DEPRESSION AND SOCIAL SUPPORT AS PREDICTORS OF

FUNCTIONAL IMPAIRMENT AND PAIN IN MEN AND WOMEN

RECOVERING FROM CORONARY ARTERY BYPASS GRAFT (CABG) SURGERY

by

Andrea Helen Con

B.A. (Psychology). University of British Columbia, 1990

D.Edu. (Guidance Studies). University of British Columbia, 1993

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS

in the

Faculty of Education

ⓒ Andrea Helen Con 1997

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July 1997

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APPROVAL

NAME   Andrea Helen Con.

DEGREE   Master of Arts

TITLE   Depression and Social Support as Predictors of
                    Functional Impairment and Pain in Men and Women
                    Recovering From Coronary Artery Bypass Graft
                    (CABG) Surgery

EXAMINING COMMITTEE:

David Paterson

Janny Thompson, Assistant Professor
Senior Supervisor

Gary D. Poole, Senior Lecturer, Psychology
Department, SFU and Director of Centre for University
Teaching, SFU.
Member

Dr. Joy Johnson
Assistant Professor, UBC School of Nursing
T.201-2211 Wesbrook Mall
Vancouver, B C V6T 2B5
Examiner

Date: July 22, 1997

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ABSTRACT

Little is known about the differences between men's and women's cardiac rehabilitation processes. What helps men during recovery may not necessarily aid a women's recovery. Psychosocial variables are known to impact recovery in positive and negative ways. Unfortunately, it is not exactly clear how or what variables are most effective predictors of recovery outcomes for men and women.

Ninety coronary artery bypass graft (CABG) patients (60 men, 30 women) completed a battery of psychological questionnaires on or after the third day post-surgery. Results showed that women reported significantly more depressive symptoms than men. For women, pain was correlated positively with depressive symptomatology and functional impairment. For men, pain and functional impairment were correlated negatively with social support.

In addition, the results of a multiple regression of pain on age, severity of disease, and two psychosocial variables (depressive symptomatology and social support) for the women showed that after controlling for age and severity of disease, depressive symptomatology and social support accounted for a significant 43% increment in the variance in pain. The psychosocial variables accounted for much less variance in pain in men. However, in a multiple regression of functional impairment on the same variables, depressive symptomatology and social support accounted for a significant 14% increment in the variance in pain in men but a nonsignificant increment for the women.

The results support the notion that psychosocial variables play different roles in the recovery paths of men and women. In consequence, cardiac rehabilitation programs would be more effective with gender-specific tailoring.

ACKNOWLEDGMENTS

I am grateful to many people who helped make this project become a reality. To Dr. Janny Thompson, my senior supervisor, I am thankful for the many hours you spent contributing to several drafts of this thesis. Your ability to point me in the right direction throughout this process helped me to reach this goal. Thank-you to Dr. Gary Poole for your feedback and for making the defense process almost enjoyable!

To Dr. Wolfgang Linden, thank-you for your guidance, encouragement, and for always believing in me. To Dr. Andrew Ignaszewski, I am in awe of your enthusiasm and energy! Thank-you for opening the door to your world and allowing me to access it. To Ms. Claire Miller, thank-you for showing me the ropes and teaching me new meaning to the word "organized!" Thank-you to the Healthy Heart Program at St. Paul's Hospital for making me a part of your family. I would also like to acknowledge the cardiologists, nurses, and employees at St. Paul's Hospital on 5A and 5B for giving me a chance to help your patients.

A special thank-you goes to Anuradha Chawla for all of your support and for being my personal cheering team. I am indebted to you for not only helping with the data but also for clearing and taking over my schedule to make sure that this project happened. To Christopher Selenta, thank-you for all your help with the data and for doing almost anything to help me out from the most mundane to the most important. You are the best at scoring, coding, data entry, you name it! Thank-you, Vikki Baker, for all your support and help with the data and phone calling! Your efficiency and professionalism was most appreciated. To Tracey Earle, thank-you for helping me write the initial proposal. Without your guidance and know how, who knows when the project would have been

done? Thank-you for also helping me prepare for the defense. To Thomas Rutledge, I am grateful for all your statistical help. Thank-you for teaching me what you know in plain English that makes sense! Thanks to everyone in the Behavioural Cardiology Laboratory for being my second home and for all the empathy, food, and support.

I would like to thank my partner, Christopher Withers, for supporting me through good and bad and always letting me know that there is more to me and my life than this project. To my parents, Bill and Loretta Con, for helping me attain my goals and letting me know that they're always there for me. To my sister Ari Con, who knows how to make me laugh, knows when the going gets rough, and has faith in me. Thanks also to my brother, Adam Con who knows how to be there for someone in their time of need.

I would also like to thank the Heart and Stroke Foundation of B.C. and Yukon who helped fund this research project.

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Coronary heart disease (CHD) is a significant cause of morbidity and mortality

among women, and accounts for more deaths than all neoplastic diseases combined

(Eaker, Packard, & Thom, 1989). The morbidity and mortality rates are particularly

evident in women over the age of 40, where 50% of the women in any given medical

practice will die of cardiovascular disease (Reeder, Lauzon, Mao, Nair, & Petrasovits,

1991; Wenger, Speroff, & Packard, 1993). In Canada, the prevalence rate of heart disease

in women is nearly equal to that of men particularly over the age of 75 (Wilkins & Park,

1996), and the leading cause of death for women aged 65 and over is heart disease

(Wilkins, 1996). Forty-one percent (41%) of all deaths in women are due to

cardiovascular diseases compared to 37% in men (Heart and Stroke Foundation of

Canada, 1995). Unfortunately, CHD has been viewed as a "man's disease" and most of

the research on CHD has involved only men or very few women. Such exclusions have

limited the generalizability of study findings to the female patient population (Gurwitz,

Col, & Avorn, 1992; Wenger, 1992). In addition, there has been little research that

defines the differences between male and female cardiac rehabilitation processes.

Recovery from a cardiac event or surgery can take up to a year and typically

involves physical, behavioral, and psychological dimensions (Mayou & Bryant, 1987).

For example, coronary artery bypass graft (CABG) surgery is a major operation

performed to alleviate angina and to improve quality of life. However, with respect to

physical recovery, residual pain associated with the surgery can last for months, and more

seriously, patients can suffer a recurrence of angina symptoms if the underlying coronary artery disease progresses (Murray & Beller, 1983). Cardiac rehabilitation programs are aimed to help patients pace their recovery. Therefore, an important step in the recovery process involves the assessment of a patient's level of pain and functional impairment at any given time because it can have a significant impact on their lifestyle choices and quality of life.

Cardiac rehabilitation programs are designed to restore survivors of an acute cardiac event to an optimal level of medical, physiological, psychological, social, and vocational performance (Naughton, 1992). What we know about rehabilitation programs is based on research with men (Feigenbaum & Carter, 1987). Components of typical programs include exercise therapy, education, counselling, and socializing to help promote the individual's return to a maximum level of functioning. Cardiac rehabilitation programs have been shown to improve functional capacity (Cannistra, Balady, O'Malley, Weiner, & Ryan, 1992; Froelicher et al., 1984; Redwood, Rosing, & Epstein, 1972) and favorably alter risk factor profiles (Oberman, Cleary, Larosa, Hellerstein, & Naughton, 1982; Vermeulen, Lie, & Durrer, 1983) of men with coronary artery disease. What is not known is how cardiac rehabilitation programs affect women and what recovery variables may be of more importance in their convalescence (Lerner & Kannel, 1986; Schuster & Waldron, 1991). The present study extends research on cardiac rehabilitation by including women in the research sample and by looking at psychological variables that have an impact on male patients' recovery but may have different effects on recovering female cardiac patients.

The remainder of the introduction will include three sections. The first section will discuss the assessment of cardiac rehabilitation outcome. Definitions of health status and recovery in heart disease, pain, functional impairment, and psychosocial influences associated with rehabilitation outcome will be reviewed. The second section will examine factors associated with rehabilitation outcome. The impact that variables such as marital status, social support, depression, and demographic and biobehavioural factors have on recovery will be discussed. The third section will review the literature on women and their lack of participation in cardiac rehabilitation programs.

Assessing the Outcome of Cardiac Rehabilitation

Health Status in Chronic Disease

The World Health Organization defines *health* as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization [WHO], 1948). This definition suggests a model for conceptualizing health and health care outcomes not only in terms of disease (pathology at the cellular level) and impairment (loss or abnormality at the organ-system level), but in terms of health-related behaviours at the level of the individual (functional limitation) and expectations at the societal level (disability; Nagi, 1965; WHO, 1980). *Health status* is a term commonly used for the behavioral aspects of health. The categories of behaviors affected by health are generally agreed to be physical, social, and emotional functioning; self-perception of health; and well-being. Other categories that are sometimes added to this list include pain level, cognitive functioning, and social opportunities.

Measures of health status can be specific or generic. Disease-specific instruments contain items concerning the degree of limitation by symptoms directly related to the

disease of interest. Generic instruments contain items that ask about limitations due to health in general, rather than about specific symptoms, and are useful across various conditions and populations. Criteria for including items in measuring health status are that they represent (a) aspects of life affected by the presence or absence of disease in general, or a specific disease, and (b) concepts to which individuals and society attach importance in contributing to the quality of life (Ware, Brook, Davies, & Lohr, 1981). Comprehensive assessment of the array of behaviours affected by health is necessary for the valid definition and measurement of health status.

For individuals with chronic diseases, decisions to use expensive health care resources and their providers' decisions to use certain tests and interventions are made many times over the course of the disease (Rice, Hodgson, & Kopstein, 1985). The primary goal of health care for such patients is to maximize function in everyday life and to achieve the highest level of well-being (Schroeder, 1987). Making decisions to help accomplish this goal are beneficial because it may help to reduce health care costs (Manning, Newhouse, & Ware, 1982) and because functional status and well-being are highly valued by patients. These decisions may be driven by the effect or potential effect of disease on patients' function and patients' perception of their state of health, rather than on laboratory measures of impairment or disease. Patients' function and their perception of health status are therefore essential outcomes of medical care, in addition to disease-specific measures.

Awareness of health status levels associated with particular pathologies, stages of disease, and impairment levels can assist health care planners and providers in anticipating societal health care needs. Knowledge of these relationships might help

identify those groups of patients requiring the greatest degree of care or those most likely to experience disability. Moreover, determination of factors related to health status and knowledge of the relative influence of these factors may improve interventions for addressing low levels of health status among persons with chronic disease.

In order to help patients with chronic diseases, measurements of functional impairment and pain are important to assess because this will provide information that will improve quality of life and help patients achieve a higher level of daily functioning. How patients perceive the progress of their recovery will greatly depend on how well they feel they are able to handle day-to-day activities and adjust to coping with the progression of the disease. Patients with heart disease are often prone to experience pain and functional impairment once diagnosed or after the cardiac event. As many patients survive the initial event and are able to live for many years, even decades, following the event, pain and functional impairment are particularly relevant to measure during the recovery proeess.

Health Status, Functional Impairment, and Recovery in Heart Disease. Findings from the Medical Outcomes Study indicated that out of nine common chronic medical conditions, heart disease had the greatest impact on overall functional status and subjective well-being (Stewart et al.,1989). Consistent with this finding, one of the primary goals of health care for patients with coronary heart disease is to improve daily functioning and enhance well-being. This is exactly the purpose of cardiac rehabilitation. The goals of cardiac rehabilitation are, in addition to secondary prevention, to improve quality of life (e.g., to relieve symptoms, to improve physical capacity, working ability, and the psychosocial well-being of the patients), provide emotional support, treat risk

factors for the progression of CHD, teach health behaviors that improve prognosis, and facilitate a return to occupational activities (Dennis, 1992).

In studies with heart disease patients, several outcome factors have been used to measure recovery. There is little agreement as to what is a "good" outcome measure. Physiological measures are inadequate as outcome measures of successful rehabilitation because well-being is influenced by factors other than health state (Orem, 1991). Mortality is often used as a clinical endpoint. Functional impairment in basic activities of daily living (feeding, dressing, bathing, etc.) has been demonstrated to be predictive of subsequent mortality (Manton, 1988). Reuben, Rubenstein, and Hirsch (1992) studied 282 elderly patients and found that information on physical functioning and the quality of social interactions were prognostic of mortality. Denollet (1994) suggested the use of somatic (e.g., chest pain, dyspnea, fatigue, sleep problems) and cognitive (e.g., concern about health and functional status) health complaints, although not always paralleling the seriousness of CHD, may provide information on the degree of psychosocial recovery from CHD.

Most patients with CHD predominantly experience decrements in physical health (disability), functional status, and well-being (Blumenthal et al., 1989; Stewart et al., 1989). As a consequence, they tend to worry about their disease and the impact it has on their life (e.g., Frasure-Smith & Prince, 1985). Perceived disability and exaggerated concern with bodily functions are associated with, for example, persistent chest pain complaints (Williams et al., 1986) and failure to return to work (Smith & O'Rourke, 1988) in coronary patients. Most important, measures focusing on common problems of cardiac patients, such as feelings of disability and decrements in well-being, may be more

appropriate than traditional measures to provide evidence for the psychological effect of

rehabilitation. King and Gortner (1996) found that women's perceptions of recovery after

cardiac surgery are independent of New York Heart Association (NYHA) functional

classification. and these perceptions improve before other more objective measures of

activity or health state demonstrate improvement. This tends to suggest that

measurements of functional impairment and pain are important recovery factors to look

at during cardiac rehabilitation.

Based on previous findings. recovery variables such as pain and functional

impairment tend not to correlate with severity of disease. If one's perception of how one

is doing has an impact on the recovery process. measurements of functional impairment

and pain are relevant to assess as they will impact the patient's quality of life and speed of

recovery.

Pain and Recovery in Heart Disease. When dealing with chronic illness,

symptoms of pain and/or discomfort are often of prime importance when recovering or

caretaking. There is no direct way of measuring pain, therefore, we are not sure how

much pain someone suffers when they say it hurts (Townsend, 1988). Assessment of pain

is difficult but it may be more important to assess a patient's description rather than rely

on one's clinical subjective judgment as it is the patient's assessment of pain that may

hinder their recovery (Soafer, 1984).

There is little research on cardiac pain (e.g. response to pain, coping strategies

etc.) but there is relevant information in the general and chronic pain literature. An

attractive framework that takes a systems approach to health, views acute pain as a useful

adaptive function protecting the individual from further harm by providing important

negative feedback information (Schwartz, 1983). Pain is a multidimensional phenomenon composed of sensory, emotional, cognitive, and social-situational components that interact to produce the total pain experience. Taking all these factors into consideration is important because how the patient perceives them will influence how they behave and hence, their recovery.

Pain tolerance and perception have been shown to be important during recovery. As individual differences in outcomes are not predicted by preoperative indicators of physical health (Horgan, Davies, Hunt, Westlake, & Mullerworth, 1984), measuring pain during recovery is an important way to know how the patient is coping. Valdix and Puntillo (1995) investigated 21 male and 10 female cardiac surgery patients' experience of pain and the accuracy of their recall of pain while they were in Intensive Care Units (ICU). Patients completed the first interview in the ICU (Time 1), and then were asked recall questions in a second interview (Time 2) when they were moved to the ward for their postoperative hospital recovery. They found that women recollected having a higher "worst pain" in ICU than men. Wielgosz and Earp (1986) studied 63 women and 43 men with cardiac illness and found that those participants who labeled themselves as having a vulnerability to serious heart disease, also experienced persistent pain, despite the absence of significant coronary disease. Cardiac pain syndromes (angina pectoris, cardialgia) of 563 male patients with chronic ischaemic heart disease were closely related to the psychological state of the patients. The most severe psychological changes were observed in patients with more than one cardiac pain syndrome (Zaitsev, 1982).

The Impact of Psychological Factors on Recovery

Cardiac rehabilitation programs expose patients to activity in gradually increasing doses (behavioural control), arrange for them to see others similar to themselves performing the activity (modeling), and have health care professionals provide information and feedback (cognitive control; Ewart, 1989). Interventions such as these, which enhance the patient's perception of control, should facilitate recovery from CHD (Krantz, 1980). Engblom, Korpilahti, Hamalainen, Ronnemaa, & Puukka (1997) found that cardiac rehabilitation programs in conjunction with usual medical care after CABG may induce a perception of improved health.

However, researchers have largely failed to document a psychological effect of cardiac rehabilitation (Blumenthal & Emery, 1988) and there is a risk that cardiac rehabilitation will become a passing vogue if its psychological benefits cannot be demonstrated (Mulcahy, 1991). The results of many studies have not supported the hypothesis that cardiac rehabilitation improves psychological functioning. These negative findings were unexpected because cardiac rehabilitation aims at the enhancement of self-efficacy (Bandura, 1982) and control (Carver & Scheier, 1990) as cognitive mediators of stressful events.

Jette and Downing (1996) found that in patients entering cardiac rehabilitation programs, high levels of psychological distress were related to poorer health on both the physical and psychological dimensions. Clinical data that are routinely collected for cardiac patients, including demographic information, do not provide a very thorough profile of a patient's health. Measurement of impairment or collection of data concerning patient characteristics is not sufficient to fully assess the health of patients with cardiac

disease. The relationship of impairment and individual characteristics to functional limitations and disability is complicated and multifaceted making it necessary to have multidimensional measures.

In their reviews of the literature, Finlayson and McEwen (1978) and Byrne (1982) concluded that the failure to return to work, or normal activity levels, after MI was more strongly related to psychological distress than to the extent of the organic disease itself. Therefore measurements of patients' level of pain and functional impairment are important to assess as markers of successful recovery and outcome than just the severity of disease. In addition, the relationship of particular psychological variables, such as depression and social support, to functional impairment and pain may also provide important and relevant information to accelerate recovery and positive outcomes.

Factors Associated with Rehabilitation Outcome

Marital Status and Social Support

The social support system that a patient has after CHD is very important. It has been claimed that social support serves as a counterweight to psychological stress and acts both to reduce distress (Croog & Levine, 1977; Keeling, Price, Jones, & Harding, 1996) and to enhance physical recovery (Rahe, Ward, & Hayes, 1979). It is not known how stress, support, and distress are causally related to illness. It is known that the perception of more social support (i.e., having someone there whenever you need them) is more important than the actual amount of social support (i.e., the number of people you consider supportive) as it can act as a buffer both before and after the cardiac event in relation to quality of life (Jenkins, Jono, Stanton & Stroup-Benham, 1990; King, Reis, Porter, & Norsen, 1993).

When the patient is a man who is married, the wife has been shown to facilitate recovery from AMI (Ell & Haywood, 1984). Better recovery from AMI has been positively associated with good family support, having a close confiding relationship with someone, and having multiple sources of help for the spouse (Beach et al., 1993; Nyamathi, 1987). Having a supportive wife has also been shown to have a significant effect on not only health and functioning of the family, but also on the patients' physical and emotional adaptation to cardiac illness (Bedsworth & Molen, 1982; Nyamathi, 1987; Nyamathi, Jacoby, Constancia, & Ruvevich, 1992; Reunions, 1985).

Kulik and Mahler (1989) studied 56 male CABG patients and found that although patients were essentially equivalent in preoperative physical status, married patients who received higher hospital support (i.e., more visits from spouses/partners in-hospital) took less pain medication and recovered more quickly than their low-support counterparts. Speed of recovery for unmarried patients was generally slower than for married, high-support patients and faster than for married, low-support patients.

In other rehabilitation studies, researchers have found that marital status has had an impact on morbidity and mortality. Ruberman, Weinblatt, Goldberg, and Chaudhary (1984) looked at 2,320 male MI survivors and found that those who were socially isolated were four times more likely to die after AMI. Marital status was a predictor of improved functioning and returning to independent living for stroke patients (Baker, 1993). Chandra, Szklo, Goldberg, and Tonascia (1983) found that, independent of other factors, married men and women who experience an AMI have a significantly better survival prospect, both in-hospital and after discharge, than unmarried men and women. What is

it about marital status that has an impact on cardiac rehabilitation? Although there is no

literature on the topic, marital satisfaction may be the key.

Married people appear to be healthy, having low rates of chronic limitation and

disability (Verbrugge, 1979). Marital relationships seem to emphasize the positive

aspects of support, influencing an overall perception of support and psychological well-

being (Coyne & DeLongis, 1986).

The marital relationship is often seen as each spouse having social support from

the other. Because many women in a cardiac population are elderly, many will also be

widowed and tend to seek social support elsewhere (e.g., children, siblings, friends). In

addition, the experience of heart disease in older women often limits functional ability,

making it crucial for elderly cardiac female patients to reside in the community so that the

availability and assistance from others in their network is readily accessible. Friedman

(1993) studied 80 older women with heart disease and found that support from nonfamily

members (i.e., friends, neighbors) rather than from family members (i.e., spouse, sibling,

child, other relatives) was related to less satisfaction with life. Regardless of the sources

of social support, the perception of having social support should be important for both

men and women. Furthermore, the relationship between social support and pain and

functional impairment would be important to explore for men and women because it is

not clear if social support would impact pain and functional impairment differently for

each gender.

Depression

In addition to evaluating a patient's social support, clinicians should also be

assessing patients for depression, as it is common for both male and female patients to

experience depression after AMI (Forrester, Lipsey, Teitelbaum, DePaulo, & Andrzejewski, 1992; Hackett, 1985). The severity of depressive symptomatology ranges from mild to severe and the prevalence of depression varies between 30 to 75% of a cardiac rehabilitation population. Approximately 10 to 30% of patients are clinically depressed following MI (Carney et al., 1987; Taylor & Berra, 1993).

Depression has serious implications for rehabilitation. Milani, Littmen, and Lavie (1993) found that depressive symptoms were present in a significant number of patients in cardiac rehabilitation and that the absence of depressive symptoms predicted improvement in functional capacity following cardiac rehabilitation. It has also been found that depression is a risk factor for having another MI in the future, as well as for sustaining a MI (Dreyfuss, Dasberg, & Assael, 1969). Other correlates of depression in cardiac rehabilitation samples include poor adherence to medication regimens (Carney, Freedland, Eisen, Rich, & Jaffe, 1995), longer in-hospital stay (Schubert, Burns, Paras, & Sioson, 1992), higher incidence of hospital re-admissions, decreased ability at work, and greater decrements in sexual functioning (Stern, 1984).

Research on depression in cardiac rehabilitation has been based mostly on samples of men who suffered an MI. The results of meta-analytic and retrospective studies have suggested that high levels of depressive symptomatology post MI may be accounted for by pre MI symptoms (i.e., Booth-Kewley & Friedman, 1987; Schleifer et al., 1989). The causative role of depression in AMI remains unclear (for a review see Fielding, 1991).

A firm risk factor for major depression is being female (Weissman, 1987). In the CHD population, it has been shown that women tend to exhibit more clinically diagnosed

depression than men (Hamilton & Seidman, 1993) and that their depression is more likely

to be present after 1 year (Stern, Pascale, & Ackerman, 1977). As depression is also

common among the elderly (Davison & Neale, 1986; Wallace & O'Hara, 1992), it is a

particularly relevant variable to consider when studying the cardiac rehabilitation of

women.

Although the severity of the cardiac event plays an important role in determining

one's recovery, cardiac rehabilitation programs play a vital role in facilitating the CHD

patient's recovery (Cronin, 1990; Malan, 1992; Moser & Dracup, 1995). Physiologically,

the clinical benefits of rehabilitation programs are obvious. Unfortunately, patients often

physically recover more rapidly than psychologically. A depressed mental state often

complicates rehabilitation (White, 1951). It has been found that depression is not related

to the severity of the AMI (Cay, Vetter, Philip, & Dugard, 1972; Stern, Pascale, &

McLoone, 1976), nor is it correlated with severity of the stroke patients' physical,

cognitive, or language impairments (Stein, Gordon, Hibbard, & Sliwinski, 1992).

In addition, with the higher than average number of patients with chronic diseases

being depressed, patients who are depressed may be more difficult to be supported

(Coyne et al., 1987). When compared to non-depressed patients, 30 male and 7 female

depressed chronic pain patients reported greater pain intensity, greater interference due to

pain and more pain behaviours (Haythornthwaite, Sieber, & Kerns, 1991).

Demographic and Biobehavioural Factors

A review of the literature indicates that sex and age are critical variables to

explore in terms of their effects on long-term recovery and adaptation to chronicity. Life-

span development theory and sex-role socialization help explain some of the distinctive

responses to chronic illness and recovery from cardiac surgery. The interplay of two

status variables, sex and age, suggests that both should be considered when men and

women are compared. The complex interplay between biologic and social, psychologic,

cultural, environmental, and historical variables should not be overlooked in a study of

factors affecting psychosocial and physiologic correlates of recovery from cardiac

surgery.

With regards to age, women tend to develop cardiovascular disease an average of

10 years later in life than men (Castelli, 1988). Although the prevalence of CHD is

greater in men than women, the occurrence of CHD after age 65 in women surpasses

men. In women the CHD mortality rate continues to increase until age 70, while the

death rate remains relatively constant after age 60 in men. As in men, the incidence of

CHD in women increases with age. Therefore, with the female CHD growth rate

escalating steadily with aging, when a woman has attained the age of 75 years she has

about as much chance of suffering a morbid episode as does a man. However, women

with diagnosed CHD tend to have poorer survival rates following a myocardial infarction

and also have a higher proportion of unrecognized MIs. The age at which the cardiac

event occurs becomes an important factor in recovery because one's age can influence

severity of disease and disease progression.

Gender has been found to be a significant predictor of mortality in men and

women undergoing coronary artery bypass surgery (Hannan, Bernard, Kilburn, &

O'Donnell, 1992). The operative mortality rates for men ranges from 0.9% to 3%

whereas for women, the operative mortality rates range from 1.3% to 8.8%. The rates for

women tend to be from 1.6 to 4.8 times higher than those for men. Carey, Cukingnan,

and Singer (1995) and Khan et al. (1990) found that being female carried increased

perioperative risk in both morbidity and mortality. Women have been reported to have

significantly more operative morbidity than men, experiencing more myocardial

infarction, respiratory insufficiency and stroke (Cosgrove, 1993). Women are about twice

as likely as men to have perioperative mortality during CABG surgery (Khan et al.,

1990). Loop, Golding, MacMillan, Cosgrove, Lytle, and Sheldon (1983) found that the

predictive information on operative mortality rates provided by two "basic" risk factors

(emergency operation and left ventricular impairment) could be improved significantly by

adding gender as a variable.

The older age at which the cardiac event occurs, the severity of the disease,

psychosocial variables, or economic status can affect the positive long-term outcomes

after angina, PTCA, and CABG surgery. Much of the literature has focused on influences

for return to work after cardiac surgery. Clinical factors such as cardiac function, severity

of disease, and presence or absence of symptoms are generally thought to influence

resumption of work after surgery. CABG has been shown to produce significant relief of

angina pectoris in 70-90% of patients (Frick, 1976; Wenger & Hurst, 1980). Return to

work after surgery was positively associated with relief of symptoms in several studies

(Anderson, Barboriak, Hoffman, & Mullen, 1980; Wallwork, Potter, & Caves, 1978).

However, improvement in work status (19%) did not match the percentage of patients in

whom symptoms were relieved (80%), and only 28% of the patients were unemployed

postoperatively because of symptoms (Symmes, Lenkei, Berman, 1978). Relief of

symptoms did not always correlate with objective evidence of improved cardiovascular

function (Frick, Harjola, & Valle, 1979; Wenger & Hurst, 1980). In addition, women

have a lower return-to-work rate than do men after MI and CABG surgery. Education

background, job demandingness, professionalism, and higher income levels have been

identified as predictors of return to work by Stanton, Jenkins, Savageau, and Thurer

(1984).

<div align="center">Women and Cardiac Rehabilitation</div>

After hospitalization, only 20% of all patients entering structured rehabilitation

programs are women (Comoss, 1988; Schuster & Waldron, 1991), despite the fact that

40% of all coronary events occur in women (Lerner & Kannel, 1986). Women tend not

to be in rehabilitation programs making it difficult for health professionals to know how

best to help them.

Why don't women participate? One reason for this lack of participation may be

the timing of cardiovascular disease in women. Women tend to develop cardiovascular

disease an average of 10 years later in life than men (Castelli, 1988). In addition,

prognosis after an acute myocardial infarction (AMI) is not as good for women as for men

(Puletti, Sunseri, Curione, Erba, & Borgia, 1984; Tofler et al., 1987). The severe

pathology associated with this poorer prognosis hinders the elderly women's ability to

participate in the activities (i.e., exercise) that are supposed to improve their functional

capacity. Hence, with more women than men surviving to older age, and women more

frequently developing cardiovascular illness at an older age, it has been emphasized that

any age-based rationing of clinical care disproportionately disadvantages women (Jecker,

1991).

A second reason for lack of participation on the part of women has come to been

known as the Yentl syndrome (Healy, 1991). Women have not been treated as

aggressively for heart disease until they "behave like a man" in the sense that they have had severe coronary artery disease or a myocardial infarction. Studies have shown referral bias in women which has led to several medical care and social disadvantages among women (Young & Kahana, 1993). For example, women are referred for coronary bypass surgery later in the course of their disease than men, and later referral may increase their chances of operative death (Khan et al., 1990; Krumholz, Douglas, Lauer, & Pasternak, 1992; Tobin et al., 1987). Ayanian & Epstein (1991) found that women were less likely than men to undergo coronary angiography, percutaneous transluminal coronary angioplasty, or coronary surgery when admitted into the hospital with a diagnosis of myocardial infarction, unstable or stable angina, chronic ischemic heart disease or chest pain. Steingart et al. (1991) studied 1,842 men and 389 women with left ventricular ejection fractions of 40 percent or less after an AMI. They found that women had angina before myocardial infarction as frequently and with more debilitating effects than men, yet women underwent cardiac catheterization only half as often, even after controlling for age and coexisting disease. It would seem that there have been many missed opportunities for women to be referred to a rehabilitation program before serious heart disease occurred. Even then, female coronary patients are less likely to be referred for cardiac rehabilitation, despite a similar clinical profile and improvement in functional capacity to men (Ades, Waldmann, Polk, & Coflesky, 1992). Gender differences in the clinical quality of care become apparent as early as the diagnostic stage. Diagnosing CHD in women is more difficult than in men because women have a greater prevalence of non-coronary causes of chest pain and because diagnostic tests have been standardized to male norms.

A third factor that may play a role in women not being in cardiac rehabilitation programs is related to the care-taking duties that women typically perform. For men, return to gainful employment is often used as a measure of successful cardiac rehabilitation (Wenger, 1979). This focus on return to paid employment may not be relevant to many women because they do not work (i.e., they are retired). A more important criterion for successful rehabilitation in women might be related to "home work." For instance, many women do not perceive housework as strenuous and resume household chores within one week of hospitalization despite never having followed a program of regular exercise (Flavell, 1994). They also tend to go home to looking after a husband, who may be elderly and also unwell. Cardiac rehabilitation programs tend not to be a priority for women because they are not so concerned with getting back to work, per se, but with looking after their families.

What cardiac rehabilitation programs are currently offering may not be particularly relevant or attractive to women. With the recovery process and standard rehabilitation schedule standardized to men, the referral process coming later in women's disease progression, and family and household duties being more of a priority to women, these components are not taken into consideration. In addition, psychosocial aspects may be more relevant and important during a women's convalescence and tend not to be addressed because women are an underrepresented population with respect to research. Depression, and social support are particular psychosocial aspects that may offer some insight as to how men and women require gender-specific tailoring of cardiac rehabilitation programs.

Women patients who are recovering from a cardiac event seem to have very different recovery paths from the paths experienced by men. One scenario that women may face is, because they are older when they have their cardiac event, they may be widowed, and/or most of their family is gone having moved away to start their own families. Adequate social support may be difficult to obtain under such circumstances, making rehabilitation more difficult. A second possibility may be that women resume employment in addition to their caretaking duties. Clearly, with the additional health problem, it would be beneficial for these patients to focus on their rehabilitation, rather than on their responsibilities at work or at home. A third scenario is that women who are married may return home to look after their spouse, who may be older and require more attention.

Women who have heart disease have been a neglected population of study. With previous research focused on men, this study extends the cardiac rehabilitation literature by looking at the same psychological variables that have an impact on male patients' convalescence but may have different effects on recovering female CHD patients. This study also examined variables that are more likely to be of importance to women and may therefore have a stronger impact on their recovery compared to men. Attending to these psychological variables at an early stage in women's recovery may offer clinicians new ways of helping women optimally recover. In addition, the results of this study may help to modify cardiac rehabilitation programs in ways that will make them more attractive and relevant to women, encouraging them to participate.

Hypotheses

Hence, the study has the following objectives: (1) to investigate the severity of depressive symptomatology in female CABG patients; (2) to describe women patients' level of social support; (3) to examine the relationship between severity of disease and social support and depressive symptomatology; (4) to determine the level of pain and functional impairment and their relationship to depression, social support, marital status, and severity of disease; and (5) to identify psychosocial predictors of recovery levels of pain and functional impairment.

Given the extant research, it was hypothesized that:

1. Female cardiac patients would report a level of depressive symptomatology that was higher than that of women from the general healthy population.

2. Female cardiac patients would report a level of depressive symptomatology higher than the level reported by male cardiac patients.

3. Pain and functional impairment would not correlate with severity of disease.

4. Pain and functional impairment would be negatively correlated with social support

5. Pain and functional impairment would be positively correlated with depression.

6. Depression would be negatively correlated with social support.

7. Some of the variance of the reported levels of pain and functional impairment after coronary artery bypass graft surgery would be accounted for by psychosocial variables (i.e., depression, and social support).

Method

Participants and Procedure

Ninety coronary artery bypass graft (CABG) patients were recruited from the

Cardiac Care Ward at a large urban hospital. To avoid compromising the physiologic

integrity of patients, patients were approached when they had met the following criteria:

(1) third day or later after surgery, (2) no anginal pain within the past 8 to 12 hours, (3) no

additional serious medical problems, and (4) stable vital signs. Eligible participants were

asked to complete a questionnaire package.

Thirty-three percent (n = 30) of the participants were women. Sixty-three percent

of the women were married (n = 19) and the other 37% were either widowed, divorced, or

single (n = 11). The women were an average of 66.4 years old (SD = 10.8). Eleven

percent (n = 3) of the women had jobs outside of the home and the remaining 89% (n =

27) of the women were either retired, homemakers, or unemployed. None of the women

required emergency surgery, 25% (n = 8) needed very urgent surgery, 57% (n = 17)

required urgent surgery, and 18% (n = 5) needed elective surgery. The average urgency

rating for the women was 2.9 (SD = .66).

Sixty-seven percent (n = 60) of the participants were men, 78% (n = 47) of whom

were married or in a common-law relationship. The remaining 22% (n = 13) of men were

either single, divorced, or widowed. The average age of the men was 63.6 years (SD =

10.1). Seventy-five percent of the men (n = 45) were not working (e.g., retired,

unemployed) while the remaining 25% (n = 15) were employed outside of the home.

Four percent of the men (n = 2) required emergency surgery, 32% (n = 19) needed very

urgent surgery, 33% (n = 20) required urgent surgery and 31% (n = 19) needed elective

surgery. The average urgency rating for the men was 2.9 (SD = .89).

Measures

Severity of Disease. The severity of disease was coded by cardiac surgeons who

categorized the urgency with which patients required surgery based on how many hours a

patient may go without having the surgery before serious negative consequences may

result. These categories were then coded as follows: 1 for emergency surgery (< 6 hours),

2 for very urgent surgery (< 72 hours), 3 for urgent surgery (< 6 weeks), and 4 for elective

surgery (< 3 months).

Depressive Symptomatology. The Beck Depression Inventory (BDI; Beck, Ward,

Mendelson, Mock, & Erbaugh, 1961) is a self-report measure of the severity of affective,

cognitive, behavioral, and physiologic symptoms of depression. It consists of 21 items

which are rated from 0 to 3, with a range of scores between 0 and 63. A total score

represents both the number and severity of symptoms (Beck, 1967). A score between 0-9

indicates no to minimal depressive symptomatology; 10-18 indicates mild to moderate

depressive symptomatology; 19-29 indicates moderate to severe depressive

symptomatology; and 30-63 indicates severe depressive symptomatology. BDI scores

have been found to discriminate medical patients, nonmedical patients, and healthy

individuals, even though the BDI contains performance and somatic symptoms that could

be attributed to the medical conditions themselves (Beck, Steer, & Garbin, 1988).

The BDI has been shown to be a valid and reliable test. Concurrent validity was

established with clinical ratings by experienced psychologists and correlation with other

measures of depression (Beck, 1967; Beck et al., 1988). Construct validity was

established by demonstrating that the BDI could be used to categorize subjects according to their level of depression. Reliability was established using both stability and internal consistency indicators (Beck, 1967). The reliability of the scale was good for the present sample (Cronbach's α = .85). The BDI has also been shown to be a reliable and valid instrument for assessing depressive symptomatology in older adults (Gallagher, Neis, & Thompson, 1982) and was chosen for the present study because of its' demonstrated predictive power for poor prognosis in cardiac patients (Frasure-Smith, Lesperance, & Talajic, 1993; Lesperance, Frasure-Smith, & Talajic, 1996).

Social Support. The Interpersonal Support Evaluation List (ISEL; Cohen, Mermelstein, Kamarck, & Hoberman, 1985) is a 40-item questionnaire measuring the perception of availability of social support. The instrument provides a total score as well as scores on each of the following four subscales (10 items per subscale): Appraisal (e.g., "There are very few people I trust to help solve my problems."), Belonging (e.g., "There are several different people with whom I enjoy spending time."), Tangible (e.g., "If I got stranded 10 miles out of town, there is someone I could call to come and get me."), and Self-Esteem (e.g., "I have someone who takes pride in my accomplishments."). Respondents indicate whether each statement is "probably true" or "probably false" about them. The total score was used in the present study.

The ISEL has been shown to have adequate reliability (Cohen et al., 1985). Over a 6-month period, test-retest reliability was r .74 and internal consistency was strong (coefficient α = .88 to .90). For the present study, the scale had high internal consistency (α = .92). The ISEL has been shown to be uncorrelated with the Marlowe-Crowne Social Desirability Scale, an important indication that response bias does not interfere with

scores on the ISEL. The ISEL has been shown to be moderately correlated with other measures of social support. The reliability and validity of the ISEL have been supported by comparison of psychometric properties of the ISEL with other measures of social support (Heitzmann & Kaplan, 1988).

Pain and Functional Impairment. The West Haven-Yale Multidimensional Pain Inventory (WHYMPI; Kerns, Turk, & Rudy, 1985) is a 52-item scale divided into three sections, each of which contains several subscales (12 in total). Questions are answered based on either a 6- or 7-point Likert scale and the scores on the scales are the mean of responses to the scale questions. The WHYMPI was designed to assess an individual's perception of the impact of the pain on their mood, psychosocial, and behavioral functioning. The first two parts are used to assess appraisals of pain and the impact of pain on different domains of individuals' lives and perceptions of the responses of significant others to their distress and suffering. The last part is used to assess the frequency with which individuals indicate that specific behaviors are performed or not performed because of their pain. The first two parts are directly related to psychosocial variables and the third part to behavioral activities and limitations to daily functioning. Two subscales of the WHYMPI were used in the present study. The Pain Severity scale (e.g., "Rate the level of your pain at the present moment") was used to evaluate the patients' perception of pain and the Interference Scale (e.g., "How much does your pain/heart problem interfere with your day to day activities?") was used to measure the patients' level of functional impairment. The interference subscale is the most direct measure of functional disability.

The internal consistency estimates using Cronbach's alpha for all 12 scales of the WHYMPI appear to be quite satisfactory ranging from .70 to .90 (Kerns, Turk, & Rudy, 1985). Good test-retest reliability has been reported using Pearson product-moment correlations between scores obtained 2 weeks apart. Stability coefficients were in the .62 to .91 range, indicating that these scales are quite stable over time. The subscales were factor analyzed with 9 other scales from previously validated instruments and found to be psychometrically sound (see Kerns et al., 1985). Reliabilities for the Pain Severity and Interference subscales in the present sample were good (α = .83 and α = .91, respectively).

Results

Descriptive Statistics

The means and standard deviations of the predictor variables (depressive symptomatology and social support), the outcome variables (pain and functional impairment), and age in men and women CABG patients are shown in Table 1.

Distribution of Depressive Symptomatology

The female CABG patients had a mean BDI score of 11.3 ($\underline{SD}$ = 8.2) indicating mild to moderate depressive symptomatology. The range of scores on the BDI (2-32) reflected a distribution in which 46% of women reported no or minimal symptomatology, 31% reported mild to moderate symptomatology, 19% reported moderate to severe symptomatology, and 4% reported severe symptomatology.

The mean for depressive symptomatology for CABG men was 8.7 ($\underline{SD}$ = 6.1) indicating minimal depressive symptomatology. The range of men's scores on the BDI (0-34) reflected a distribution in which 65% of CABG men reported no to minimal

symptomatology, 30% reported mild-to-moderate symptomatology, 3% reported moderate-to-severe symptomatology, and 2% reported severe symptomatology.

Hypothesis #1 stated that the female cardiac patients would report a level of depressive symptomatology that is higher than that of women from the general healthy population. Fifty-four percent of the present female cardiac population had a score of 10 or higher on the BDI reflecting at least mild symptomatology. By contrast, Murrell, Himmelfarb, and Wright (1983) reported that 14.5% of healthy women between the ages of 65 and 74 years in their study were at risk for a degree of psychological distress that would require intervention. They used the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) and a cutoff score of 20. O'Hara, Kohout, and Wallace (1985) used a cutoff score of 16 on the CES-D and found that 10% of their rural healthy females 65 years old and over reported levels of depressive symptomatology that would require further investigation. The percentage of women (54%) in the present cardiac population who reported depressive symptomatology that might warrant intervention was much higher in comparison with the epidemiological studies of depression with healthy women in the 65 years and above range.

A t-test was performed to test hypothesis #2, which stated that female cardiac patients would report a level of depressive symptomatology similar to, if not higher than, the level reported by the male cardiac patients. Women reported significantly more depressive symptomatology than did the men (t (88) = -1.72, p < .05).

Correlates of Pain, Severity of Disease, Functional Impairment, Depressive

Symptomatology, and Social Support

The correlations among pain, severity of disease, functional impairment,

depressive symptomatology, and social support for women and men are shown in Tables

2 and 3, respectively.

Women. Hypothesis #3 stated that pain and functional impairment would not

correlate with severity of disease. This hypothesis was partially supported. Pain was not

correlated with severity of disease, however, higher levels of functional impairment were

associated with more severity of disease.

Hypothesis #4 stated that pain and functional impairment would be negatively

correlated with social support. This hypothesis was not supported. Neither pain nor

functional impairment were correlated with social support.

Hypothesis #5 stated that pain and functional impairment would be positively

correlated with depression. Depressive symptomatology was correlated significantly with

both pain and functional impairment. Women with higher levels of pain and functional

impairment reported higher levels of depressive symptomatology.

Hypothesis #6 stated that depression would be negatively correlated with social

support. This hypothesis was supported: lower levels of social support were associated

with higher levels of depressive symptomatology.

Men. Hypothesis #3, which stated that pain and functional impairment would not

correlate with severity of disease, was supported. Severity of disease was not associated

with reported pain and functional impairment levels in the men.

Hypothesis #4 stated that pain and functional impairment would be negatively correlated with social support. Both functional impairment and pain were correlated significantly with social support. Lower levels of functional impairment and pain were associated with higher levels of social support.

Hypothesis #5 stated that pain and functional impairment would be positively correlated with depression. Both correlations were positive, however, only functional impairment was correlated significantly with depression. For men, higher levels of functional impairment were associated with higher levels of depressive symptomatology.

Hypothesis #6 stated that depression would be negatively correlated with social support. This hypothesis was supported. Having high levels of social support was associated with lower levels of depressive symptomatology.

Hierarchical Regression Results

For each gender, two hierarchical multiple regression analyses were conducted: one with pain as the outcome variable and one with functional impairment as the outcome variable. For each analysis, the outcome variable was regressed on the psychosocial variables (depression, and social support) in order to determine if these psychosocial variables independently contributed to predicting reported pain levels during recovery. Because age, marital status, and severity of disease were known biobehavioural correlates of pain and functional impairment, the regressions were conducted by entering age, marital status, and severity of disease into the regression models at Step 1. The psychosocial variables (depression and social support) were entered at Step 2. This procedure permitted the identification of variance in pain and functional impairment that

was accounted for by psychosocial factors above and beyond variance explained by age, marital status, and severity of disease.

Women. Table 4 displays the results of the regression of functional impairment on age, marital status, severity of disease, depressive symptomatology, and social support for women. At Step 1, age, marital status, and severity of disease accounted for an nonsignificant 19% of the variance in functional impairment. At Step 2, depressive symptomatology and social support accounted for an nonsignificant 10% increment in the variance in functional impairment.

Table 5 shows the results of the regression of pain on age, marital status, severity of disease, depressive symptomatology, and social support for women. At Step 1, age, marital status, and severity of disease accounted for an nonsignificant 3% of the variance in pain. At Step 2, depressive symptomatology and social support accounted for a significant 43% increment in variance in pain. Examination of the beta coefficients revealed that, had social support or depressive symptomatology been entered alone at Step 1, each would have been a valid predictor of pain.

Men. Table 6 reports the results of the regression of functional impairment on age, marital status, severity of disease, depressive symptomatology, and social support for the CABG men. At Step 1, age, marital status, and severity of disease accounted for a significant 18% of the variance in functional impairment. At Step 2, depressive symptomatology and social support accounted for a significant 14% increment in the variance in functional impairment. Examination of the beta coefficients revealed that, had depressive symptomatology been entered alone at Step 1, it would have been a valid predictor of functional impairment.

Table 7 reports the regression results of pain on age, marital status, severity of disease, depressive symptomatology, and social support for men. At Step 1, age, marital status, and severity of disease accounted for an nonsignificant 9% of the variance in pain. At Step 2, depressive symptomatology and social support accounted for an nonsignificant 5% increment in the variance in pain.

Discussion

Women with heart disease have been an underrepresented group in clinical trials of research in cardiovascular disease. Much of what is assumed about their disease progression is based on male norms. The results of this study demonstrate that psychosocial variables are associated with recovery in men and women in different ways. Also, the results highlight the importance of patients' experience during rehabilitation for gender-specific tailoring of cardiac rehabilitation programs.

One clear gender difference was evident in levels of depressive symptomatology. Women reported higher levels of depressive symptomatology than the men, suggesting that women are at greater risk for psychological distress during the postoperative period. This finding is also consistent with the fact that rates of depression are higher for women than men in the general population (Weissman, 1987; Weissman and Klerman, 1977). Assessment of depression in both men and women after CABG surgery seems clinically relevant as depression is known to hinder recovery above and beyond the organic impairment. As the level of depressive symptomatology reported was significantly higher for the women, this may be a particularly important variable to examine in female cardiac patients. Provision of services to help women deal with their depression may be useful components of cardiac rehabilitation programs.

A second gender difference was found in the relationship between severity of disease and functional impairment. Women whose disease progression was more severe, reported higher levels of functional impairment. There was no relationship between severity of disease and functional impairment for the men. It is tempting to explain this gender difference by referring to age and gender, however, such an explanation does not apply to the present sample given the lack of an age difference between the men and women. Potential gender and age differences are, however, important to consider when doing research with cardiac patients. Women tend to get heart disease a decade later than men and the pathology associated with heart disease is often diagnosed much later in the disease progression. By the time women are treated, the severity of disease is much worse, therefore, making the recovery more difficult. Men tend to be younger at the onset of heart disease and it is more easily detected and earlier diagnosed. By treating heart disease early and continually monitoring its progression, chances for intervention and a less complicated course are more favorable.

A third gender difference was noted in the relationship between social support and functional impairment. Social support played an important role in men's level of functional impairment. The less social support, the more functionally impaired the men felt. It has been suggested that men require more caretaking than women (Zimmerman, 1986), in general, and it would hold that if the men were not being supported, they would have a more difficult time returning to their day-to-day activities. There was no relationship for the women between social support and functional impairment.

A fourth gender difference was found in the relationships among social support, pain, and depressive symptomatology. For men, higher levels of support were related to

lower levels of pain and less depressive symptomatology. This finding suggests that for

the men, being supported may help to encourage and motivate them to maximize function

in everyday life, achieve a high level of well-being, perceive less pain, and feel less

psychologically distressed.

The differences in psychological well-being and physical functioning is important

to research in men and women recovering from cardiac surgery. One of the goals of

cardiac rehabilitation is to improve quality of life. In order to achieve this, programs

must focus on relieving symptoms, in addition to helping patients improve physical

capacity, working ability, and their psychosocial well-being. Knowing that these aspects

may differ for men and women, cardiac rehabilitation programs could customize their

curriculum so that they meet the needs of both men and women cardiac patients,

encouraging more of them to participate.

The present study also provides evidence of some similarities between men and

women during recovery. For both men and women CABG patients, depressive

symptomatology was associated with limited functional capacity. This finding combines

both a physiological and psychological component that influences recovery. Pain is often

an indicator that something is not right, however, when it is combined with a depressed

emotional state, not only can the pain "feel" worse, but it can limit what one is physically

capable of doing. This may unintentionally perpetuate a cycle. It is a common finding

that when patients are sick and are not able to perform activities of daily life, they may

feel depressed. When patients feel pain, they are reminded of their "fragile" state, and are

further debilitated. This makes patients feel more depressed and less motivated than

before to attempt trying to rehabilitate. This cycle, if left alone, may cause patients to be unnecessarily incapacitated.

Functional impairment was related to biobehavioural, recovery, and psychosocial factors. For both men and women CABG patients, those experiencing high levels of pain, felt limited in their functional capacity. In addition, for both men and women CABG patients, feeling supported was related to lower levels of depressive symptomatology. Social support may have a positive effect on mood and allow for others to help out and aid in the recovery process. This finding may have important implications for those who report low levels of social support. Patients who seek social support but are unable to obtain it, may have a more difficult recovery path because they must make lifestyle changes and adjustments on their own.

The lack of relationship between severity of disease, pain, and the psychosocial variables for both the men and women replicates many findings in the literature (e.g., Jette & Downing, 1996; Konttinen, 1987; Sokol, Folks, Herrick, & Freeman, 1987; Stein, Troudart, Hymowitz, Gotsman, & De-Nour, 1990). Severity of disease was found to be related to functional impairment in the women but not the men. As well, severity of disease did not correlate with the psychosocial variables. For the men, those who were married, had less severe disease. Marital status was not related to functional impairment, pain, or the psychosocial variables for the men and not related to all the variables for the women.

The findings from the hierarchical regressions suggest that psychosocial variables are powerful predictors of pain in women CABG patients and functional impairment in men CABG patients. Investigation of psychosocial variables is important in determining

what variables are more relevant for helping each gender recover. Feeling depressed and having inadequate support can predict pain levels in women CABG patients. If women are feeling depressed and not supported, after having gone through the operation and knowing the rehabilitation that is still yet to come, it may very well make postoperative procedures "worse" and women may feel the weight of the whole ordeal right then. The biobehavioural variables (age, marital status, and severity of disease) as well as the psychosocial variables (depressive symptomatology and social support) were not significantly predictive of functional impairment in women but this nonsignificant finding may have been an artifact of the small sample size ($\underline{N}$ = 30 women). Given that the biobehavioural variables accounted for a nonsignificant 19% of variance in functional impairment among women and a significant 18% of the variance in functional impairment among men, it seems reasonable to hypothesize that, had the sample of women been larger, and had the relations among variables held, the findings would have been significant for both genders. A similar conclusion might be drawn about the variance in functional impairment accounted for by the psychosocial variables.

For CABG men, the psychosocial variables were not predictive of pain levels but they were predictive of functional impairment. For the younger men, many will be anxious to return to work and assume their daily activities. The majority of patients will not return to work for 6 months post-surgery. Men may be feeling depressed and not experiencing the support to which they are accustomed (e.g., camaraderie at work, wife may be working to support family since the husband is in rehabilitation) in addition to not be able to physically do what they would like. These temporary limitations are often hard

to accept and adjust to. Men may find it particularly difficult, given that they also feel depressed and unsupported.

The findings from this study imply that men and women have different recovery paths that need to be addressed. In addition to the physical adjustment of the surgery, psychosocial variables also need to be assessed for both men and women. The inclusion of psychosocial factors seems to be an important step in women's recovery. Psychosocial factors that have been researched previously with men seem to be more relevant in men's recovery at a much later time in their rehabilitation. Psychosocial variables should be assessed soon after the surgery and continually monitored throughout the convalescence period. This addition may help to design treatment programs that are attractive and relevant to women, and that deal with women's unique obstacles to participation in cardiac rehabilitation programs.

Some limitations of the study should be noted. First, the cross-sectional design does not allow conclusions about causal relationships between functional impairment, pain, and the psychosocial variables. Longitudinal studies would better determine any causal links.

Second, the sample employed may limit the generalizability of the results. Only patients who underwent CABG surgery were approached to participate in this study. Other types of cardiac procedures, surgery, and events may have different consequences and hence, the results here may not apply to other types of cardiac patients during rehabilitation. In addition, patients in this study were approached when they had stable vital signs and were doing fairly well. This selection bias may also limit the

generalizability of the results. Third, the study relied upon the self-report measures of

patients. These measures may be subject to social desirability effects.

Future directions for research include a larger sample size to replicate these initial

findings. A follow-up study is also advisable to see what kind of impact these

psychosocial variables have had over time. Future research needs to continue the focus

on gender differences in cardiac patients to examine in greater detail the theories

explaining the gender differences, and to develop psychological interventions for both

male and female patients.

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Table 1

Means and Standard Deviations of Age, Depressive Symptomatology, Social Support,

and Pain and Functional Impairment Levels in Men and Women CABG Patients

	Age	Depressive Symptomatology	Social Support	Pain	Functional Impairment
Men[a]	63.6 (10.1)	8.7 (6.1)	33.6 (6.4)	2.4 (1.3)	3.1 (1.5)
Women[b]	66.4 (10.8)	11.3 (8.2)	32.3 (6.2)	2.7 (1.3)	2.9 (1.6)

Note. Standard deviations are in brackets following the mean.

[a]$\underline{n}$ = 60.   [b]$\underline{n}$ = 30.

Table 2

Intercorrelations Among Severity of Disease, Functional Impairment, Pain and Depressive Symptomatology and Social Support in Women (N = 30)

	Severity of Disease	Functional Impairment	Pain	Depressive Symptomatology	Social Support
Severity of Disease					
Functional Impairment	.40**				
Pain	.00	.46**			
Depressive Symptomatology	.18	.30*	.49**		
Social Support	.02	.06	.11	-.38*	

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

Table 3

Intercorrelations Among Severity of Disease, Functional Impairment, Pain and Depressive Symptomatology and Social Support in Men ($N = 60$)

	Severity of Disease	Functional Impairment	Pain	Depressive Symptomatology	Social Support
Severity of Disease		.02	-.20	-.18	-.08
Functional Impairment			.39**	.36**	-.33**
Pain				.12	-.24*
Depressive Symptomatology					-.35**
Social Support					

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

Table 4

Hierarchical Multiple Regression of Functional Impairment on Age, Marital Status, Severity of Disease, Depressive Symptomatology

and Social Support for Women

Dependent Variable = Functional Impairment

Step	Independent Variables	$\underline{B}$	$\underline{Beta}$	$\underline{R^2}$	$\underline{\Delta R^2}$	$\underline{\Delta F}$	$\underline{df}$
1	Age	.01	.07				
	Marital Status	-.41	-.19				
	Severity of Disease	.99	.42*	.19	.19	2.09	3, 26
2	BDI - Depressive Symptomatology	.07	.35				
	ISEL - Social Support	.05	.21	.29	.10	1.68	5, 24

Note. $\underline{N}$ = 30; beta = the value of the beta coefficient immediately after the block of variables in question was added to the model.

*p < .05.

Table 5

Hierarchical Multiple Regression of Pain on Age, Marital Status, Severity of Disease, Depressive Symptomatology and Social Support

for Women

Step	Independent Variables	B	Beta	R^2	ΔR^2	ΔF	df
1	Age	-.02	-.16				
	Marital Status	-.11	-.06				
	Severity of Disease	.01	.00	.03	.03	.31	3, 26
2	BDI - Depressive Symptomatology	.12	.71***				
	ISEL - Social Support	.10	.47**	.46	.43	9.67***	5, 24

Dependent Variable = Pain

Note. $\underline{N}$ = 30; beta = the value of the beta coefficient immediately after the block of variables in question was added to the model.

**$p <$ .01. ***$p <$ .001.

Table 6

Hierarchical Multiple Regression of Functional Impairment on Age, Marital Status, Severity of Disease, Depressive Symptomatology

and Social Support for Men

Dependent Variable = Functional Impairment

Step	Independent Variables	$\underline{B}$	Beta	$\underline{R^2}$	$\underline{\Delta R^2}$	$\underline{\Delta F}$	$\underline{df}$
1	Age	-.06	-.42***				
	Marital Status	.07	.05				
	Severity of Disease	.10	.06	.18	.18	3.87**	3, 54
2	BDI - Depressive Symptomatology	.07	.30*				
	ISEL - Social Support	-.04	-.16	.32	.14	5.60**	5, 52

Note. $\underline{N}$ = 60; beta = the value of the beta coefficient immediately after the block of variables in question was added to the model.

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

Table 7

Hierarchical Multiple Regression of Pain on Age, Marital Status, Severity of Disease, Depressive Symptomatology and Social Support

for Men

Dependent Variable = Pain

Step	Independent Variables	B	Beta	R^2	ΔR^2	ΔF	df
1	Age	-.03	-.22				
	Marital Status	-.06	-.05				
	Severity of Disease	-.28	-.20	.09	.09	1.80	3, 54
2	BDI - Depressive Symptomatology	.00	.00				
	ISEL - Social Support	-.05	-.23	.14	.05	1.60	5, 52

Note. $\underline{N}$ = 60; beta = the value of the beta coefficient immediately after the block of variables in question was added to the model.