coefficients for nonpatients range from .68 to .91. Construct validity for the SCL-90 has been supported with factor analysis. The BSI has concurrent validity with the SCL-90 and MMPI, and normative data are available for psychiatric and nonpsychiatric groups. The BSI can be completed in 10 minutes. The global severity index, a total score representing the number of symptoms and intensity of distress, was used as a measure of psychological well-being in regression analyses. The individual subscales were examined to differentiate physiological disturbances related to physical recovery, from psychological symptoms. Repeated measures analysis of variance were conducted to examine symptom distress and change during recovery. Correlations were examined to explore the relationship of depression and anxiety subscales with self-efficacy and coping behaviors, and depression was analyzed as a covariate for self-efficacy and activity.

Recovery Demands and Coping Resources. The Recovery Demands and Coping Resources questionnaire (Appendix E) was developed by the investigator for the postoperative telephone interviews at Weeks 2 and 6 to assess recovery activities, medications, NYHA symptom status, in addition to recovery concerns, methods of coping, types of social support offered during recovery, and the interaction of coping and social support. The guide, developed according to Gottleib's (1978) protocol, asks the subject to: identify up to 3 problems,

state who has been helpful with the problem, and explain what is particularly helpful about that person's way of assisting with the problem. An additional question as to what the person did to manage the problem was added for further information on coping. Scoring of the instrument involved development of a classification scheme by deriving categories from a subset of interviews until no new categories emerged. Coding was verified with a second rater. Interrater reliability was established for rating and content coding of the remaining interviews.

Patients also rated a list of problems generated by an extensive review of the research literature (Doordan, 1976; Gilliss, Gortner, Shinn, & Sparacino, 1989; King & Parrinello, 1988; Nicklin, 1986; Wilson-Barnett, 1981). The list of problems was used to help explain variance in recovery outcomes. The problem list was quantified to enable treatment as a covariate in statistical analyses to determine if the types, numbers, or frequency of problems makes a difference in coping or in recovery outcomes. The categories and patterns of responses emerged from observation and analyses of patients' descriptive accounts of the recovery experiences. Self reports and patient accounts, important for the assessment of personal meaning and appraisal, were analyzed and compared.

Multidimensional Scale of Perceived Social Support (MSPSS). The MSPSS (Blumenthal et al., 1987) is a brief self-report measure of perceived social support from family,

friends, and significant other measured on a 7-point Likert-type scale (Zimet et al., 1988; Zimet et al., 1990). Principal components factor analysis indicated confirmation of the 3 subscales. Internal reliability of the subscales and the total scale was demonstrated with coefficient alpha levels ranging from .83 to .98 in diverse sample populations of students, pediatric residents, adolescents, pregnant women, and coronary artery disease patients. Test-retest reliability ranged from .72 to .85. Construct validity was supported for the total scale and the subscales through correlations with measures of depression, anxiety, marital status, and interpersonal sharing. This instrument was administered at Week 6 to validate social support findings.

Data Analysis

Data were collected over 6 months and entered on a personal computer using Statview (Abacus Concepts, 1987), Excel (Microsoft, 1989), and Systat (Wilkinson, 1989) statistical software. Qualitative and quantitative techniques were used to analyze the data.

Statistical Analyses

Descriptive statistics were used to analyze the characteristics of the sample. Analysis of variance and chi square techniques were used to compare sample sites and patient populations. Repeated measures analyses of variance was used to analyze change over time in recovery demands, coping, self-efficacy, social support, and the outcome measures of NYHA functional status, activity, and the BSI.

The magnitude of bivariate relationships was examined using Pearson correlation coefficients of the major variables at each data point. The major variables for multiple correlation and prediction included demographic variables (age, sex, socioeconomic status), recovery demands, coping behaviors, self-efficacy, and social support, and each of the dependent variables of NYHA, activity, BSI scores, and MSPSS scores. Subscale scores and total scores of the BSI were considered. Correlations and interactions were examined for redundancy and tested for statistical significance. Hierarchical multiple regression was used to determine the best predictors of recovery among the independent variables and interaction terms.

Preliminary power analysis for multiple correlations and regression analyses for equations with 5 predictor variables for a medium effect size of .15, an alpha of .05, and a desired power of .80, suggested a total of 79 subjects were needed (Cohen & Cohen, 1983; Cohen, 1988). This sample size satisfies the minimum requirement of 10 subjects per variable and allows for correlations. The final sample included 81 patients.

The patient interview data were coded and content analyzed to describe recovery problems, coping methods, and support resources in order to identify common patterns or themes among the patients which explain differences in recovery, support regression findings, and explore the relationships among the variables. Interrater reliability

was obtained following comparison of the findings with those of an independent rater who analyzed a portion of the interview data.

Study question 1: What is the effect of different types of coping behaviors used during recovery on recovery outcome? This question was first analyzed through correlations for differences in outcome according to type of coping behaviors used. Each outcome, NYHA, the activity scores of the Self-Efficacy and Activity Scales, and the BSI total scores, was examined. A secondary analysis was used to determine if the relationship of type of coping and outcome is dependent upon demands or complications. The interview data were analyzed for differences in coping behaviors compared to the results obtained with the Jalowiec Coping Scale (1988).

Study questions 2 and 4: Are higher self-efficacy expectations at Week 2 postoperatively positively related to recovery outcomes at Weeks 2 and 6? Is social support positively related to each of the recovery outcomes? Patient responses were analyzed with correlations and regressions on the outcome measures at Weeks 2 and 6. Recovery support scores were correlated with scores from the Multidimensional Scale of Perceived Social Support for convergence.

Study questions 3, 5, and 6: Are self-efficacy expectations and confrontive coping behaviors positively related to recovery outcomes? Do patients with higher social support and higher self-efficacy expectations have more positive recovery outcomes? Do patients with higher social

support and confrontive coping behaviors have more positive recovery outcomes? The interaction effects of self-efficacy and coping, social support and self-efficacy, and social support and coping, respectively, on each of the recovery outcomes were determined by hierarchical multiple regression with each variable entered separately first and then the interaction term, for each of the recovery outcomes. The correlation matrices were examined to identify covariates. Covariates, such as age or gender, were entered as a set in the first step of the regression, followed by each of the independent variables, then the interaction term, for each of the recovery outcomes. Covariates identified in the literature include recovery demands, age, or depression. Interview data were analyzed for patient reports of the interaction of support, coping, and self-efficacy, which were compared to the statistical findings to further explain these relationships.

Summary

This chapter reviewed the design for the study, the sample selection criteria, access to the study sites, instrumentation, data collection procedures, and the analytical plan for the study data. The results are presented in tables and text in the following chapter.

CHAPTER FOUR

RESULTS

Chapter Four presents the results of the study. First, management of data is discussed. Second, the demographic and illness characteristics of the sample are described and the 3 study sites are compared. Then the reliability of the instruments and results are presented for each of the study variables: coping, self-efficacy and activity, social support, and psychological distress. Finally, the answers to the research questions are presented.

Data Management

Prior to proceeding with data analysis all data were examined for completeness. All hospital and telephone interviews were conducted by the investigator. In the hospital, patients were assisted with completion of the questionnaires as needed. Occasionally, if the patient was unable to complete all the forms at one time due to hospital procedures or visitors, the forms were left with the patient and picked up later by the investigator. In 2 instances patients did not have time to complete all the questionnaires resulting in missing data, as noted in the reporting of the results. All of the mailed data were returned or completed by telephone with the exception of data from one patient who chose not to complete the forms. Several patients omitted questions or did not complete the reverse side of the BSI form. Whenever possible the form was returned to the patient in the hospital or questions were asked by phone to complete

the forms. Then, if less than 20% of the data was missing, the scale mean was substituted for the missing items or the mean was calculated with the remaining items according to the scoring procedures specific to each instrument. One patient was unable to be contacted by telephone, but did return the questionnaires and wrote a note regarding his recovery which addressed all but the self-efficacy questions. In this instance, additional information was obtained from the medical record and also volunteered by his family when the phone follow-up was attempted.

Subjects and Settings

The convenience sample consisted of 81 adult cardiac surgery patients drawn from 3 community hospitals in Northern California over a period of 18 weeks. Names of potential patients were obtained by telephone from the office staff responsible for scheduling surgery. Hospital A had 27 patients in the study, Hospital B had 41 patients, and Hospital C had 13 patients. Originally, a total of 87 patients who met the study criteria agreed to participate and completed the hospital interviews and questionnaires. Six of these patients were dropped from the study: 2 patients experienced a lengthy complicated hospital recovery, 2 patients died, 1 surgery was postponed for medical reasons, and 1 patient was not able to be located postoperatively. Additionally, 3 persons who met the study criteria chose not to participate: 1 patient wanted to visit with family, 1 patient stated he was not interested, and 1 patient stated he

Table 4.1

Eligibility Summary

Eligibility Status	Number
Total Missed:	22
Total Not Eligible:	122
Non English Speaking:	7
Age > 70:	89*
Age <40:	8
Too Ill:	19
Total Eligible:	90
Refused:	3
Inducted/Dropped From Study:	
Death	2
Unable to Locate	1
Recovery Complications	2
Cancellation of Surgery	1
Final Sample:	81

Note. *May not include all noneligible elderly patients.

did not want to talk to anyone because he was too upset by the unexpected surgery. After consulting with nursing staff, 19 patients were deemed to be too ill to participate. Another 22 potential subjects were unable to be contacted because of urgent scheduling, changes in the surgical schedule, or conflicting interview times at another site. At

least 122 patients were not eligible due to age under 40 (8 patients), age over 70 (89 patients), or inability to speak English (7 patients). The investigator was not apprised of all patients not eligible for the study. Information on the eligibility and attrition of the sample is summarized on Table 4.1.

Demographic Characteristics

Table 4.2 summarizes the demographic characteristics of the sample. The sample consisted primarily of male Caucasian men over the age of 60. Most of the patients had attended or graduated from high school, and 19% attended college. Occupations were diverse with clustering around medium to small businesses, professional roles, sales, or management positions. Approximately half of the patients were retired. The average income was $44,342. The distribution of retirement and occupational status of the 8 patients who declined to state their level of income were consistent with the rest of the sample.

The sample does not represent the diverse population with heart disease or include large numbers of low income or uninsured patients. There were no Black patients in this sample. The 7 patients unable to speak English and not included in the study spoke Spanish, Pakastani or Indian dialects. Two study patients resided in states outside of California and 4 patients planned to return to homes in other countries after they were fully recovered.

Table 4.2

Demographic Characteristics of the Sample

Characteristic	Number	(%)	
Gender:			
Male	65	(80%)	
Female	16	(20%)	
Age in Years:			
40-49	13	(16%)	Mean age=58.8
50-59	23	(28%)	
60-70	45	(55%)	
Ethnicity:			
Caucasian	67	(83%)	
Hispanic	6	(07%)	
Asian	3	(04%)	
Filipino	3	(04%)	
Pacific Islander	2	(02%)	
Marital Status:			
Married	62	(77%)	
Widowed	11	(14%)	
Divorced	3	(04%)	
Single	5	(06%)	
Education:			
Grades 1-6	8	(10%)	
Grades 7-9	15	(19%)	
Grades 10-11	20	(25%)	
High School Graduate	23	(28%)	
Some College	7	(09%)	
College Graduate	5	(06%)	
Graduate Degree	3	(04%)	
Retirement:			
Retired	36	(44%)	
Not Retired	40	(49%)	
Partially Retired	5	(06%)	

Table 4.2 continued

Employment:			
High Executive, Large Business	1	(01%)	
Manager, Medium Sized Business, Professional	23	(28%)	
Administrator, Small Business	12	(15%)	
Clerical, Sales	17	(21%)	
Skilled Manual	14	(17%)	
Machine Operator, Semi-skilled	5	(06%)	
Unskilled Labor	5	(06%)	
Housewife	3	(04%)	
Other	1	(01%)	
Income:			
$ 20,000 and below	21	(26%)	Mean: $44,342
$ 21,000- 40,000	21	(25%)	
$ 41,000- 60,000	15	(19%)	
$ 61,000- 80,000	10	(12%)	
$ 81,000- 100,000	5	(06%)	
$100,001 and above	1	(01%)	
Declined to state	8	(10%)	

Note. Percentages may not add to 100% because of rounding

Demographic differences by site were examined. There were no statistically significant differences by site in ethnicity, gender, age, marital status, retirement status, type of employment, income level, or education when the relationships were examined with chi square contingency tables and ANOVA techniques.

Table 4.3 portrays the illness characteristics of the sample. The majority of the sample was comprised of coronary artery bypass surgery patients. There were no statistically significant differences in the sample populations by site in type of surgery, length of stay, or baseline measures of New York Heart Association (NYHA) symptom status, or symptom distress on the BSI.

Table 4.3

Cardiovascular and Health Characteristics of the Sample

Characteristic	Number (%)
Type of Surgery	
Coronary Bypass	64 (79%)
Valve Replacement	12 (15%)
Both Bypass and Valve	5 (06%)
NYHA Status Before Surgery	
Class I	14 (17%)
Class II	42 (52%)
Class III	16 (20%)
Class IV	9 (11%)
Illness History Before Surgery	
Angina/Chest Pain	72 (88%)
Myocardial Infarction	34 (42%)
Previous Angioplasty	18 (22%)
Diabetes	21 (26%)
Hypertension	54 (67%)
Chronic Lung Disease	13 (16%)
Other Chronic Medical Problems	37 (46%)
Smoking History	
Smoked Within Past Month	24 (30%)
Quit or Never Smoked	57 (70%)

Note. Percentages may not add up to 100% due to rounding.

Differences according to age and gender were examined. There were no statistically significant differences for age and NYHA status at baseline or at Weeks 2 or 6, the BSI scores preoperatively or at Week 6, or length of stay. There were significant inverse relationships between age and income (p.=004) and education (p=.04). Gender differences were explored although the results are to be viewed with caution because of the small number of women in the sample (16).

Preoperatively, there were no women in the NYHA group 1, the group with no symptoms. Women tended to be hospitalized longer than men (p=.0431). Mean length of stay (day of surgery to discharge) for men was 7.7 days (S.D.=1.8), while women stayed a mean of 9.1 days (S.D.=3.9).

There were no statistically significant differences by gender in age, type of surgery, retirement status, education, NYHA status or BSI at baseline or postoperatively. More men were employed in management or upper level positions than women (p=.0003). The differences in income were not statistically significant although men tended to have higher family incomes (mean $47,083) and more variance in income than women (mean $31,692). This difference may also be attributed to a significant difference in marital status (p=.015). Of the women, 50% were married and 38% were widowed; whereas 82% of the men were married and only 8% were widowed. The remaining men and women were divorced or never married.

Twenty patients (25%) experienced problems such as arrhythmias, bleeding, or elevated temperature during early hospital recovery. An additional 12 patients (15%) experienced postoperative complications extending into the home recovery period, such as resistant infections, neurological disorders, arrhythmias, vocal cord paralysis, or pain disorders.

Baseline differences in illness history which had an impact upon recovery were noted. Diabetic patients

experienced more complications (p=.003) and other health problems (p=.004). Smokers were more likely to have complications (p=.009), lung disease (p=.011), and coexisting health problems (p=.032).

Recovery Demands and Complications

Data from the recovery demands portions of the 2 and 6 week telephone interviews were tabulated. Each symptom was given a score of "0" if it had not occurred, "1" if it occurred for 1 to 2 days, "2" for 3 to 5 days, or "3" if it occurred for 6 to 7 days in the past week. The scores for all symptoms were summed to yield total recovery demand scores for 2 weeks and 6 weeks. At both data collection points, the 5 most frequently occurring symptoms in decreasing order were problems with sleep, back discomfort, pain, fatigue or weakness, and "feeling down". At both times the most frequently noted problem with recovery routine was the activity limitation, the problem for social relationships was being dependent, and the problem with responsibilities was concern about finances. The total score was used to indicate recovery demands or problems occurring at 2 and 6 weeks. Mean demand score significantly decreased from .486 at Week 2 to .263 at Week 6 (p=.0001). There were no statistically significant differences by age or gender in reporting of recovery demands.

Complications during the hospital phase of recovery were separately analyzed. A 3 point score for complications was calculated with "0" indicating no major medical

complications; "1" indicating complications that added 1 or 2 days to the hospital stay, but were resolved by discharge (e.g., bleeding, temperature, temporary confusion); and "3" indicating major complications which extended beyond hospital discharge (e.g., neurological problems, lingering cardiac problems, infections). These scores were used to attempt to differentiate immediate postoperative complications from other recovery demands.

Changes in NYHA symptom status were significant with an an average rating of 2.25 preoperatively, 1.57 at Week 2 to 1.22 at Week 6. NYHA symptom status demonstrated a significant improvement at Week 2 and again at Week 6, with the Week 6 score approaching 1 for "no symptoms". NYHA status was examined as a recovery outcome indicator and explored for predictive ability through correlations with the other outcome variables.

Correlations were analyzed between complications, length of stay, preoperative, 2 and 6 week scores for the New York Heart Association (NYHA) status, and recovery demands, and each of the outcomes: psychological distress (BSI), walking, general activity, work, health, and roles (see Table 4.4). Significant correlations existed between recovery demands and the BSI, walking, general activity, health, and roles; complications and the BSI, general activity, and work; and the NYHA status and the BSI, walking, general activity, and health. Work was only significantly correlated with

Table 4.4

Correlations Between Demands, NYHA Symptom Status, Complications, Length of Stay (LOS), and Outcomes (n=80).

	Week 6 Outcomes					
Variable	BSI	Walking	Activity	Work[a]	Health	Roles
Demands 2	.370***	-.239*	-.275*		-.300**	-.269*
Demands 6	.438***	-.336**	-.478***		-.406***	-.322**
NYHA Wk 1	.230*				-.222*	
NYHA Wk 2	.484***	-.373***	-.333**		-.255*	
NYHA Wk 6	.368**	-.383***	-.512***		-.338**	
Complic.	.341**		-.249*	-.376*		
LOS[b]	.262*	-.383**	-.277*			

[a] $n=43$, [b] $n=76$
*$p<.05$, **$p<.01$, ***$p<.001$

postoperative complications and resumption of roles only with recovery demands.

Psychological Distress

Psychological distress was measured by the Brief Symptom Inventory (BSI) (Derogatis & Spencer, 1982). The reliability coefficients (Cronbach's alpha) for the raw scores on the total scale and the 10 subscales were determined at baseline and at Week 6 and are reported on Table 4.5. The reliabilities for total scores were satisfactory with

Table 4.5

Brief Symptom Inventory (BSI) Reliability Coefficients

Scale & Subscales	Number of Items	Baseline[a] Reliability Coefficient (alpha)	Six Week[b] Reliability Coefficient (alpha)
BSI Total	53	.929	.954
Somatization	7	.629	.799
Obsessive-Compulsive	6	.792	.808
Interpersonal Sensitivity	4	.387	.637
Depression	6	.754	.862
Anxiety	6	.730	.858
Hostility	5	.680	.702
Phobic Anxiety	5	.452	.768
Paranoid Ideation	5	.669	.660
Psychoticism	5	.455	.538

[a] (n=79), [b] (n=80)

alphas of .929 preoperatively and .954 postoperatively. Subscale scores were less satisfactory and ranged from alpha .387 to .792 preoperatively and .455 to .862 at Week 6. The ideal alpha of .80 for internal consistency was not achieved for any of the preoperative subscale scores and only 3 of the Week 6 subscale scores: obsessive-compulsive, depression, and anxiety subscales. Depression and anxiety, 2 variables of interest in this research, demonstrated acceptable reliability alphas ranging from .730 to .862. Published internal consistency reliability for the subscales, established with 719 psychiatric outpatients, range from a low of .71 for the psychoticism dimension to a high of .85

for depression. A number of patients in the present study scored all items with a "0". The shorter time frame to complete the questionnaires in the hospital and the presence of family or visitors may have influenced some answers on questionnaires completed in the hospital.

The issue of missing data was of concern with this scale. The authors state that random deletion of up to 25% of the items does not significantly impact the total score or subscale score (Derogatis & Spencer, 1982). Those instances when patients did not complete the reverse side of the form resulted in 34% missing data. There was no other pattern noted for missing responses. In this study, if more than 20% of the data was missing, the form was returned to the patient in the hospital or completed by telephone.

The total score was determined by adding the numbers for each item and dividing the sum by the number of items answered on each form. The total score is the General Severity Index (GSI), the most sensitive global indicant of distress determined with the BSI. T-scores were also determined according to the published standardized scale for conversion of the raw score into area t-scores with a mean of 50 and a standard deviation of 10.

There are published norms for nonpsychiatric patients. A t-score above or equal to 63 on the GSI or on any 2 primary dimensions is considered by the authors as the operational definition of caseness for psychiatric disorder (Derogatis & Spencer, 1982). The raw score meeting the definition for

caseness is lower or the same for men than women in all dimensions of the BSI, because females report a significantly higher number and intensity of psychological symptoms (Derogatis & Spencer, 1982). To determine "caseness" the raw score means were compared with the raw score means equivalent to or above *t*-scores of 63 for men and women.

The GSI totals in this study (.53 for men and .506 for women) were just below the published means for caseness: .58 for men and .60 for women. On the subscale scores, preoperative somatization (.775) was above the mean for caseness for the entire sample and close to the mean at six weeks (.694), with male subjects mean scores (.796 and .719) at both data points in the study above the published mean for caseness in men (.70). Published male and female caseness means for anxiety are .68 and 1.03 respectively. In this sample the preoperative anxiety mean for men (.849) was less than the mean for women (.927), but only the male score exceeded the published score for caseness and both men and women were below the caseness mean at 6 weeks. Postoperative depression was near the mean published for men, as was phobic anxiety preoperatively. All the other subscale scores were well below the published norms for psychiatric disorder.

Examination of the individual GSI scores revealed that 30 patients (37%) preoperatively and 25 patients (31%) at 6 weeks met or exceeded the definition of caseness (*t* score of 63). Of the 38 patients with psychological distress at caseness levels preoperatively or at 6 weeks, 13 showed an

increase in distress, 19 showed an decrease, and 6 remained unchanged. Only 2 of the 13 patients with increased distress had physical postoperative complications extending into home recovery. Eight patients with scores below caseness levels preoperatively reported distress above the caseness level postoperatively.

The only statistically significant age or gender difference in this study for the GSI or the subscales preoperatively or at Week 6 was on the psychoticism dimension at baseline where men had a mean score of .31 and women a mean of .09 (p=.02). The low reliability score for the psychoticism subscale and the small numbers of females in the study make this finding questionable.

Differences in the total scores and subscale scores from baseline to Week 6 were analyzed with 1 factor repeated measures ANOVA and the results are reported on Table 4.6. The only statistically significant finding was a decrease in anxiety from a preoperative mean of .863 to .575 at Week 6 (p=.0002). The other scores displayed trends in the expected directions for the aggregate sample. GSI scores decreased as did scores on most other dimensions. However, increases were noted in mean scores for depression and hostility.

The Week 6 BSI scores correlated positively with recovery demands and NYHA symptom status at Weeks 2 and 6, and with postoperative complications (r=.335 to r=.432)(p=.000 to p=.003). Patients experiencing symptoms and complications had higher psychological distress.

Table 4.6

Comparison of BSI Scores of Distress: Preoperative to Week 6

Scale	Preoperative Mean (S.D.)	Week 6 Mean (S.D.)	p value
BSI Total	.530 (.372)	.506 (.446)	.5630
Somatization	.775 (.548)	.694 (.633)	.2730
Obsessive-Compulsive	.729 (.611)	.708 (.657)	.7687
Interpersonal Sensitivity	.359 (.394)	.346 (.461)	.8339
Depression	.470 (.533)	.550 (.686)	.2088
Anxiety	.863 (.651)	.575 (.662)	.0002**
Hostility	.454 (.465)	.515 (.557)	.2600
Phobic Anxiety	.341 (.428)	.261 (.531)	.1728
Paranoid Ideation	.410 (.519)	.345 (.496)	.2897
Psychoticism	.268 (.345)	.274 (.422)	.8924

n=78
**significant at 99%

Coping During Recovery

The reliability of the Jalowiec Coping Scale was computed with Cronbach's alpha coefficients for internal reliability and the results are presented in Table 4.7. First, the items were analyzed according to the 3 factors identified by the author in a confirmatory factor analysis with data from 1,400 patient and nonpatient subjects (Jalowiec, 1988). In this study the 13 item confrontive coping subscale demonstrated good reliability with alphas of .87 and .84. The alphas for the 9 item emotive coping subscale (.70 &.72) and 14 item palliative coping subscale

Table 4.7

Reliability of the Jalowiec Coping Scale

Type of Coping (#of items)	Baseline Reliability Coefficient*	Week 6 Reliability Coefficient*
Three Factor Scoring (40)		
Confrontive (13)	.87	.84
Emotive (9)	.70	.72
Palliative (14)	.66	.56
Extra Items (4)		
Two Factor Scoring (40)		
Problem-Oriented (15)	.87	.83
Affective-Oriented (25)	.74	.66

*Cronbach's Alpha with n=80

(.66 & .56) were less satisfactory. The alphas for palliative coping did not meet Nunnally's (1978) criterion of .70. The total scale includes 4 additional items that do not fit any of the 3 factors: crying, drinking, taking drugs, and meditation. The author reported alphas of .85, .70, and .75 in her sample.

The alphas were recalculated according to the original 2 factors and were raised to more satisfactory alphas of .66 to .87. Having more items per scale contributed to the increase in reliability (Nunnally, 1978). Most of the confrontive coping items are in the problem-oriented scale and the remainder of the items are in the affective coping scale. Both methods of scoring were used in the analyses in this study.

Mean coping scores decreased on each of the coping subscales from the preoperative rating to the Week 6 rating, but the change in scores was only significant for the emotive/affective scores and the total scores (see Table 4.8). The patients used more confrontive or problem-solving strategies during both of the assessment points and there were no significant changes in the problem-solving or confrontive coping scores.

The most frequently used coping strategy that patients reported preoperatively was to maintain control, followed in order by information seeking, "view the problem objectively", "think through different solutions", and "prepare to expect the worse". The least frequently used strategy was to "take drugs", followed by "blame someone else", "resignation", "let someone else solve the problem", and "meditate". Postoperatively, the most frequent strategy again was to "maintain control", followed by "view the problem objectively", "information seeking", "find purpose or meaning in the situation", and "think through different ways to solve the problem". The least used strategy was to "take drugs", followed by "drink alcohol", "blame someone else", "resignation because it's hopeless", and "meditation". Social desirability may have influenced responses. At both points, the most frequently used coping behaviors were confrontive or problem-solving behaviors. Affective, palliative or emotive behaviors were the least frequently reported strategies. Drugs, alcohol, and meditation

Table 4.8

Coping Scores During Recovery

Coping Scale	Preoperative Mean (S.D.)	Week 6 Mean (S.D.)
Total Scale	2.54 (.37)	2.36 (.33)**
Two Factor Scores		
Problem-Oriented	3.11 (.62)	2.97 (.59)
Affective	2.22 (.36)	2.00 (.32)**
Three Factor Scores		
Confrontive	3.33 (.67)	3.18 (.66)
Emotive	2.30 (.60)	1.91 (.52)**
Palliative	2.27 (.46)	2.18 (.44)

**p=.0001 significant change from previous score

were items that did not enter any of the 3 factors in Jalowiec's (1988) factor analysis.

There was a significant negative correlation between age and total coping scores (r=-.236, p=<.03). Examination of the correlations for the 2 and 3 factor subscales revealed significant negative correlations between age and problem-oriented coping and between confrontive and emotive coping (p=<.05). There were no differences by gender for total coping or any of the coping subscales.

Social Support

The results of the reliability testing of the Multidimensional Scale of Perceived Social Support (MSPSS) and the Recovery Social Support (RSS) instruments are

presented on Table 4.9. The reliabilities for the MSPSS in this study ranged from .83 to .966 and compare favorably with the alpha reliabilities ranging from .81 to .98 reported by Zimet et al. (1990). These alphas meet Nunnally's (1978) optimal criterion of .80.

The reliability alphas for the Recovery Support Scale achieved Nunnally's (1978) criterion of .80 for total support and for emotional support with alphas ranging from .835 to .916. The alphas for the aid and information scales were less satisfactory. Nunnally (1978) suggests a minimal criteria of .70 for a new instrument. This alpha level was achieved on the information scale at Weeks 2 and 6 (.776 and .781) and on aid support at Week 6 (.712). At Week 2 the instrument was administered over the telephone and patients tended to be more fatigued, both factors possibly contributing to lower reliability scores or the inflated score for emotional support. Several aid and information items did not apply to a preoperative patient who was active and independent prior to surgery; whereas the emotional support items were applicable at all data collection points. The results obtained for aid and information preoperatively, and for aid at Week 2, must be viewed with caution until further testing of the instrument is undertaken.

Correlations between the subscales were also examined. The correlations of the total MSPSS scale with the 3 MSPSS subscales were above .70, and the correlation between family

Table 4.9

Reliability of the Social Support Instruments

Instrument	Baseline Reliability Coefficient*	Week 2 Reliability Coefficient*	Week 6 Reliability Coefficient*
MSPSS (n=80)			
Total			.915
Family			.831
Friends			.919
Significant Other			.966
RSS (n=81)			
Total	.835	.861	.872
Aid	.655	.532	.712
Emotional	.841	.916	.862
Information	.671	.776	.781
Adjusted Aid	.737	.744	.811

*=Cronbach's Alpha

and friend support subscales was 1.0. Correlations between the other MSPSS subscales were within the desirable range of .30 to .70 suggested by Nunnally (1978). The correlations between the total RSS scales and the subscales of emotion and aid were above .70 at each time period, and the correlations between the total RSS scales and the information subscales ranged from r=.616 to r=.623. Correlations between emotion and aid, and emotion and information were satisfactory (r=.334 to r=.610), but the correlations between information

and aid were low (r=.084 to r=.223). These results suggest that the information subscale tapped a dimension different from the other 2 scales.

The Week 6 RSS total and subscales correlated with the MSPSS total and subscales satisfactorily (r=.335 to r=.678), with correlations highest between total scores, followed by the correlation between emotional support and significant other support. The lowest correlations were between information and friend or family support.

The correlation matrix of the raw scores from all 3 Recovery Social Support data collection points was examined to determine if the inter-item correlations and the item-total correlations were within the suggested range of .3 to .7 (Nunnally 1978). The majority of the items had satisfactory correlations with items on the same subscale and with the total support scores. Three items (3, 7, and 14) in the aid subscale had significant correlations with each other and did not correlate significantly with the total support score or with more than 1 other item on the subscale. These items, "My family/friends try to do too much for me", "I have too many visitors and offers of help", and "Other people don't let me do as much as I think I can do", represent a negative perception of aid that is not consistent with the other support items in the subscale. Deletion of these 3 items significantly raised the reliability coefficient alphas for the aid subscale from .655, .532, and .712, to .737, .744, and .811. See Table 4.9 for adjusted aid scores.

Although these 3 items were reverse scored, they represent an aspect of recovery support that should be examined separately from the concept of aid in future studies of recovery support.

A preliminary factor analysis was conducted with the Week 6 Recovery Social Support questionnaire to determine if the items loaded on the a priori factors. The principle components varimax solution identified 11 factors with eigen values above 1. A minimum loading of .40 was used as the criterion for the initial sorting of items. The first factor contained 9 of the 14 items listed under emotional support, and focused on having someone to talk with and obtaining reassurance. The second factor contained 6 of the 10 informational support items related to obtaining recovery information and recovery expectations. The third and fourth factors included 9 of the 15 items listed under instrumental support or aid. The third factor focused on assistance with the recovery regimen, and the fourth factor focused on assistance with household tasks. The fifth and sixth factors contained items about not having someone to help or getting too much help, both listed under instrumental support. The remainder of the factor items were distributed evenly among the original 3 dimensions of support. The first 4 factors accounted for 46% of the total variance explained, and the 11 factors accounted for 73% of the total. Further development of the factors and examination of differences among the factors at the 3 data collection points will be undertaken

prior to use in future research. The preliminary findings with factor analysis and reliabilities support further development of this instrument. The scale was used as originally developed in the current statistical analyses.

There was a significant difference in mean RSS scores from preoperative assessment to Week 2, and from Week 2 to Week 6 for total scores and scores on all the subscales except aid which only was significant in change from Week 2 to Week 6 on the post-hoc Scheffe F-test (see Table 4.10). The change in mean aid support during recovery must be viewed with caution because of the low reliability scores for the aid subscale of the Recovery Support Scale and the number of items that did not apply preoperatively.

There was a negative correlation between age and preoperative emotional support on the RSS scale (r=.223)(p=.046). There were no other significant differences by gender or age for the MSPSS or RSS subscales or total support scores. The mean support scores were significantly higher for married patients on the RSS total, aid and emotion scores, and the MSPSS total and significant other scores (p=.0001 to p=.0004). Recovery information had a negative correlation with recovery demands at Weeks 2 and 6 (r=.26, r=.24) (p=.022, p=.031). There were no significant differences in support for patients with complications, health problems, or different NYHA symptom status.

Table 4.10

Support Behaviors Over Time

Support Scale	Preoperative Mean (S.D).	Week 2 Mean (S.D)	Week 6 Mean (S.D)
MSPSS (n=80)			
Total			5.73(1.00)
Significant Other			5.88(1.41)
Family			6.02(0.95)
Friend			6.02(0.95)
RSS (N=81)			
Total	2.89(.27)	2.80(.22)**	2.94(.33)**
Aid	2.75(.32)	2.75(.21)	2.86(.39)*
Emotion	3.10(.37)	2.98(.33)*	3.13(.42)**
Information	2.78(.39)	2.62(.34)**	2.81(.46)**

Note. MSPSS Scores range 1-7, RSS Scores range 1-4
*=95%,**=99% significant difference from previous score

Self-Efficacy and Activity

The results of the analyses of the reliability of the self-efficacy and activity instruments for this study are reported on Table 4.11. Reliability was evaluated with Cronbach's alpha for the self-efficacy scales and the activity scales for health and resumption of social roles. The Kuder-Richardson formula (KR-20) was used to assess the reliability of the dicotomous activity scales: walking,

Table 4.11

Reliability of Self-Efficacy (SE) and Activity Scales

Scale	Preoperative Reliability Coefficient	Week 2 Reliability Coefficient	Week 6 Reliability Coefficient
Self-efficacy: (n=80)			
Walking*		.918	.910
General Activity*		.939	.915
Working*[a]		.975	.975
Health (all 8 items)*		.720	.482
Roles*		.848	.966
(Health 7 Items)*		.967	.942
Activity: (n=80)			
Walking**	.917	.895	.911
General Activity**	.910	.905	.859
Working**[a]	.728	.937	.957
Health (8 items)*	.517	.709	.513
Roles*	.913	.844	.817
(Health* 7 Items)*	.561	.724	.619

[a] n=45
*=Cronbach's Alpha, **=Kuder Richardson's Formula

general activity and work. Except for health, the Cronbach's alpha reliability coefficients are high ranging from .848 to .975 for self-efficacy and .728 to .994 for the corresponding activity scales. The reliabilities for the health scales are less satisfactory and ranged from .482-.709. Week 2 and Week 6 data were unavailable from 1 subject. Coefficients above .90 indicate redundancy among the items for those scales (Nunnally, 1978).

The health scale item, "participating in cardiac rehabilitation sessions," did not apply to the majority of patients. Only 1 patient was in a cardiac rehabilitation program prior to surgery and 1 man participated in a rehabilitation program at 6 weeks. The remainder of the patients had difficulty answering the question because in most cases it did not apply at any of the data collection points: patients were not recovered sufficiently, they did not either have access to or financing for a rehabilitation program, or they were exercising on their own. A few patients planned to participate in a program in the near future. The reliabilities for health were recalculated after dropping the rehabilitation question. The alphas, although still too low, were raised slightly for the health activity scales and substantially increased for the self-efficacy scales to an acceptable level. Given that the other items in the health scale adequately represented the construct of interest and the significant increase in alpha, the rehabilitation item could have been dropped from the scale in the final analysis (Nunnally, 1978). Because there was not much variance in the health efficacy or activity scores, the scores for all 8 items were used for the final analyses to maximize the variance.

The scores were consistently high on most of the items in the health scales. Patients were taking care of themselves, following doctor's recommendations, taking medications, and keeping medical appointments. Patients who

were not exercising also had low scores on the walking and general activity scales. Dietary problems did occur both due to poor appetite and difficulty understanding or maintaining the prescribed diet. The greatest variance occurred with the smoking item.

Because self-efficacy for roles and role resumption activity included items related to spouse, others living in your home, and work relationships, the mean scores were calculated by taking an average for only those role items which applied to the specific patient. The work scales were only used for the 43 patients who were working immediately prior to surgery. The means for the walking, general activity, and health scales were calculated based on the full scale even if the patient initially claimed the individual items did not apply. For example, in the hospital some patients stated they did not go to stores or restaurants, but in follow-up interviews they stated they had gone shopping or out to dine with a friend.

Age and gender differences for self-efficacy and activity were examined. Men had higher efficacy expectations for health at Week 2 and for walking at Week 6 (p=.03), and higher walking activity at Week 2 (p=<.007) than women. There were significant inverse correlations between age and self-efficacy at Week 2 with general activity (p=.001), work, and at Week 6 with work and walking efficacy (p=.01), and for the activities of walking (p=.001) at Week 6 and general activity at Weeks 2 and 6 (p=.001, p=.03). Age and self-

efficacy and activity for resumption of roles were positively correlated at Week 6 (p=.018, p=.002). There were no other significant relationships between age or gender and self-efficacy or activity.

Change in Self-Efficacy and Activity

The mean scores for preoperative activity and Weeks 2 and 6 self-efficacy and activity are presented on Table 4.12. As recovery progressed the mean scores changed as expected. There were a significant differences (p=.01) in general activity, work and resumption of roles in mean scores on the activity scales from baseline to Week 2, and in mean scores for both self-efficacy and activity from Week 2 to Week 6. The mean scores for work activity decreased at Week 2 (p=.01), and work efficacy and work activity increased from Weeks 2 to 6 (p=.01). There was a slight decline in mean walking activity at Week 2, and a significant increase in self-efficacy for walking and walking activity at Week 6 (p=.01). Mean health activity scores improved at both Weeks 2 and 6 (p=.05), but there was no significant increase in self-efficacy for health from Week 2 to Week 6. As noted previously, both health activity and health self-efficacy scales demonstrated low reliability scores in this sample and scores were inflated.

Pearson correlation coefficients were examined to determine the relationships between the various self-efficacy and activity measures at Weeks 2 and 6. The correlations between walking, general activity, and health were

Table 4.12

Mean Scores on the Self-Efficacy and Activity Scales

Time/Scale (n=80)	Mean	S.D.	Range
Preoperative Activity:			
Walking	0.500	.258	0.133-1
General Activity	0.846	.209	0.176-1
Work[a]	0.774	.405	0-10
Health	8.193	.816	5.62-10
Roles	9.122	1.683	1-10
Activity Week 2:			
Walking	0.440	.224	0.133-1
General Activity	0.623**	.22	0.059-1
Work[a]	0.090**	.222	0-.857
Health	8.343*	.697	5.75-8.75
Roles	7.984**	1.692	0.86-10
Activity Week 6:			
Walking	0.678**	.244	0.2-1
General Activity	0.878**	.156	0.235-1
Work[a]	0.296**	.402	0-1
Health	8.529*	.486	6.5-10
Roles	8.932**	1.289	3.167-10
Self-Efficacy Week 2:			
Walking	05.553	02.474	1.333-10
General Activity	07.668	02.346	1.235-10
Work[a]	04.002	03.518	0-9.643
Health	09.631	00.834	4.875-10
Roles	08.419	01.488	2.5-10
Self-efficacy Week 6:			
Walking	07.759**	02.267	1.7-10
General Activity	09.413**	01.271	4.24-10
Work[a]	08.02**	02.927	0-10
Health	09.657	00.611	7-10
Roles	09.546**	00.746	6.08-10

[a]n=43
*=95%,**=99% significant difference from previous score.

statistically significant at p=.001 to p=.003. Efficacy for role resumption did not correlate significantly with walking

activity, nor did role activity correlate with efficacy for walking, general activity or health. Role efficacy did significantly correlate with general activity (p=.000) and health activity (p=.001). Resumption of roles at 6 weeks correlated only with self-efficacy for role resumption (p=.000), independent of efficacy for the other dimensions. The ceiling effect for efficacy and activity was noted at 6 weeks as the efficacy and activity scores began to peak across 4 dimensions. The self-efficacy and activity correlation matrix at Week 2 was similar with all efficacy and activity correlations significant (p=.02 to p=.000), except for the insignificant correlations between efficacy for walking and resumption of roles activity, and between walking activity and role activity.

The correlations between self-efficacy and activity for work were analyzed separately for the 43 employed patients. The correlations between self-efficacy for work at Week 6 were significant with the other 4 self-efficacy dimensions at Week 6 (p=.02 to p=.000), with walking efficacy low and role efficacy high, and with Week 2 efficacy ratings for role (p=.03) and work (p=.001). Work activity at Week 6 significantly correlated only with Week 2 work activity (p=.000) and role activity (p=.006). Correlations for Week 2 work activity were not significant with any efficacy ratings at Weeks 2 or 6, including work efficacy. Efficacy for work at Week 2 correlated significantly with efficacy for general activity and role resumption at Week 2 and with Week 6 work

activity rating. Preoperative work activity correlated significantly with efficacy for work, but not work activity, at Weeks 2 and 6 (p=.000, p=.001). Work activity at baseline was significantly related to Weeks 2 and 6 activity scales for general activity and role resumption, all self-efficacy dimensions at Week 2 and with Week 6 self-efficacy for general activity, work and role resumption.

Preoperatively, only activity was assessed. Again, role activity correlated significantly with general activity (p=.003), but not other activities. High correlations between walking and general activity indicate the overlap of these dimensions. Efficacy and activity for resumption of roles and return to work were more discrete.

Correlations Between Predictor Variables

Pearson correlation coefficients were calculated with the predictor variables to check for multicollinearity suggested by correlations above .70 (Nunnally, 1978). Coping, social support, or self-efficacy did not correlate with each other above the criterion of r=.70.

Correlations among baseline health status variables and self-efficacy and activity at Week 6 were examined to determine their influence on recovery. As expected, postoperative complications were correlated with higher NYHA symptom status; lower self-efficacy ratings for walking, general activity, and resumption of roles; lower ratings for general activity; and greater psychological symptom distress, depression and anxiety (p=.000 to p=.05). Length of stay

demonstrated similar correlations except for a significant correlation with self-efficacy for health, but not self-efficacy for role resumption at Week 6. Co-existing health problems did not correlate with outcomes beyond self-efficacy for walking and activity measures for walking and general activities. Self-efficacy expections for walking and health were negatively related to baseline NYHA functional status (p=.02, p=.001).

Examination of the correlations for specific conditions and Week 6 outcomes revealed no significant correlations with hypertension; a significant positive correlation (p=.03) between diabetes and role resumption activity; and significant positive correlations for lung disease with NYHA status, self-efficacy and activity for walking and general activity, and anxiety symptom distress at 6 weeks (p=.003 to p=.04). Recovery complications, which were significantly correlated with length of stay and existing health problems, was selected as the covariate most representative of health status problems at baseline or hospitalization in the regressions.

Correlations between complications and recovery demands, and NYHA status, activity, and psychological distress at 6 weeks were examined (see Table 4.13). There was a positive correlation between complications or demands and NHYA status or psychological distress. There was a significant negative correlation between recovery demands and activity outcomes at Week 6. No significant correlations were found between

Table 4.13

Significant Correlations Between Complications, Recovery Demands and Week 6 Outcomes (n=79)

Outcome	Complications	Week 2 Demands	Week 6 Demands
NYHA	.390***	.398***	.610***
BSI	.336**	.387***	.454***
Depression		.271*	.287*
Anxiety	.316**	.368***	.395***
Walking		-.257*	-.353***
General Act.	-.257*	-.268*	-.474***
Work[a]	-.371*		
Health		-.297**	-.403***
Roles		-.262*	-.315**

[a] $n=43$
*$p<.05$, **$p<.01$, ***$p<.001$

depression, walking, health, and role resumption and complications, or between work and demands. Except for work activity, Week 6 recovery demands were more highly correlated with the outcome measures than Week 2 demands or immediate postoperative complications. As noted earlier few patients returned to work by 6 weeks, preventing determination of the relationship between resumption of work and recovery demands.

Testing of the Research Questions

Regression analyses were run based upon the results of the reliability information from the instruments and the significance of the correlations among the predictor variables, to answer the 6 research questions.

Question One

What is the effect of different types of coping behaviors used during recovery on recovery outcomes? Correlations with total coping scores, problem and affective oriented coping, as well as the 3 factor coping scores were conducted with the Week 6 reports of activity, NYHA status, recovery demands, and the BSI scores. Total coping behaviors, affective or problem-oriented behaviors, or the confrontive, emotive, or palliative coping behaviors did not demonstrate any significant correlations with activity scores for walking, general activity, work, health, or resumption of social roles, or NYHA status at Week 6.

Confrontive or problem-oriented coping scores did not significantly correlate with the BSI total score or subscale scores. Affective coping behaviors significantly correlated with the BSI total and all the subscale scores. Using the 3 factor scoring for coping, emotive coping also was significantly correlated with all the BSI symptoms except phobia, and palliative coping was only significantly correlated with paranoia and obsessive/compulsive behavior on the subscales, but not the total BSI. The significant

Table 4.14

Significant Correlations Between Coping and Week 6 Psychological Distress (n=80)

	BSI	Depression	Anxiety
Preoperative:			
Total Coping	.337**	.322**	.323**
Affective[a]	.385***	.316**	.397***
Emotive[b]	.433***	.381***	.511***
Week 6 Scores:			
Total Coping	.364***	.317**	.269*
P/E Coping			-.266*
Affective[a]	.493***	.410***	.433***
Emotive[b]	.584***	.473***	.448***

*p<.05, **p<.01, ***p<.001
[a]=2 Factor Coping Scale, [b]=3 Factor Coping Scale

correlations between types of coping and the total BSI and the depression and anxiety subscales are depicted on Table 4.14.

Only affective or emotive and palliative coping strategies were found to significantly correlate with psychological distress. Problem-oriented coping was not significantly related to any of the outcomes. The activities of walking, general activity, work, health, and resumption of social roles, and NYHA symptom status at Week 6 were not significantly related to any coping behavior.

A ratio (P/E) was calculated with the proportion of problem-oriented coping strategies used divided by the proportion of emotion oriented coping strategies used, according to the method cited by Keckeisen and Nyamathi (1990). A score above 1 indicated that more problem-oriented strategies were used than emotion-oriented coping strategies. The majority of patients used proportunately more problem-oriented strategies. A score of less than 1 was found for only 5 patients preoperatively and 4 patients at Week 6. The P/E ratio did not significantly correlate with recovery demands, BSI scores, NYHA status, and any activity or self-efficacy measure.

Question Two

Are self-efficacy expectations at Week 2 and Week 6 postoperatively positively related to recovery activity outcomes at Weeks 2 and 6? Table 4.15 illustrates the significant Pearson correlations between self-efficacy and self reported activity at Weeks 2 and 6. Self-efficacy for walking, general activities, and health were significantly correlated with the corresponding activities and each other at both data collection points. The correlation between self-efficacy for work and work activity at Week 2 was not significant, but was significant at Week 6. Work self-efficacy was more highly correlated with role resumption activity and general activity than with work activity at both data points. The fact that most patients had not returned to work by Week 6 but had resumed other general activities and

Table 4.15

Significant Correlations Between Self-Efficacy and Activity at Week 2 (n=80)

Self-Efficacy	Walking Activity	General Activity	Health Activity	Work[a] Activity	Role Activity
Walking	.80***	.42***	.44***		
General	.48***	.74***	.41***		.33**
Health	.38***	.38***	.77***		.56***
Work[a]		.44**			.54***
Role	.26*	.44***	.28*		.82***

Significant Correlations Between Self-Efficacy and Activity at Week 6 (n=80)

Self-Efficacy	Walking Activity	General Activity	Health Activity	Work[a] Activity	Role Activity
Walking	.84***	.58***	.40*		
General	.56***	.78***	.38*		
Health	.50***	.43***	.72***		
Work[a]		.51***	.33*	.38*	.48***
Role		.54***	.37***	.36*	.54***

[a] $n=43$

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

Table 4.16

Significant Correlations Between Self-Efficacy and Activity at Week 2 and Week 6 Activity (n=80)

	Week 6 Activity				
Week 2 Self-Efficacy	Walking Activity	General Activity	Health Activity	Work[a] Activity	Role Activity
Walking	.50***	.33**	.24*		
General	.52***	.55***	.22*		
Health	.45***	.47***	.53***		.25*
Work[a]		.35*	.33*		.48**
Role	.25*	.52***		.31*	.73***
Week 2 Activity					
Walking	.50***	.32**	.24*		
General	.41***	.50***			
Health	.41***	.41***	.78***		
Work[a]				.61***	.40**
Role	.27*	.43***	.27*	.41**	.73***

[a]n=43
*p<.05, **p<.01, ***p<.001

and roles may account for this finding. Self-efficacy for resumption of roles correlated significantly with general activity, health and role activity at both data collection points and with work activity at Week 6. Except for work self-efficacy and activity, correlations were highest between

each self-efficacy rating and its corresponding activity measure.

The relationships between Week 2 self-efficacy and activity scores with Week 6 activity scores were explored (see Table 4.16). Self-efficacy scores at Week 2 had the same or slightly higher correlations with corresponding activities at Week 6, except for health and work activities at Week 2 with Week 6 health and work activities. Patients often commented that they felt like they could do more than they actually were able to do. As noted earlier, the findings for health and work were difficult to interpret because so few patients returned to work within 6 weeks and patients closely adhered to the prescribed regimen during the first 6 weeks of recovery. Therefore, work and health activity at Week 2 appears to be a better predictor of work and health activity at 6 weeks in this sample. The patients were not followed until they actually returned to work.

Question Three

Are self-efficacy expectations and confrontive coping behaviors positively related to recovery outcomes? None of the coping measures were significantly related to walking, general activity, return to work, health activity or resumption of social roles. Only self-efficacy had a relationship to the activity or role outcomes as measured in this study. Patients used confrontive coping behaviors more than emotive coping behaviors. Total coping and either emotive or affective coping were positively related to the

BSI and the depression and anxiety subscales. Correlations between self-efficacy for walking and anxiety, and self-efficacy for general activity and the BSI were also significant. In exploratory regressions on the BSI or its subscales, the interaction of self-efficacy and any of the coping measures did not have a significant effect beyond the direct effects of the self-efficacy and coping measures.

Question Four

Is social support positively related to recovery outcomes? Social support as measured with the RSS and MSPSS instruments demonstrated significant negative correlations between the total BSI and the depression and anxiety subscales as noted on Table 4.17. Recovery informational support was significantly correlated with the BSI totals, depression, and anxiety at Weeks 2 and 6. Recovery emotional support was significantly correlated at Week 2 with anxiety and preoperatively and at Week 6 with the BSI, depression and anxiety outcomes. On the MSPSS support scale, the total score and the 3 subscales were significantly correlated with the BSI total score and with depression, but only the total score and significant other, not family and friend support, were correlated with anxiety.

The MSPSS total was significantly correlated with self-efficacy for general activity at Week 6 (r=.24)(p=.03), but no other Week 6 activity or role outcomes. Significant correlations between recovery information support and self-reported activity outcomes are displayed on Table 4.18. The

Table 4.17

Significant Correlations Between Social Support and Psychological Distress at Week 6 (n=80)

Support	BSI	Depression	Anxiety
RSS Preoperative	-.309**	-.343**	-.304**
Aid			-.241*
Emotion	-.286**	-.357***	-.265*
Information			
RSS Week 2	-.27*	-.33**	-.33**
Aid			
Emotion			-.22*
Information	-.46***	-.47***	-.46***
RSS Week 6	-.30**	-.42***	-.25*
Aid			
Emotion	-.35**	-.35**	-.23*
Information	-.46***	-.48***	-.37***
MSPSS Week 6	-.37***	-.46***	-.29**
Family	-.35**	-.43***	
Friend	-.35**	-.43***	
Significant Other	-.27*	-.42***	-.25*

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

recovery information support scale at Week 6 was significantly correlated with Week 6 health activity ($r=.25$)($p=.03$), and a trend towards significance was noted

Table 4.18

Significant Correlations Between Social Support and Activity (n=80)

Activity	Support Measure		
	Aid Week 2	Information Week 2	Information Week 6
Week 2:			
Walking		.268*	.226*
General			
Work[a]			
Health		.362***	.231*
Roles		.270*	.261*
Week 6:			
Walking		.262*	
General		.243*	
Work[a]	.324*		
Health		.274*	.245*
Roles			

*p<.05, **p<.01, ***p<.001
[a]n=43

between information support and general activity and role activity. However, Week 2 recovery information was significantly correlated with Week 2 walking, health, and role resumption, and with Week 6 walking, general activity, and health (p=.001 to p=.03). The finding that recovery aid

at Week 2 was correlated (p=.03) with work resumption at Week 6 may be spurious due to the low reliability of the aid measure and the low number of patients who had returned to work. An interesting finding was that recovery information at Week 2, but not at Week 6, correlated with self-efficacy for walking, general activity, health, and resumption of roles at both Weeks 2 and 6. None of the other correlations between social support total or subscale scores and activity measures were significant.

Question Five

Do patients with higher social support and higher self-efficacy expectations have more positive recovery outcomes? The influence of self-efficacy and social support on the activity outcomes were examined with multiple regression analyses. The hierarchical regression models for walking, general activity, health, and resumption of roles at weeks 2 and 6 are displayed on the following tables. Support and self-efficacy did not enter a regression model for return to work. The only support measure that entered the models was recovery information support at Week 2. The interaction of support and self-efficacy did not enter any of the models.

In the regression model for walking at Week 2 displayed on Table 4.19, recovery information support from Week 2 was entered at Step 1 and accounted for 8.9% of the explained variance. Self-efficacy for walking at Week 2 was entered at Step 2 and explained an additional 54.6% of the variance beyond the effects of informational support. The total of

Table 4.19

Regression Model for Support and Self-Efficacy on Walking at Week 2 (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Inform.SS	.301	.091	.091	1,78	7.750	.007
Step 3: SE Walk	.783	.635	.544	2,77	114.762	.000
Model				2,77	66.899	.000

63.5% of the variance in Week 2 walking activity was explained by the model. The regression model held with recovery demands entered at Step 1, but the total variance explained by the model increased only to 64.3%.

The predictive regression model for walking at week 6 is depicted on Table 4.20. Recovery information support from Week 2 is entered at Step 1 and accounts for 9.1% of the variance. Week 2 self-efficacy for walking enters at Step 2, accounting for an additional 17.5% of the variance. The

Table 4.20

Predictive Model with Support and Self-Efficacy on Walking at Week 6 (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Inform.SS	.309	.095	.095	1,78	8.223	.005
Step 3: SE Walk	.443	.270	.175	2,77	18.459	.000
Model				2,77	14.235	.000

total model predicted 27% of the variance in walking activity at Week 6. When Week 2 recovery demands was entered at Step 1 the total model variance increased only to 27.6%.

The cross-sectional regression model for resumption of general activities at Week 2 is displayed on Table 4.21. Recovery information was entered at Step 1 and contributed 4.9% of the variance. Self-efficacy for activity added 57.6% to the variance for a total explained variance of 62.5%. If recovery demands was entered at Step 1 the total variance explained only increased to 62.6%.

Table 4.21

Regression Model with Support and Self-Efficacy on General Activity at Week 2 (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Inform.SS	.221	.049	.049	1,78	3.989	.049
Step 3: SE Act.	.795	.625	.576	2,77	118.272	.000
Model				2,77	64.166	.000

The predictive model for general activities at Week 6 is depicted on Table 4.22. Week 2 recovery informational support accounted for 7.1% of the variance in activity outcome. Self-efficacy for activity at Week 2 added another 24.4% to the variance explained. Recovery informational support and self-efficacy for activity at Week 2 predicted a total of 31.5% of the total variance in resumption of general

Table 4.22

Predictive Model with Support and Self-Efficacy on General Activity at Week 6 (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Inform.SS	.266	.071	.071	1,78	5.941	.017
Step 3: SE Act.	.518	.315	.244	2,77	27.428	.000
Model				2,77	17.714	.000

activity at Week 6. Inclusion of recovery demands at Week 2 only raised the total variance to 32.1%.

The model for resumption of health activities at Week 2 is presented on Table 4.23. Recovery information support from Week 2 was entered at Step 1 and explained 15% of the variance. Self-efficacy for health at Week 2 was entered at the second step and explained an additional 46% of the variance. A total of 61% of the variance in health activity

Table 4.23

Regression Model with Support and Self-Efficacy on Week 2 Health Activity (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Inform.SS	.387	.150	.150	1,78	13.959	.000
Step 2: SE Health	.716	.610	.460	2,77	90.820	.000
Model				2,77	60.226	.000

at Week 2 was explained by the model. This model also held when recovery demands were entered at Step 1, but addition of recovery demands to the model did not substantially increase the total model variance explained.

The predictive model for resumption of health activities at Week 6 is displayed on Table 4.24. Week 2 recovery information entered at Step 1 contributed 7.8% of the variance. Self-efficacy for health at Week 2 added another 53.6% to the variance explained. Together, recovery information support and self-efficacy for health activity at Week 2 predicted 61.4% of the variance in self-reported health activity at Week 6. Week 2 recovery demands only increased the total explained variance to 61.5%.

Table 4.24

Regression Model with Support and Self-Efficacy on Week 6 Health Activity (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Inform.SS	.387	.150	.150	1,78	13.959	.000
Step 2: SE Health	.716	.610	.460	2,77	90.820	.000
Model				2,77	60.226	.000

The model for resumption of roles at Week 2 is displayed on Table 4.25. Week 2 recovery information was entered at the first step and accounted for 6.5% of the variance in resumption of roles. At the second step self-efficacy for

Table 4.25

Regression Model with Support and Self-Efficacy on Resumption of Roles at Week 2 (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Inform.SS	.255	.065	.065	1,78	5.423	.022
Step 2: SE Roles	.808	.677	.612	2,77	145.895	.000
Model				2,77	80.639	.000

role resumption explained an additional 61.2% of the variance for a total of 67.7% of the variance in resumption of roles explained by the model. The addition of recovery demands at Step 1 did not increase the total explained variance. Recovery information did not enter into a predictive model for Week 6 role resumption.

None of the recovery support or MSPSS total scores or subscales at Week 6, nor the interaction of support and self-efficacy, made a significant contribution to the activity outcomes beyond the direct effect of self-efficacy because of the high correlations between self-efficacy and the target behavior. Recovery demands had a direct negative effect on the activity outcomes, but support or the interaction of support and self-efficacy did not enter the regression with recovery demands in the model.

The zero order correlation between self-efficacy for general activity and the BSI was significant (r=-.228,

p=.04). None of the self-efficacy measures demonstrated a significant contribution in addition to social support in regression equations on the BSI outcome with or without recovery demands in the equation. Self-efficacy for general activity offered only a small direct effect on psychological distress and no interaction effect with social support was found. Social support has primarily a main effect on psychological outcomes, and self-efficacy is directly related to specific activity outcomes.

Question Six

Do patients with higher social support and confrontive coping behaviors have more positive recovery outcomes? Confrontive or problem-oriented coping did not contribute to the outcomes measures in this study. The P/E ratio at Week 6 correlated significantly with the information subscale of the Recovery Support Scale (r=.239, p=.034). Informational social support at Week 2 contributed to the activity outcomes, but none of the other social support measures had an effect on walking, activity, health activity, resumption of roles or return to work outcomes. The interaction term combining problem-oriented coping or confrontive coping and social support did not significantly contribute to any of the regression equations. The addition of recovery demands or complications to the equation did not change this finding.

Qualitative Analysis of the Interview Data

Answers from the following interview questions were transcribed: what challenges, problems or concerns the patients had; how they managed or coped with these problems or with the way they felt about the situation; and who was most helpful in helping them manage the situation. Preliminary analysis revealed that physical discomfort was the most frequently reported problem at Week 2. Other frequently reported problems were fatigue, difficulty sleeping, boredom, depression, and impatience with the healing process. By Week 6 most of the problems were resolved although patients continued to report fatigue and discomfort. Patients primarily used problem-solving coping strategies to manage physical discomforts, such as pacing their activity, taking pain medications, and trying to balance rest and exercise. They reported that these problem-solving techniques were helpful in managing problems and enhanced their recovery. Strategies named to manage depression and boredom included distractions such as watching television, reading, knitting, working with a computer, taking naps, walking, or talking with family or friends. Only a few patients mentioned emotive strategies such as crying or expressing anger.

Following the investigator's preliminary analysis of the transcriptions, the raw data and transcriptions were analyzed by a second rater with expertise in social support and stress and coping research. Independent classification of the data

demonstrated high agreement with interrater reliability averaging above .90. The data from the transcribed interviews were used to amplify and explain findings of the quantitative analyses.

The coping strategies were classified into the 3 coping factors identified by Jalowiec (1988): confrontive, palliative, and emotive. Confrontive coping included identifying the problem and taking action to deal directly with the problem, such as increasing exercise to increase strength, or seeking information. Palliative coping included more passive problem-solving, such as distraction, acceptance, or napping. Emotive coping included emotional methods of dealing with the problem, such as crying, worrying, or getting angry. Patients primarily used confrontive coping to manage problems, although palliative measures were also employed. Self-reliance or will-power was a coping strategy reported by patients that was not specifically mentioned on the Jalowiec questionnaire. Patients frequently commented on the use of will-power in conjunction with problem-solving techniques to overcome problems during recovery.

In most instances multiple strategies were reported for managing a problem. For example, fatigue was managed by carefully pacing activities, taking pain medication at night for a more comfortable rest, gradually increasing exercise but including time to rest in the afternoon, allowing other people to help, distraction with music or television, seeking

reassurance and information from the doctor or nurse, and eating a proper diet to improve anemia. Multifaceted problems such as fatigue require multiple strategies. These strategies often included both problem-oriented and emotion-oriented strategies along with support.

In answer to who was most helpful, spouses were most often mentioned as helpful to married patients, while unmarried patients reported help from family or friends. Approximately one third of the patients also reported that information from physicians, nurses, neighbors who were nurses, or family members who had experienced heart surgery, was helpful in managing problems with recovery. Patients sought information on how to manage symptoms and reassurance that they were progressing. Supportive others provided tangible assistance, information, and emotional support. A few patients reported that their families were "overprotective and solicitious, athough well intentioned."

The problems, coping strategies, and support systems identified in the interviews agree with the data obtained with the recovery demands interview questions, the Jalowiec Coping Scale, and the Recovery Support Scale. The interaction of support behaviors enhancing coping and management of recovery problems was repeatedly mentioned by patients. For example, supportive others managed the environment and provided assistance, enabling the patient to rest when he was fatigued. When patients were depressed, they mentioned talking to the spouse as a helpful strategy.

Information and reassurance provided support and coping assistance in managing distress. The interview data will be further coded and analyzed in a follow-up study to further identify themes and relationships in the manner suggested by Strauss and Corbin (1990).

Summary

The reliability of the intruments was analyzed prior to testing of the research questions. Social support and emotive coping strategies had direct effects on psychological distress, while self-efficacy had a direct effect on self-reported activities and social outcomes. Confrontive coping did not relate to any of the outcomes. No interaction or buffering effect was determined in the statistical analyses. The qualitative findings were examined to clarify statistical relationships and identify additional recovery demands and coping and support resources.

CHAPTER FIVE

DISCUSSION AND RECOMMENDATONS

The discussion of the findings of this study begins with a presentation and discussion of regression models which best explain each of the outcomes. Next, findings for each of the predictor and outcome variables are summarized and discussed. Additional findings from observations, exploratory data analyses, and analyses of the qualitative data are included in the discussion of the models and variables.

Recovery Outcome Models

Several regression models were explored to best explain each of the recovery outcomes. The master status variables age and gender were entered at the first step of each regression in order to evaluate their potential effect on the mediators and outcomes. Next, recovery demands, coping, social support and/or self-efficacy were entered into the regression equations. The interaction terms for the various types of coping, social support, and self-efficacy did not enter any of the models. The interaction between the mediators and recovery demands or complications did not enter any of the models, indicating lack of statistical support for a buffering effect.

Psychological Distress

Several regression models were developed to analyze the direct and interactive effects of coping and social support on the BSI scores. The cross-sectional model accounting for

Table 5.1

Cross-Sectional Model for Psychological Distress at Week 6 (n=80).

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Age,	.021					
Gender	-.059	.004	.004	2,77	0.151	ns
Step 2: Week 6 Demands	.454	.207	.203	3,76	19.455	.000
Step 3: MSPSS	-.327	.311	.104	4,75	11.321	.001
Step 4: Emotive	.531	.567	.256	5,74	43.751	.000
Total Model				5,74	19.354	.000

the greatest amount of variance in BSI scores is displayed on Table 5.1. Age and gender were entered first into the regression and accounted for 0.4% of the variance. The score for recovery demands at Week 6 accounted for an additional 20% of the variance at the second step of the equation.

The MSPSS total score was entered at the third step and accounted for an additional 10% of the variance. The total scores for the MSPSS had the highest zero order correlation with the BSI scores of all the support scores except for the recovery information score. Because recovery information was also significantly correlated with emotive coping (r=-.397), the use of the MSPSS total score resulted in a greater amount of explained variance in the final regression model. Emotive coping, which had the highest zero order correlation of all

the coping scores with the BSI, was entered at the final step in the hierarchy and accounted for an additional 26% of the variance. The final model explained 56.7% of the variance in psychological distress.

The interaction of social support and emotive coping did not offer a significant contribution above the effects of the other variables. Support was negatively related to psychological distress and the relationships for emotive coping and recovery demands were in a positive direction. The relationship between distress and male gender or age was positive but not statistically significant. This model depicts those with higher psychological distress as having high recovery demands, low support, and high use of emotive coping strategies.

A predictive model for the effects of Week 2 recovery demands and informational support on psychological distress at Week 6 is presented on Table 5.2. As noted above, age and gender entered at Step 1 were not statistically significant. Week 2 recovery demands were entered at the second step and accounted for an additional 14.4% of the variance in psychological distress. At Step 3 lower recovery information support at Week 2 contributed an additional 13.7% of the variance in psychological distress above the effects of age, gender, and recovery demands. The total model explained 28.5% of the variance in psychological distress at Week 6. Lower recovery information contributed a greater amount of variance in the outcome than Week 2 general recovery support,

Table 5.2

Predictive Model for Psychological Distress (n=80).

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Age,	.021					
Gender	-.059	.004	.004	2,77	0.151	ns
Step 2: Week 2 Demands	.384	.148	.144	3,76	12.845	.001
Step 3: Week 2 Info.SS	-.386	.285	.137	4,75	14.371	.000
Total Model				4,75	7.464	.000

aid or emotional support. Lower recovery information and higher recovery demands at Week 2 have a direct effect on psychological distress at Week 6. No significant interaction effects were found for support and demands on psychological outcome, indicating lack of statistical support for the buffering effect of social support. Coping strategies were not assessed at Week 2, precluding further testing of coping.

Activity Outcomes

Predictive and cross-sectional models for each of the recovery activity outcomes were developed. Age, gender, recovery demands and complications were entered into the models along with social support and self-efficacy belief scores.

Walking Activity. The high correlation between self-efficacy for walking and walking activity at Week 6 accounts

for a high proportion of explained variance in the cross-sectional model. Week 6 walking activity was best explained by Week 6 self-efficacy for walking (see Table 5.3). Age and gender were entered into the regression at Step 1 and accounted for 15% of the variance in walking. Recovery demands at Week 6 were entered at the second step and accounted for an additional 11% of the variance. Both age and recovery demands had significant negative correlations with walking. Entered at the third step, self-efficacy for walking contributed an additional 46% of the variance. Walking activity at Week 6 is best explained by younger age, less recovery demands, and higher self-efficacy for walking.

Table 5.3

Cross-Sectional Model for Week 6 Walking (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Age	-.360					
Gender	-.144	.153	.153	2,77	7.051	.002
Step 2: Week 6 Demands	-.336	.264	.111	3,76	11.462	.001
Step 3: Week 6 SE Walk	.782	.725	.461	4,75	125.727	.000
Total Model				4,75	49.525	.000

When NYHA status was entered into the regression in place of recovery demands, the total R^2 was only raised to .728 from .725. The high zero order correlation of walking

activity and self-efficacy (r=.84) demonstrates the reciprocal relationship of behavior and efficacy; efficacy for walking is influenced by walking activity. Daily walking was part of the prescribed regime for recovery. Most patients were highly compliant; walking scores averaged 8 blocks to 1 mile at Week 6 which were significantly above mean scores preoperatively. A few patients experienced pre-existing orthopedic, pulmonary, or other conditions that restricted walking ability.

A predictive regression model to explain the effects of Week 2 recovery demands and self-efficacy beliefs on Week 6 walking outcome is displayed on Table 5.4. At Step 1, age and gender explained 15.3% of the variance in walking outcome. Walking activity was associated with younger male patients. Recovery demands at Week 2 explained an additional

Table 5.4

Predictive Model for Week 6 Walking (n=80)

	Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1:	Age	-.360					
	Gender	-.144	.153	.153	2,77	7.051	.002
Step 2:	Week 2 Demands	-.272	.225	.072	3,76	7.061	.009
Step 3:	Week 2 SE Walk	.360	.359	.134	4,75	15.679	.001
Total Model					4,75	10.485	.000

7.2% of the variance in walking outcome when entered at Step 2. At Step 3, self-efficacy for walking at Week 2 predicted an additional 13.4% of the variance in walking at Week 6 above the effects of age, gender, and recovery demands. In this model, 35.9% of the variance in Week 6 walking is best predicted by male gender, younger age, fewer recovery demands at Week 2, and higher self-efficacy for walking at Week 2.

General Activity. The regression results for general activity were similar to those for walking (see Table 5.5). Age and gender were entered at Step 1 and together accounted for 6.8% of the variance. Age alone was significantly correlated with activity, but when entered with gender, was not significant. Week 6 recovery demands were entered at the second step and explained an additional 22.8% of the variance. Week 6 self-efficacy for general activity was entered at the final step and contributed an additional 32% of the variance above the effects of the age, gender, and demands. This model explained 61.3% of Week 6 resumption of general activity. Again, self-efficacy for activity at Week 6 explained the largest proportion of the variance. Age and Week 6 recovery demands had significant negative contributions to resumption of general activity.

When NYHA symptom status was entered in place of recovery demands, the total R^2 explained by the model increased only to .617 from .613. Mean self-efficacy for general activity and general activity scores were high at

Table 5.5

Cross-Sectional Model for Week 6 General Activity (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Age,	-.239					
Gender	-.083	.065	.065	2,77	2.68	ns
Step 2: Demands 6	-.481	.293	.228	3,76	24.51	.000
Step 3: SE Act. 6	.745	.613	.320	4,75	62.02	.000
Total Model				4,75	29.754	.000

Week 6, and like walking scores, were highly correlated (r=.78) at Week 6. General activity scores were higher than walking scores which was consistent with interview data. Patients with walking restrictions reported that they were able to resume other general activities by modifying situations. For example, they could shop if they parked near the store or travel short distances by allowing rest periods. Mean activity scores at Week 6 were slightly above preoperative scores.

The predictive model for Week 6 general activity is displayed on Table 5.6. Age and gender did not contribute a significant amount of variance at Step 1. Recovery demands contributed 8.6% of additional variance. Week 2 self-efficacy for activity accounted for an additional 34.1% of the variance at Step 3. The age, gender, recovery demands and self-efficacy at Week 2 predicted a total of 32.7% of the variance in self-reported general activity at Week 6.

Table 5.6

Predictive Model for Week 6 General Activity (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Age,	-.239					
Gender	-.083	.065	.065	2,77	2.68	ns
Step 2: Demands 2	-.297	.151	.086	3,76	7.70	.007
Step 3: SE Act. 2	.474	.327	.341	4,75	38.00	.000
Total Model				4,75	9.101	.000

Work Resumption. Resumption of work at Week 6 was predicted by a different set of factors (see Table 5.7). Partially due to the smaller sample size for working people, neither age or gender were significantly correlated with work with zero order correlations, and only contributed 10% of the variance at Step 1. Recovery demands did not offer a significant contribution to the regression model. Immediate postoperative complications which extended into the early home recovery period did enter at Step 2 and explained an additional 13.9% of the variance. Self-efficacy for work at Week 2 or Week 6 did not enter the regression, but work activity at Week 2 did enter at Step 3 and accounted for an additional 34.3% of the variance above the contribution of complications. The total model explained 48.2% of the variance in resumption of work for the 43 patients who were working at the time of surgery.

The results for work resumption are mixed due to a number of circumstances. Most patients were advised by their physicians to take 6 to 12 weeks off work for recovery. Therefore, the majority of the patients had not returned to work at 6 weeks or were not working fulltime. A few patients were able to work at home or use computer modems at home to communicate with their usual workplace. Another group of patients reassessed work commitments and considered partial retirement or working parttime. The majority of patients who returned to work prior to 6 weeks tended were self-employed.

Table 5.7

Predictive Model for Week 6 Resumption of Work (n=43)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Age,	.312					
Gender	-.061	.10	.10	2,40	2.248	ns
Step 2: Complications	-.379	.239	.139	3,39	7.124	.011
Step 3: Work act. (Week 2)	.503	.482	.243	4,38	17.826	.000
Total Model				4,38	8.846	.000

At Week 6 the majority of patients reported feeling confident that they could return to work and mean self-efficacy scores were nearly double mean work activity scores. Confidence in being able to return to work may be a better indicator of perceived recovery at Week 6 than actual return to work. Self-efficacy for work was more highly correlated

with general activity and role activity at Weeks 2 and 6 than with work activity. In this study return to work was dependant upon medical recommendations, the absence of postoperative complications, and work activity at Week 2. This finding is consistent with other return to work studies (Dennis et al., 1988).

The interview data were analyzed to better explain work resumption. Several patients mentioned that maintaining contact with work associates or working at home functioned as a coping strategy to overcome boredom or depression. Work kept them from focusing on physical complaints. A few of the younger patients reported a fear of not being able to return to work or concern that there would be a stigma associated with heart surgery that would make them appear less capable of dealing with stress and achievement in the workplace. Resumption of work appears to be highly valued as a measure of personal ability or worth as noted by Kos-Munson et al. (1988). Patients experiencing complications which were more severe were less likely to be able to return to work. Therefore, complications became a better predictor for work than recovery demands. Future testing of these explanations and follow-up of actual time for resumption of work are necessary to clarify the important outcome of return to work.

Health Activity. The poor reliability for self-efficacy and activity for health at Week 6, even without the rehabilitation question, precluded further model testing for health activity. The inflated health efficacy and activity

scores limited testing for health activity outcomes. Mean efficacy for health was high, 9.6 at Week 2, to 9.7 at Week 6, out of a maximum efficacy score of 10. Mean health activity was high at all 3 data collection points, but highest with little variance at Week 6. Health activity at Week 6 was best explained by health activity at Week 2 and was negatively correlated with recovery demands. Self-efficacy for health also was a predictor, but not as highly correlated with the outcome as Week 2 health activity. Any of the statistical findings for health may be spurious because of the low reliability for both the health efficacy and the health activity scales.

Twenty-five of the 81 patients reported that they did not always "exercise as much as instructed." This group includes patients who had other health problems restricting activity as well as those who did not exercise for other reasons. Not always following the recommended diet was noted by 14 patients. Seven of the 24 smokers had resumed smoking to some extent. Two patients reported they did not always take care of themselves to maintain their health. Only 1 patient had actually begun a rehabilitation program although several patients planned to join a program in the near future. Some patients mentioned interest in a program if it was available and not too expensive, while others stated that they did "not need" a program because they exercised regularly on their own. These findings have important

implications for patient teaching and counseling after surgery.

Role Resumption. The regression model for resumption of roles is portrayed in Table 5.8. Age and gender were entered at Step 1, accounting for 11.4% of the explained variance. Age was significantly correlated with role activity in a positive direction. Week 2 recovery demands accounted for an additional 4.6% of the variance at Step 2. Week 2 self-efficacy for role resumption entered at Step 3 and explained an additional 46.3% of the variance in resumption of roles. The total model predicted 62.3% of the variance in resumption of roles.

Table 5.8

Predictive Model for Week 6 Resumption of Roles (n=80)

Source	Beta	Cum R^2	R^2 Change	df	F	p
Step 1: Age,	.337					
Gender	-.025	.114	.114	2,77	4.947	.010
Step 2: Demands 2	-.218	.160	.046	3,76	4.162	.044
Step 3: SE Roles (Week 2)	.734	.623	.463	4,75	92.109	.000
Total Model.				4,75	31.02	.000

Self-efficacy at Week 6 only contributed 14.6% (p=.000) additional variance when it was entered at Step 3. Self-efficacy at Week 6 had peaked with a mean of 9.5 out of a

maximum of 10, with little variance in scores. The ceiling effect decreased the amount of variance and prediction. Role resumption was best predicted by self-efficacy at Week 2, older age, and inversely by recovery demands. The 3 work items were removed from the scale for retired patients, as were items regarding relationships with the spouse or others in the home if they did not apply to the living situation. The omission of work items may contribute to the higher mean scores for the older patients.

Summary of Cardiac Recovery Models

The general recovery model was only partially supported. The direct effects of self-efficacy beliefs on activity outcomes, and lower social support and emotive coping on psychological distress were supported. The buffering effect of social support or coping strategies with recovery demands was not supported in this study. It was anticipated that the development of a recovery specific support measure would enable assessment of the interaction. The sample may have been too small to detect an interaction for variables with small effect sizes. Neither problem-oriented coping nor any of the coping, social support, and self-efficacy interactions demonstrated statistical significance. Recovery demands demonstrated direct negative effects and self-efficacy beliefs had positive effects on walking, general activity, health and role resumption. Work outcomes were most strongly predicted by complications and work activity at Week 2.

Psychological distress was positively correlated with recovery demands and emotive coping, and negatively with social support.

Discussion of the Major Variables

Findings for each of the predictor and outcome variables are presented in the following section. Comments regarding interactive effects which were found in the analysis of the interview data are included in the discussion of the models and variables.

Social Support

Social support demonstrated a direct inverse relationship with psychological distress measured with the BSI. The Multidimensional Scale of Perceived Social Support (MSPSS) achieved desirable reliabilities in this study. Age and gender differences were not found, but married patients had significantly higher total scores and scores for support from the significant other. The MSPSS was only administered at Week 6 precluding assessment of changes in source specific support during recovery.

The investigator developed Recovery Support Scale (RSS) achieved desirable reliability for the total scale and for the emotional support scale preoperatively and at Weeks 2 and 6. Reliabilities for the the aid subscale and the information subscale preoperatively were less reliable. Inter-item correlations revealed that 3 items on the aid scale did not correlate well with the other scale items or the total scale. These items represented the excessive or

unwanted offers of assistance frequently mentioned by recovering patients, and are not consistent with the generally positive perception of support covered by the other items on the instrument. Deletion of the 3 items raised the Cronbach reliability alphas for the aid subscale to an acceptable level.

Preliminary factor analysis suggested 4 primary factors within the total scale. The first factor included items on the emotional support subscale, having someone special available to talk with and obtaining reassurance. These items represent emotional and appraisal support. The second factor emerged with items from the informational support subscale pertinent to obtaining recovery information and knowing what to expect. The next 2 factors contained instrumental support items on the aid subscale. One factor identified assistance with the recovery regimen and the other identified assistance with household tasks. The next 2 factors contained items from the aid subscale related to either not having someone to help or getting too much help. These items were the items that contributed to the lower reliability scores for the aid subscale. The remainder of the factors were less discrete and distributed among the 3 subscales. Further testing and refinement of the instrument are necessary prior to use in future research. Multiple dimensions of support are included on this instrument. Further factor analyses would require a larger sample size.

The Recovery Support Scale was administered in the hospital preoperatively and many of the aid items did not apply to patients who did not have physical limitations. Rewording of the items is necessary to cover these situations. Telephone administration of the instrument at week 2 was problematic. Patients resorted to "yes" or "no" responses and did not answer all the questions as they became fatigued. A shorter instrument with a simpler sliding scale is indicated for telephone data gathering.

The decrease in recovery support at Week 2 may be attributed to the difference in data collection methodology, or perception of support may have decreased in the context of increased need for support at Week 2. By Week 6 all of the recovery support scores were above the preoperative mean. Perception of support may have been inflated as the patients recovered. In the interviews at Week 6, patients reported increased independence and less need for assistance, information, and emotional support.

The use of different measures and time periods limits comparison of results. Rankin (1988) reported that mean levels of perceived network support in her sample of cardiac surgery patients increased from baseline to 1 month and then decreased at 3 months, although the mean was still higher than the baseline mean. It is most likely that the decline in scores in the present study was due to differences between administration by telephone at Week 2 and paper and pencil self administration at the other 2 data collection points.

The only statistically significant age difference in support was the negative correlation between age and preoperative emotional support. The age difference is consistent with Rankin's (1988) study findings in which younger cardiac surgery patients had higher mean levels of support than older patients.

The buffering effect of social support on stress was not statistically supported in this study. It was anticipated that assessment of recovery specific demands and support measures would enhance the ability to identify the buffering effect. The direct inverse relationship was supported between psychological distress and general support (MSPSS) and its source specific subscales, and recovery specific support and the informational support subscale. These findings suggest that both lack of support and recovery information can lead to distress. An alternate explanation is that persons with high distress, possibly from excessive recovery problems, do not perceive they have adequate support and information. The reciprocal process noted by Barrera (1986) which exists between stress and support may explain the relationship among recovery demands, distress, and support in this study. The direction of causality is difficult to determine but the findings underscore the clinical importance of adequate information and support during recovery.

The perception of support as overprotectiveness noted by Antonucci (1985) and Rook (1984) emerged when individual item

scores for instrumental support were examined. At both Weeks 2 and 6, patients tended to agree with the statements that, "My family or friends try to do too much for me," and "Other people don't let me do as much as I think I can do." This contention was also noted in interview comments such as, "My wife, the mother hen," or "My family won't allow me to do anything even though I feel fine." Identification of the impact of the over-protective nature of support was not the purpose of this study, but patients did comment on restrictions imposed by family which limited walking, delayed return to work, or discouraged them from attending social functions. Incorrect timing or type of support as discussed by Jacobson (1986) may have contributed to negative perceptions of the supportive acts of others.

The only significant correlations between support and the self-efficacy or activity scales were the total MSPSS and self-efficacy for general activity at Week 6, and the recovery information subscale and Week 6 health activity. Patients mentioned numerous supportive acts which assisted their recovery, such as assistance with tasks which enabled the patient to conserve energy for activities like walking, being driven to appointments, preparation of food in accordance with the recommended diet, or cessation of smoking by family members in support of the patient's efforts to abstain. Family support may have been a role expectation (Thoits, 1985) not specifically accounted for by the patients completing the instruments. Another explanation emerged

based upon observations during the hospital and telephone interviews. A few patients stated they did not anticipate needing any help and rated support low throughout the study. These same patients often had spouses, family or friends available and willing to help. Most likely a difference existed in perceived and received support. Difficulty in measuring these various interpretations of support further confounds understanding the effect of support on recovery outcomes.

Recovery information support was the only support measure significantly correlated with walking, general activity, health, and resumption of roles. Information at Week 2 was positively correlated with Week 2 walking, health, and role activity; and with Week 6 walking, health, and general activity (p=.03 to p=.001). Information at Week 6 was positively correlated with health activity. Further, information at Week 2, but not at Week 6, was significantly correlated with self-efficacy for walking, general activity, health, and resumption of roles at Week 6 (p=.02 to p=.000). These findings suggest that recovery specific informational support does influence self-efficacy and activity in these domains. This finding has important clinical implications for teaching. Patients who perceive that they have sufficient information early in recovery are more confident and achieve higher activity outcomes than patients without this information. An alternate explanation is that

efficacious patients were able to obtain recovery information, enabling them to achieve higher activity levels.

Patients in this study were able to mobilize assistance during the crisis period. Most patients in this study lived with someone or had a family or friend live with them during the first few weeks. Four patients with physical problems beyond the capabilities of family to manage, went to extended care facilities for a few days before returning home. Neighbors, friends, or family members who were nurses were frequently mentioned as a source of reassurance or information, particularly during the first few days at home.

Support and coping interactions and support and self-efficacy interactions were explored to examine coping and efficacy enhancement effects noted in the theoretical literature (Antonucci & Jackson, 1987; Lazarus & Folkman, 1984; Pearlin & Aneshensel, 1986; Thoits, 1986). These effects were not statistically supported in this sample. Analysis of the qualitative data did reveal an interactive effect with comments such as the following:

> If it wasn't for my family, I don't know how I would have dealt with my feelings. Even when I was depressed or irritable, they were patient and let me vent my feelings. They were good listeners and just were there when I needed them.
>
> My daughter made me get dressed and go for a walk with her every day. Now I am able to get out and walk on my

own. When I first came home I didn't want to do anything, but I knew I should.

The interactive and buffering effects of support were not statistically supported, although the benefits of support were reported in the qualitative data. Also, support on the MSPSS only demonstrated an effect with psychological distress and with self-efficacy for general activity, but the interviews revealed several examples of support enhancing walking, general activity, health activity, and resumption of work and roles. The negative aspects of the supportive relationships were not fully analyzed for their effects on self-efficacy or outcomes. Direct and indirect acts by supportive others provided information, assistance, environmental management, and encouragement. These behaviors were reported verbally by the patients, but not detected by the instruments. The effects may not have been powerful enough to be detected with this size sample or the relationships were more complex than the linear analytic techniques were able to detect.

Coping

Confrontive or problem-oriented coping behaviors did not contribute to the activity or psychological outcomes measured in this study, although they were the most frequently used coping strategies. The relationship between recovery outcome and use of problem-oriented coping strategies may be more complex than the linear relationship examined in this study. Greater specificity in measurement of the problems and

outcomes may better capture the relationship of problem-oriented coping and outcomes.

The coping strategies reported by the patients during the telephone interviews were congruent with the findings on the Jalowiec Coping Scale. Additional strategies reported by patients were self-reliance/will-power to overcome the discomforts and problems encountered during recovery, having a positive attitude towards recovery, and having confidence in having a full recovery. The patients reported specific problem-oriented coping strategies which were effective in managing problems, such as pain or fatigue, and palliative measures which were helpful in dealing with the distress created by such problems. The interactive effects of coping and support were not statistically confirmed. Tools to measure problem specific coping strategies along with a fully developed recovery support measure may further explicate the interactive effects of coping and social support.

There are other possible explanations for the lack of evidence for the effectiveness of confrontive coping. Patients employed a broad repertoire of coping strategies to deal with recovery demands. Having the ability to flexibly utilize a variety of strategies may be more effective in managing problems than simply using problem-solving or emotive coping strategies. If patients were able to effectively resolve or avoid the problems as they occurred, recovery outcomes may not have been affected or the effect detected. General confrontive coping might not demonstrate a

statistically significant effect on recovery even though patients reported a high use of problem-oriented or confrontive strategies. Possibly, problems which were not able to be resolved created more distress, hence the higher use of emotive coping strategies and higher BSI scores for patients with health complications and recovery demands.

The results of this study did not concur with the results of the high ratio of problem-focused/emotion-focused (P/E) coping behaviors correlating with social adjustment in myocardial infarction (MI) patients as reported by Keckeisen and Nyamathi (1990). The differences may be due to several factors. They used a smaller sample (n=30), had low alpha reliability scores for the affective-oriented coping scale in their sample, and used a different measure for psychological distress and social environment, the PAIS-SR. Seventy-three percent of their sample had a P/E ratio greater than 1, compared to 95-96% of the sample in this study, indicating greater use of problem-focused coping strategies by surgical patients in this study. There may be a difference in type, duration, and personal meaning attached to the problems encountered by the 2 different groups. For example, the surgical patient may expect that his medical problem is cured, at least temporarily, but the medical patient may use more emotive coping techniques as he adjusts to the diagnosis of disease.

The buffering effects of coping were not supported in this study. Emotive coping had a direct positive

relationship with psychological distress and no effect on the other outcomes. Christman and associates (1988) also found a positive correlation between emotive coping and psychological distress. Patients with greater distress would be expected to have more affective behaviors, but the causal relationship cannot be clearly determined.

The correlations with emotive or affective coping, recovery demands, and the BSI were all significant in a positive direction, while the ratio of problem-oriented to affective-oriented coping was negatively correlated with the BSI. One interpretation of this finding is that patients who use a higher proportion of problem-oriented strategies experience less distress. An alternate explanation may be that these patients were able to resolve problems, needed fewer emotive coping strategies, and subsequently experienced less distress. In order to explore this question further, recovery demands were added to a regression equation for distress. Demands were related to distress, but the ratio of problem-oriented coping to affective coping nor the interactions of the ratio and demands did not make a significant contribution above the amount of variance accounted for by demands. More frequent and specific measurement of coping and demands along the recovery trajectory might clarify these relationships.

Psychological Distress

The BSI is a global measure for psychological distress that had acceptable reliability in this study. Anxiety and

depression are dimensions of psychological distress that are frequently reported in studies including psychosocial dimensions of recovery. The alpha coefficients for reliability were less acceptable for the subscale scores, but the reliabilities for the anxiety and depression subscales were acceptable in this study. The mean scores for the sample were below the gender specific published means for psychiatric disorder preoperatively and postoperatively. Men's preoperative anxiety exceeded the mean score for disorder and postoperative depression was near the mean. There were no statistically significant age or gender differences in Week 6 BSI total or subscale scores.

Examination of the individual scores on the BSI revealed that 37% of the patients preoperatively and 31% of the patients at Week 6 exceeded the norm for caseness (Derogatis, 1982). Of this group with high distress, 1/3 of the group increased distress, 1/2 of the patients had decreased distress, and the remainder were unchanged. The finding of psychological distress in 31% of the patients is consistent with reports of poor psychological adjustment and emotional distress noted postoperatively in numerous other studies with percentages ranging from 25% to 40% of open heart surgery patients (Jenkins et al., 1983; Magni et al., 1987; Mayou, 1986; O'Connor, 1983; Zyzanski et al., 1981).

For the total sample the only statistically significant change from preoperative assessment to Week 6 outcome was a decrease in anxiety. Although not statistically significant,

the mean scores for depression and hostility increased. These findings are consistent with the interview data. Postoperatively, patients were relieved that the surgery was over, but frequently reported that they were bored, "felt blue", or "felt sad for no reason". The increase in hostility is more difficult to explain. A few patients reported feeling quite frustrated with the slowness of recovery or feeling angry over continuing symptoms, financial problems, or difficulty with insurance and hospital bills. Possibly at Week 6 patients were feeling more vigorous and less dependent, allowing feelings of hostility towards external factors to emerge (Lipp, 1977). The relationship of mood to self-efficacy, activity, and other outcomes in the early recovery period needs further examination.

Self-Efficacy and Corresponding Activities

The reliabilities for the self-efficacy and activity scales in this study were acceptable for walking, general activity, work, and resumption of roles. Self-efficacy and activity for health had low reliability. Deletion of the rehabilitation question improved reliability, but the Week 6 reliability alphas were still low. Scores for the 4 activity scales besides work were high at Week 6, demonstrating how rapidly patients recovered during the first 6 weeks. Interventions targeted at self-efficacy enhancement need to be implemented during this early recovery period, such as the intervention in the "Improving Recovery from Cardiac Surgery"

clinical trial (Gilliss et al., 1989; Gortner & Jenkins, 1990).

The specific results for self-efficacy beliefs and corresponding activities were presented and discussed in the first section of this chapter. The self-reported activities of walking, general activity, return to work, and resumption of roles declined at Week 2, but increased at Week 6. The means for all self-reported activies except work were above the preoperative means. Self-efficacy beliefs for all behaviors increased from Week 2 to Week 6, but was not assessed preoperatively. Gilliss et al. (1989) reported an increase in general activity at Week 4 for experimental patients, and an increase in both walking and general activity at Week 8 for both experimental and control patients. In the present study, efficacy for return to work decreased at Week 4, but increased at Week 8, although it was still below the preoperative efficacy for work. Self-reported activity for walking and general activity increased at both Weeks 4 and 8, above the preoperative means for activity. Work activity was low at Week 4, but above the preoperative mean at Week 8 in the Gilliss study. The findings from the 2 studies imply that walking and general activity increase most rapidly between Weeks 2 and 4, and work increases between Weeks 6 and 8. In the Gilliss et al. study, postoperative weeks were counted from time of discharge, but in the current study postoperative weeks were

measured from date of surgery, limiting exact comparison of the timelines.

Self-efficacy and activity for health were high at Week 2 and higher at Week 6, indicating a high degree of compliance with recommended exercise, diet, and other health behaviors during this intensive recovery period. The low reliabilities for the health scales were disappointing and confounded statistical analyses, but item analysis provided useful clinical information on problematic areas for health maintenance.

Patients were not followed until they returned to work. Work efficacy was high at Week 6. The qualitative information regarding the options of parttime work, working at home, and the value of work for some of the patients provided additional insight into the importance of work as an outcome. Options for work and counseling regarding return to work are important to include in postoperative teaching and counseling

Recovery demands were negatively correlated with self-efficacy and activity. The total scores on the BSI demonstrated a significant negative correlation with self-efficacy for general activity, and self-reported walking and general activity. Depression was not significantly correlated with any efficacy or activity measure at Week 6. Anxiety was negatively correlated with self-efficacy for walking and walking activity. These findings are difficult to interpret. Another factor may account for the distress,

recovery demands, and the effect on self-efficacy and activity. Walking was mentioned by some patients as a mechanism to cope with depression or boredom. Most likely the relationships are reciprocal and would be better explained in an intervention study.

Summary

Exploratory testing and analysis to clarify findings and identify factors associated with poor and optimal recovery were undertaken. Predictive models were examined for each of the recovery outcomes. The influence of age, gender, and recovery demands was examined in each of the models. Emotive coping and support both were related to psychological distress. Self-efficacy remained a strong predictor for walking, general activity, and resumption of roles. The models for health and work were more difficult to interpret.

The redrawn cardiac recovery model based upon the findings is presented in the final chapter. The limitations and implications of this study are then discussed.

CHAPTER SIX

SUMMARY AND CONCLUSIONS

This chapter begins with a presentation of the reconceptualized cardiac surgery recovery model based upon the findings of this study. Then the significance and limitations of the study are examined. The chapter concludes with a discussion of the implications for nursing and recommendations for future research.

Cardiac Recovery Model

The redrawn model in Figure 5.1 displays the results of this study. Recovery specific demands emerged as having a greater effect on recovery outcome than NYHA symptom status. The other change due to the lack of statistical support for a mediating or an interaction effect. All the relationships are depicted as direct effects. Problem-focused coping was not statistically related to any of the recovery outcomes. The relationships among the outcomes and the variables of coping, self-efficacy, and social support were examined preoperatively, and at Weeks 2 and 6 postoperatively.

Self-efficacy and recovery demands were related to the recovery outcomes of walking, resumption of general activity and social roles. Return to work was directly related to Week 2 work activity, since most employed patients had not returned to work at Week 6. Health activity was difficult to interpret due to the inflated health scores. Most patients followed recommended health activities and did not yet

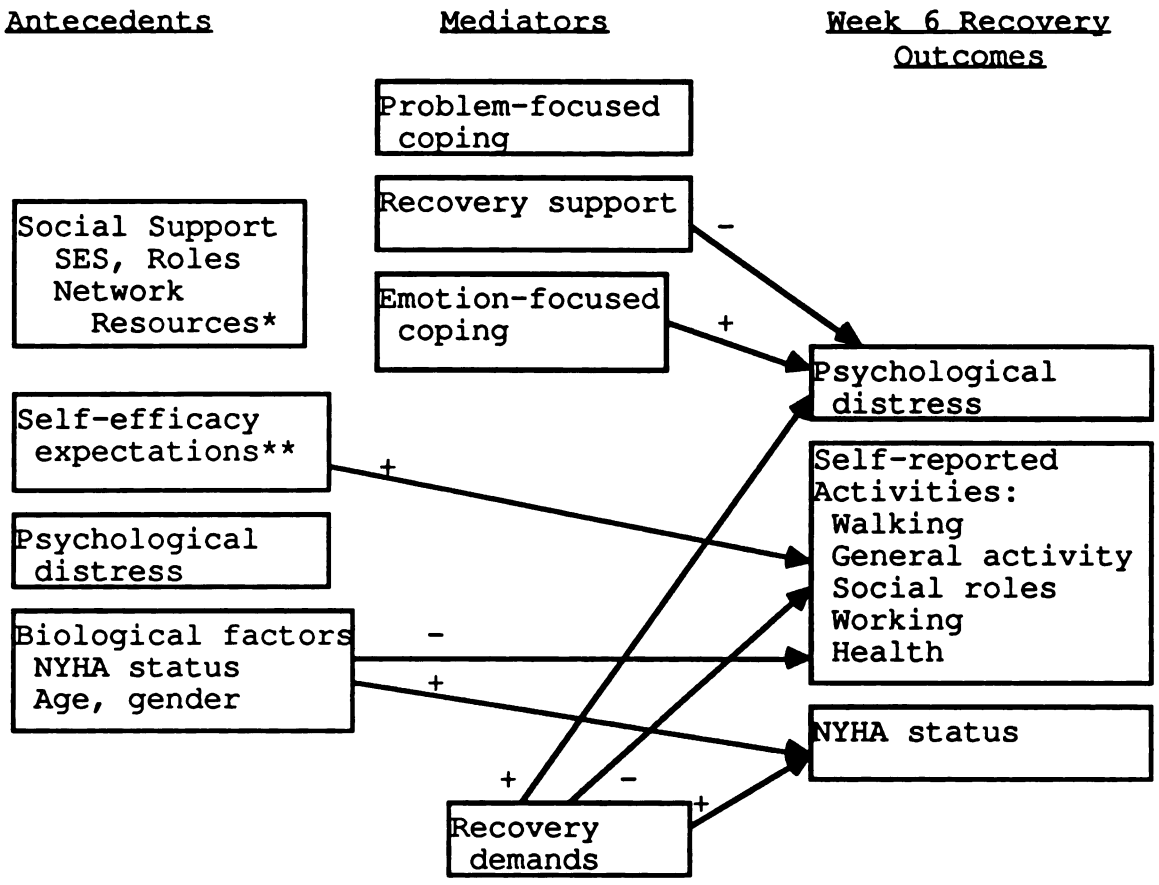

Figure 5.1. Cardiac Surgery Recovery Model Reconceptualized (Operationalized from Surgery to Week 6).

* = Not tested
** = Measured at 2 weeks postoperatively
Dotted line = buffering effect
Solid line = direct effect

participate in rehabilitation programs. Psychological distress was associated with higher emotive coping strategies, less support, and more recovery demands.

Interaction or buffering effects were not detected above the direct effects of the variables. Recovery information

contributed to several of the outcomes, more than emotional and instrumental support or source specific support. Problem-solving coping was listed as the most frequently used coping strategy, but did not emerge as statistically significant for the outcomes in this study.

Significance

The study of cardiac surgery recovery at Week 2 and Week 6 with both interviews and standardized questionaires yielded important information and generated new questions. The information from the telephone interviews supported the theoretical reciprocal relationships among the variables in this study and provided insight into recovery demands and coping mechanisms. The lack of statistical support for the effect of problem-oriented coping suggests the need for a microanalytic approach using a recovery specific coping measure to understand the relationship of coping and outcomes in the convalescing surgical patient.

The unique combination of variables within the stress and coping framework provided insight into the theoretical reciprocal relationships between coping, social support, and self-efficacy. Emotive coping and social support were related to the psychological outcomes in this study. Informational recovery support and self-efficacy were linked to the Week 2 recovery outcomes of walking, health activity, and resumption of roles. The relationship of confrontive coping and self-efficacy was not statistically supported, but

emotive coping and social support were directly related to psychological distress.

The self-efficacy findings build upon the research reported by Gortner (Gortner et al., 1988; Gortner & Jenkins, 1990) and Jenkins (Jenkins, 1985; Jenkins, 1987). This study included the variables of coping and social support in addition to examining self-efficacy with another sample of cardiac surgery patients.

The unique assessment of recovery specific support demonstrated possibilities for future research. The preliminary information from inter-item correlations, correlations with the MSPSS, factor analyses, and reasonable reliabilities for the scale and subscales encourage further research. The influence of recovery information and self-efficacy on recovery outcomes is of particular interest for further testing with other clinical groups. The study provided insight on further differentiation of the items.

Finally, the employment of several predictor variables and multiple outcomes provided a composite picture of the first 6 weeks of recovery following cardiac surgery. The validity of the findings was supported by the use of multiple measures and methods.

Limitations

The limitations of this study must be considered prior to generalizing the results to other populations. First, the sample for this study was one of convenience and primarily consisted of Caucasian men from 3 community hospitals in 1

metropolitan area. Although longitudinal, the study was conducted over a limited time period of 6 weeks. Because of the large number of variables being studied, not all questionnaires were administered preoperatively and at Week 2, limiting ability to determine some of the changes in efficacy, coping and support.

The response rate was excellent for both induction into the study and completion of the questionnaires and interviews. Patients who were too ill prior to surgery or who experienced major complications postoperatively were ecxcluded from the study, limiting the study to patients with more optimal recovery.

The sample size was adequate for the original research questions. The sample was too small for adequate factor analyses and testing of multiple interactions.

The reliance on self-report measures is another limitation of the study. Corroboration of the findings with postoperative chart reviews and interviews with the patient's family or significant others was not included in the study design. The intent of the study was to assess recovery from the patient's perspective.

The reliability of the measures were generally adequate. Exceptions were the self-efficacy and activity for health, recovery aid and preoperative information, palliative and affective coping, and several of the BSI subscales, which were used in regression analyses. The findings with the

Recovery Support Scale must be viewed with caution until further testing of the instrument is accomplished.

Implications for Nursing

Clinical implications primarily focus on identification of patients at risk and intervention with patients more likely to experience distress or less likely to resume activities and roles after surgery. Analyses of the interview data and item analyses of the instruments generated additional implications for nursing.

First, the mean scores for the sample increased over time in depression and hostility, and significantly decreased in anxiety. At Week 6, 31% of the patients exceeded the norm for psychological distress. Distress was associated with high recovery demands, low support, and high use of emotive coping strategies, although the directional causality could not be determined. These findings suggest that patients need an opportunity to work through their feelings and possibly need help with meeting high recovery demands or problems during their recovery at home. Nursing interventions need to continue beyond the immediate hospital recovery period and patients must be prepared for potential problems after surgery.

Reduction in walking and general activity were associated with older age, higher recovery demands, and lower self-efficacy for walking and general activity. Postoperative follow-up of recovery problems and interventions to increase self-efficacy are suggested.

Improved assessment of factors restricting walking and activity, particularly with the elderly or those individuals with coexisting health conditions is indicatied.

The clinical implications for assisting patients with return to work are mixed. Return to work largely depended upon physician recommendations, although most patients felt confident in their ability to work by 6 weeks. Improved assessment of ability to work, such as the techniques employed in the Stanford Return to Work Trial (Dennis et al., 1988), might be appropriate for some of these patients. Younger employed male patients frequently expressed boredom, depression, and worry about not being able to work. Counseling, exploring the possibilities of parttime work or working at home, or suggestions on how to utilize time during home recovery are some of the considerations for patient interventions.

Younger patients with higher recovery demands and lower self-efficacy scored lower on self-reported activity for resumption of social roles, including work relationships. Clinical implications for assisting patients with role resumption are similar to those for return to work. Assessment of expectations and barriers to resumption of roles precedes intervention with individual patients.

Examination of the specific items for maintenance of health activities suggested several areas for clinical intervention. Not following the prescribed regimen was mentioned by 25 patients for exercise and 14 patients for

diet. Seven of the 24 smokers had resumed smoking. The explanations given by patients were varied from not having a safe, warm, flat area to walk; having other health problems which limited walking; or a dislike of exercise. Diet adherence was problematic for patients who lived alone or experienced fluctuations in appetite. Occasionally, patients wanted more dietary information. A few of the smokers said they would quit if they were in a program for smoking cessation. Continued follow-up of discharge teaching after hospitalization is suggested for these patients. The possibility of having comprehensive rehabilitation programs available for all patients or at least those experiencing problems seems warranted to avoid additional problems in the future.

Future Research

Implications for future research are numerous as noted in the analysis and discussion of the results of this study. First, continued study of the group with a follow-up at 1 year to determine longterm recovery outcome is being planned. Findings for return to work, continued health maintenance activity, and resumption of social roles might be clarified by this additional information. Also, further analysis and reporting of the qualitative data from the interview will be undertaken.

Second, further refinement and testing of the Recovery Support Scale is indicated. The questions need to be rephrased to cover "not applicable" situations. Items

demonstrating nonsupport or conflict need to be separated into another scale. Revision of the scale to avoid dicotomous answers and shortening of the instrument for telephone administration need to be explored. Testing of the instrument's validity and reliability should be conducted with another cardiac sample or with a different recovery situation.

Third, the findings for the effects of coping might have been clearer with a recovery specific coping measure and a microanalytic approach to assessment of coping. Data from the interviews may be helpful in determining which factors to assess. The use of problem-specific coping behavior needs to be tested in future research.

Finally, the study needs to be replicated in another sample and setting to validate the findings. Intervention studies to further determine the relationships among the variables and causal mechanisms needs to be undertaken. Each study will add to the body of information on cardiac surgery recovery with the intent that further understanding will enable development of appropriate interventions to promote optimal recovery.

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APPENDIX A

Data Collection Plan

Appendix A

DATA COLLECTION PLAN

Preoperative (In Hospital)	Two Weeks Postoperative	Six Weeks Postoperative
Patient Profile	RDCR*	RDCR*
Recovery Support Scale	SE&A*	SE&A*
Jalowiec Coping Scale	Recovery Support Scale*	Recovery Support Scale**
Brief Symptom Inventory		Brief Symptom Inventory**
Activity Scale of SE&A		Jalowiec Coping Scale**
		MSPSS**

Instruments:
Patient Profile
Recovery Support Scale
Jalowiec Coping Scale
Brief Symptom Inventory (BSI) (Derogatis)
SE&A = Self-Efficacy and Activity (Jenkins)
RDCR = Recovery Demands and Coping Resources
MSPSS = Multidimensional Scale of Perceived Social Support (Zimet)

* = Phone Interview **= Mail

APPENDIX B

Consent To Be A Research Subject

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
CONSENT TO BE A RESEARCH SUBJECT
CHR#H555-05632-01

A. PURPOSE AND BACKGROUND:
I have been asked to participate in this study to learn more about the process of recovery from heart surgery. This study is being conducted by Ann Doordan, R.N., M.S., a doctoral candidate in the Department of Family Health Nursing at the University of California, San Francisco, under the direction of Susan R. Gortner, Ph.D., R. N., (sponsor) and Sally Rankin, Ph. D., R. N., and Leonard Pearlin, Ph. D. (committee members).

B. PROCEDURES:
If I agree to be in this study, the following will happen:

1. I will be interviewed in the hospital with questions about my usual activity and health, which will take approximately 15 minutes. My hospital record will be reviewed to provide information on my medical status.

2. I will be asked to complete checklists about my resources for recovery and my feelings, which will take about 25 minutes of my time.

3. I will be contacted at home by telephone and asked again about my recovery. These telephone interviews will occur two weeks and six weeks after my surgery at a time that is convenient to me. The interviews will last approximately 20 minutes.

4. I will receive by mail in six weeks checklists asking about my perceptions and activities during recovery. These questions will take approximately 35 minutes to answer and can be completed at my convenience and returned by prepaid mail. I may be contacted at 6 to 12 months after my surgery regarding my recovery at that time.

Participation in this study will take a total of approximately 1 hour for interviews and 1 hour to complete the paper and pencil checklists.

C. RISKS/DISCOMFORTS:
There are some possible risks or discomforts from being in this study:

1. I may find the interviews or completion of the forms tiring or the questions might bring to mind some things I might not care to think about. I may decline to answer the question or stop the interview at any time that I wish.

2. I have been told that my name will not be recorded on the forms or the interviews and that my answers will be used only for the purposes of this study. No individual identities will be used in any reports or publications resulting from the study. Interview information will be identified by a code number and kept in locked files at all times. Only the investigator will have access to my records.

D. BENEFITS:
There will be no direct benefit to me from participating in this study. A possible benefit is the opportunity to discuss my recovery. The anticipated benefit of this study is a better understanding of patient responses during recovery and this knowledge may be helpful for other patients.

E. ALTERNATIVES:
If I chose not to participate in this study, my care will not be affected in any way.

F. COSTS:
There will be no costs to me as a result of taking part in this study.

G. REIMBURSEMENT:
I will not be reimbursed for participating in this study.

H. QUESTIONS:
I have talked to Ann Doordan about this study, and have had my questions answered. If I have any further questions about the study, I may call her at (415) 941-2893, or her sponsor, Dr. Susan R. Gortner at (415) 476-4434. If for some reason I do not wish to do this, I may contact the Committee on Human Research, which is concerned with protection of volunteers in research projects. I may reach the Committee office between 8:00 AM and 5:00 PM, Monday to Friday, by calling (415) 476-1814, or by writing to the Committee on Human Research, Suite 11, Laurel Heights Campus, Box 0616, University of California, San Francisco, CA 94143.

I. CONSENT:
I have been given a copy of this consent form to keep.

PARTICIPATION IN RESEARCH IS VOLUNTARY. I am free to decline to be in this study, or to withdraw from it at any point. My decision as to whether or not to participate in this study will have no influence on my present or future status as a patient or any relationship with U.C.S.F.

_____ _____
Date Subject's Signature

_____
Person Obtaining Consent

University of California, San Francisco
Experimental Subject's Bill of Rights

The rights below are the rights of every person who is asked to be in a research study. As an experimental subject I have the following rights:

1) To be told what the study is trying to find out,
2) To be told what will happen to me and whether any of the procedures, drugs, or devices is different from what would be used in standard practice,
3) To be told about the frequent and/or important risks, side effects or discomforts of the things that will happen to me for research purposes,
4) To be told if I can expect any benefit from participating, and, if so, what the benefit might be,
5) To be told the other choices I have and how they may be better or worse than being in the study,
6) To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study,
7) To be told what sort of medical treatment is available if any complications arise,
8) To refuse to participate at all or to change my mind about participation after the study is started. This decision will not affect my right to receive the care I would receive if I were not in the study,
9) To receive a copy of the signed and dated consent form,
10)To be free of pressure when considering whether I wish to agree to be in the study.

If I have other questions I should ask the researcher or the research assistant. In addition, I may contact the Committee on Human Research, which is concerned with protection of volunteers in research projects. I may reach the committee office by calling: (415) 476-1814 from 8:00 AM to 5:00 PM, Monday to Friday, or by writing to the Committee on Human Research, University of California, San Francisco, CA 94143.
(6/4/90)

APPENDIX C

Patient Profile

Appendix C

PATIENT PROFILE
(In Hospital Interview)

Code _____ CHR#H555-05632-01 Date_____
Site _____

1. List those persons who will be **available** to you during your recovery at home.
   Name: *Relationship*:

2. Are there **other persons** who would be available if you need assistance after you go home.
(Prompts: help with care, house, transportation, from friends, family, neighbors, co-workers)
   Name: *Relationship*: *Help*:

3. Are you **employed**? Yes__(1), No__(0), Retired__(2), Other__(3)

   What is/was your **occupation**? Spouses occupation?
   __1. High executive, large business
   __2. Manager, medium business, professional
   __3. Administrator, small business
   __4. Clerical, sales
   __5. Skilled manual
   __6. Machine operator, semi-skilled
   __7. Unskilled
   __8. Housewife
   __9. Other:

4. **Do you plan to**:
   ___(3)return to work
   ___(2)retire
   ___(1)change jobs
   ___(0)change work hours or responsibilities

5. What do you estimate is your **family income**?
   Below $20,000___
   $21-40,000 ___
   $41-60,000 ___
   $61-80,000 ___
   Above $81,000 ___

6. Highest **educational** level attained.
   ___(7) grades1-6
   ___(6) grades1-9
   ___(5) grades 1-11
   ___(4) high school graduate
   ___(3) some college
   ___(2) college graduate
   ___(1) graduate degree

7. Describe your most important **leisure or recreational** activities.
   Activity: *Frequency per week:*
   Other:

8. Describe your most important **social activities**? (church, clubs)
   Activity: *Frequency per week:*

9. Describe your typical household/family **responsibilities**.
   House work: all__, light only__, none__
   Yard/Garden: all(mow, dig)___, light__, none__
   Meals, groceries: all__, shares__, none__
   Dependents under 18 years of age____
   Care for other adults____
   Other:

10. Which **activities** that you would like to be able to do, have you not been able to do prior to surgery? How **important** are these activities?
    Activity *Importance*

11. Rate your current status **(NYHA)**:
    __(1) Class I: No symptoms.
    __(2) Class II: Comfortable at rest but with symptoms with ordinary activity.
    __(3) Class III: Comfortable at rest but with symptoms with less than ordinary activity.
    __(4) Class IV: Inability to carry on any physical activity without discomfort. Symptoms may be present at rest.

12. **Before surgery how often did you have problems with:**

	often	some	never
appetite	_____	_____	_____
ability to sleep	_____	_____	_____
vision	_____	_____	_____
ability to walk	_____	_____	_____
level of energy	_____	_____	_____
level of comfort	_____	_____	_____
emotional state	_____	_____	_____
sexual satisfaction	_____	_____	_____
other:			

13. **Address and phone number** where you can be reached for the first three months after you are discharged from the hospital.
    When would be a good **time of day** to call in 10 days___, in 1 month___

14. Name and address of a **friend or family member** who will know where you are during the next three months.

PATIENT PROFILE-PART TWO

(Chart Review) Code_____

1. **Age**_____ Birthdate_____
2. **Sex**_____(M=1,F=2)
3. **Marital Status**____(1=married, 2=separated, 3=divorced, 4=widowed, 5=nevermarried)
4. **Ethnicity:** ___(1=Asian, 2=Black, 3=Caucasian, 4=Hispanic, 5=Other)
5. Date of **surgery** _____
6. Date **discharged** _____
7. Length of **ICU** stay _____
8. Length of **stay** _____
9. Type of **surgery:** ____
   1. Coronary bypass (CABG) vessels bypassed:_____
   2. MVR_____ 3. AVR_____ 4. CABG and valve_____
   5. Redo CABG___ (date of previous surgery_____)
   6. Redo valve___ (date of previous surgery_____)
   7. Angioplasty_____
   8. Other (State)_____

Symptoms and history: (Prior to surgery)

10. Angina	___Yes	___No	describe:
11. Syncope	___Yes	___No	
12. Shortness of breath	___Yes	___No	
13. Congestive heart failure	___Yes	___No	
14. Myocardial infarction	___Yes	___No	date _____
15. Angioplasty	___Yes	___No	date _____
16.Arrhythmias	___Yes	___No	
17. Peripheral vascular ds	___Yes	___No	
18. CVA	___Yes	___No	
19. Endocarditis	___Yes	___No	date _____
20. Chronic lung disease	___Yes	___No	
21. Diabetes	___Yes	___No	
22. Hypertension	___Yes	___No	BP _____
23. Cholesterol elevation	___Yes	___No	level _____
24. Obesity	___Yes	___No	weight___
25. Smoking	___Yes	___No	Quit_____
26. Family history	___Yes	___No	
27. Other medical problems: State:	___Yes	___No	

28. **Medications** prior to admission to the hospital:

__Nitrate	__Diuretic
__Calcium blocker	__Aspirin
__Digitalis	__Anticoagulant
__Antiarrhythmic	__Antihypertensive
__Estrogen	__Other _____
__Insulin	

29. Postoperative **complications**:

__bleeding	__CVA
__return to surgery (explain):	__neurological
__arrhythmias	__IABP
__cardioversion	__pulmonary
__pacemaker	__wound infection

Adapted from Gilliss, Gortner, Sparacino, & Shinn, 1989

APPENDIX D

Recovery Support Scale

CHR#H555-05632-01 **Recovery Support Scale** Code_____

The purpose of the following questions is to find out what kind of behaviors or actions by other people around you, such as friends or family, have been helpful or not so helpful during your recovery. Please circle the number on the right to indicate whether or not you agree or disagree that each statement is true in your situation during the past week.

	Strongly Agree 4	Agree 3	Disagree 2	Strongly Disagree 1
(Instrumental support)				
1. I have someone who prepares my meals	4	3	2	1
2. I get help with tasks without having to ask for it.	4	3	2	1
3. My family/friends try to do too much for me.	4	3	2	1
4. I have as much help as I need with house/yard work.	4	3	2	1
5. Other people are willing to run errands for me.	4	3	2	1
6. I have someone who helps me remember my medications.	4	3	2	1
7. I have too many visitors and offers of help.	4	3	2	1
8. My family or friends walk with me each day.	4	3	2	1
9. I need more help than I receive.	4	3	2	1
10. I have no one that I can ask for help except in emergencies	4	3	2	1
11. I don't like to ask for help.	4	3	2	1
12. Other people help me get the rest I need.	4	3	2	1
13. I have help with transportation to appointments.	4	3	3	1
14. Other people don't let me do as much as I think I can do.	4	3	2	1
15. Someone helps me manage my physical care	4	3	2	1
(Emotional support)				
1. I have no one to talk to when I feel "down".	4	3	2	1
2. I have someone to talk to about my feelings.	4	3	2	1
3. No one understands my feelings.	4	3	2	1
4. I have someone I can talk to about anything.	4	3	2	1
5. Other people offer me encouragement and support.	4	3	2	1
6. When I get discouraged, others try to cheer me up.	4	3	2	1
7. Other people tell me how well I am doing.	4	3	2	1
8. When I talk about negative feelings, others ignore me.	4	3	2	1
9. I have someone who shows concern for me.	4	3	2	1
10. Other people try to help me keep my mind off my problems.	4	3	2	1
11. I have someone who will stay with me when I feel lonely.	4	3	2	1
12. When I get worried, others offer me reasurance.	4	3	2	1
13. I feel more confident when I am around other people.	4	3	2	1
14. I am able to recover so well because I have love & support.	4	3	2	1
(Information)				
1. I am able to get information when I have any health problems.	4	3	2	1
2. My family/friends offer me advice whether I want it or not.	4	3	2	1
3. I get conflicting advice and information from doctors/nurses.	4	3	2	1
4. Others tell me what to do without understanding how I feel.	4	3	2	1
5. There is someone I can go to for useful advice.	4	3	2	1
6. I have all the information I need for my recovery.	4	3	2	1
7. I am confused by the information I have received.	4	3	2	1
8. I do not really know what to expect for my future recovery.	4	3	2	1
9. Recovery is much harder than I thought it would be.	4	3	2	1
10. I am uncertain about my diet or exercise requirements.	4	3	2	1

(Developed with the assistance of Dr. Leonard Pearlin)

APPENDIX E

Recovery Demands and Coping Resources

Appendix E

RECOVERY DEMANDS AND COPING RESOURCES

Code____ CHR#H555-05632-01

1. **How have things been going for you** since we last talked?

2. **(NYHA)** Rate your current status:
   ___(1) Class 1: No symptoms.
   ___(2) Class 2: Comfortable at rest but with symptoms with ordinary activity.
   ___(3) Class 3: Comfortable at rest but with symptoms with less than ordinary activity.
   ___(4) Class 4: Inability to carry on any physical activity without discomfort. Symptoms may be present at rest

3. Since we last talked have you contacted your doctor for any new problems?
   Cardiovascular_____
   Other_____

4. What **medications** are you currently taking? (Prescribed and over the counter) Are you having any side effects from these medications? (write in)
   __Aspirin __Antiarrhythmic
   __Diuretic __Antihypertensive
   __Anticoagulant __Other_____

Have you been able to **resume** to your satisfaction:

	yes (+2)	part (+1)	no (0)		(+2)	(+1)	(0)
5. normal daily activities:	___	___	___	8. social activities	___	___	___
6. work around the house	___	___	___	9. sexual activity	___	___	___
7. recreation activities	___	___	___	10. family activity	___	___	___

11. Many people who have had surgery such as yours **change their plans** for work, activities, or goals. Has this happened with you?

12. Think about your surgery and recovery of your health. What are the most difficult **challenges, problems or concerns** you have at this time?
    1.
    2.
    3.

13. Now I would like to know more about what helps you manage each of these concerns. Considering (#1), how do you try to **cope** with it or with the way you feel about the situation? (Repeat#2&3).
    1.
    2.
    3.

14. Considering (#1), who has been **most helpful** in helping you manage this situation? Is there **something about this person**(s) or the way he/she helps that is especially supportive? (Repeat for problem 2 & 3).

1.

2.

3.

15. Other patients have mentioned various **concerns or issues** during their recovery from surgery. Have any of these problems occurred during your recovery? First for those that have occurred, tell me how many days this has occurred **during the past week**: 6-7 days, 3-5 days, 1-2 days, not at all.

	6 - 7 days	3 - 5 days	1 - 2 days	0 days
Problems with **recovery routine**, such as:				
medication side effects	---	---	---	---
following recommended diet	---	---	---	---
exercise routine	---	---	---	---
ability to rest	---	---	---	---
activity limitations	---	---	---	---
Problems with **physical symptoms**, such as:				
pain	---	---	---	---
back/shoulder ache	---	---	---	---
numbness	---	---	---	---
wound infection	---	---	---	---
trouble sleeping	---	---	---	---
loss of appetite	---	---	---	---
shortness of breath	---	---	---	---
fatigue/weakness	---	---	---	---
Problems with **emotional symptoms**, such as:				
forgetfulness	---	---	---	---
confusion	---	---	---	---
feeling "down"	---	---	---	---
feeling anxious/tense	---	---	---	---
Problems with **social relationships**, such as:				
contradictory advice	---	---	---	---
needing more help	---	---	---	---
being dependent	---	---	---	---
sexuality	---	---	---	---
disagreement about activity	---	---	---	---
Problems with **responsibilities**, such as:				
family responsibilities	---	---	---	---
financial concerns	---	---	---	---
demands from job	---	---	---	---
management of house/yard	---	---	---	---
transportation problems	---	---	---	---
Any other problems:				

16. How have you tried to **manage** the problem in each of these situations (or the way you **think or feel** about it)? (probe with those mentioned above)

Recovery routine:

Physical symptoms:

Emotional symptoms:

Social relationships:

Family/Work Responsibilities:

17. For those problems that **couldn't be changed**, what did you do?

18. How have **others helped** you to manage some of these concerns?
help *person*

19. Were there times you **needed more** help or a **different type** of support than that which was available or offered?(example)

20. Did you get the type of support you needed **when you needed it?** (ask for examples)

21. What other **needed help, information, or support** would have helped you more?

Question 2 from Criteria Committee of the New York Heart Association, 1984
Questions 3-10 adapted from Gilliss, Gortner, Shinn, & Sparacino, 1989
Questions 12 & 14 adapted from Gottlieb, 1978