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THE INFLUENCE OF PSYCHOSOCIAL AND PHYSIOLOGICAL FACTORS ON SMOKING BEHAVIOUR AFTER CORONARY ARTERY BYPASS GRAFT SURGERY: A DESCRIPTIVE CORRELATIONAL STUDY

by

Jennifer Catherine McDonald

A thesis submitted in conformity with the requirements for the degree of Master of Science in Nursing at the University of Toronto Graduate Department of Nursing Science The University of Toronto

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The influence of psychosocial and physiologic factors on smoking behaviour after coronary artery bypass graft surgery: A descriptive correlational study

Degree of Master of Science, 1998

Jennifer Catherine McDonald

Graduate Department of Nursing Science,

University of Toronto

Abstract

This descriptive correlational study examined the influence of physiological factors (dyspnea, angina, incisional pain, severity of disease, and smoking history), psychosocial factors (social influences, anxiety, depression and concern for health) on smoking behaviour during the six weeks following coronary artery bypass graft surgery. A convenience sample 38 adult smokers, undergoing CABG surgery for the first time was obtained. Results indicated that the grade of left ventricle and the frequency of incisional pain had a statistically significant effect on smoking behaviour after surgery. The major limitation of the study was its small sample size. Implications of the study concerning practice include more intense follow-up of patients after discharge from hospital to
enhance smoking cessation efforts. Implications for theory and research involve replicating the study using a larger sample size, using an investigator unknown to the subjects, utilizing validated measurement tools and employing a longer follow-up period.
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ACKNOWLEDGMENTS

An endeavour of this magnitude is rarely accomplished without the love and support of others. As I reflect on the progression of this thesis over the last three years, attempting to balance many other challenges including a change in career and the birth of my first child, I was often struck by the paradox between the conviction that I would complete this project but not being certain how I would do it. It was during these difficult times that the support of others was most instrumental.

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analytical skills were complimented by her in-depth knowledge of research methodology. Her mentorship during the last three years has provided me with a framework for conducting research that will serve me for many years to come. As this project reaches completion, I can honestly say that indeed, from the greatest struggles in life come the greatest accomplishments.
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Chapter One

Background of the Problem

In Canada, 6.6 million or 31% of the population over 15 years of age smoke cigarettes. The overall prevalence of smoking has decreased by only 1% since 1988 (Health Canada, 1994). Cigarette smoking has been causally linked to cancers of the mouth, pharynx, esophagus, bladder and pancreas (Baum, 1993) and to conditions such as allergies, diabetes mellitus, hypertension, chronic obstructive pulmonary, gastrointestinal, and cardiovascular diseases (Finchman, 1992). In 1991, 41,408 deaths were attributed to smoking with cardiovascular diseases accounting for the greatest number, 16,393 (Health Canada, 1994).

A 1991 study by Health Canada reported that smoking-related cardiovascular diseases accounted for 43,713 potential years of life lost before the age of 65. The majority of these deaths resulted from coronary/ischemic heart disease, the most common precursor of which is atherosclerosis.

The treatment for Coronary Artery Disease (CAD) may include medical, pharmacological and/or surgical interventions. For those patients whose symptoms and/or disease progression are not amenable to drug therapy or angioplasty, Coronary Artery Bypass Graft Surgery
(CABG) may be offered as an alternative. This surgery involves bypassing the stenosed or occluded coronary arteries and performing a reanastomosis with patent vessels.

Patients who smoke after CABG may be at a greater risk for atherosclerosis and occlusion of the bypass grafts (Fitzgibbon, Leach, and Kafka, 1987). Repeat coronary operations account for 2 - 6% of all myocardial revascularization (Loop, Lytle, Gill, Golding, Cosgrove, and Taylor, 1983). As the risks of reoperation exceed those of the initial surgery, modifying the risk factors that will impede the redevelopment of atherosclerosis in coronary vessels is an important initiative.

The author's clinical practice as well as some research literature suggest that many patients who smoke before undergoing CABG surgery intend to quit smoking and to remain abstinent postoperatively. However, many of these patients relapse after surgery. A study by Bursey (1995) found that 29 of the 32 CABG patients studied intended to quit smoking permanently after surgery; however, when interviewed six to seven weeks postoperatively, 22 (69%) did so. Leaman, Brower and Meester (1982) studied 226 subjects undergoing CABG surgery. Forty-eight percent of the sample smoked preoperatively and of those, 44% were smoking when surveyed one year after the operation (time of relapse was not reported).
Berg, Kirk and Bain (1988) studied 65 patients undergoing CABG surgery and found that of the 33 patients who smoked within a year before surgery, 17 relapsed after discharge from the hospital. Self-reported relapse occurred at a mean of 16 weeks after surgery in 12 of the 14 patients who smoked up until their admission and ranged from one day to 10 months for those who quit within a year of surgery.

Although the predisposing factors for relapse have been examined (Curry & McBride, 1994) the reasons for the high relapse rates in the post CABG population have not been well studied. Some studies have reported that CABG improves quality of life, decreasing chest pain, activity limitations, and the requirement for cardiac medications (Jenkins, Stanton, Savageau, Denlinger, & Klein, 1983), while other literature documents the experience of pain, dyspnea, depression, and anxiety after surgery (Redeker, 1993). However, it is unclear whether these experiences influence smoking behaviour in this population.

Problem Statement

Tobacco smoking is a preventable cause of many diseases, including CAD. Many CABG patients intend to quit smoking, however approximately one third relapse during the first one to eight months postoperatively (Berg, Kirk and Bain, 1988; Scott and Lamparski, 1985;
Bursey, 1995). The factors that influence smoking behaviour after CABG are not completely understood and require further investigation.

**Purpose**

This study will investigate the effects of physiological factors (physiological symptoms including dyspnea, chest pain and incisional pain, and smoking history), and psychosocial factors (social influences - smoking behaviour of social contacts, mood state including anxiety and depression, and concern for health), on smoking behaviour within approximately six weeks after CABG.

**Literature Review**

The literature review begins by discussing the relationship between cigarette smoking and the development of atherosclerosis and CAD. CABG surgery and the consequences of smoking post operatively will then be examined. The physical and psychosocial symptoms experienced pre and post CABG and smoking cessation in the general population and in the CABG population will comprise the balance of the literature review.
Physical Properties of Cigarette Smoke and the body’s response to exposure

Tobacco smoke is comprised of nicotine, carbon monoxide, carcinogens, irritant substances and traces of other unknown gases. Nicotine is physically addictive and acts on the central and autonomic nervous systems by stimulating the brain’s nicotinic receptors, causing changes in mood, learning, concentration, alertness and performance. Nicotine also stimulates the sympathetic nervous system, triggering the release of chemicals that increase heart rate, blood pressure, vasoconstriction, blood clotting, and oxygen consumption (US Department of Health and Human Services, 1991).

Following exposure to cigarette smoke and the rapid absorption of nicotine, sympathomimetic response is induced in the body that dramatically effects the cardiovascular system. Systolic and diastolic blood pressure, heart rate, cardiac output and coronary blood flow are all increased temporarily while peripheral arteries vasoconstrict. Carbon monoxide binds with hemoglobin, reducing the amount of oxygen available for transport (US Department of Health and Human Services, 1991).
Coronary Artery Disease and Atherosclerosis

Risk factors for CAD fall into three main categories; modifiable, non-modifiable and somewhat modifiable. Modifiable risk factors include smoking, physical inactivity, a high fat diet and elevated blood pressure. Those that cannot be modified include age, gender and family history. Conditions such as diabetes mellitus, hyperlipidemia and left ventricular hypertrophy are also risk factors and are considered somewhat modifiable. Since the range of risk factors act in a synergistic rather than merely an additive manner, plaque accumulates within the vessel lumen at a rate determined by the number of risk factors present and the level of each risk factor.

When a critical percentage of the lumen is occluded, atherosclerosis manifests itself (Cunningham, 1992). Atherosclerosis is characterized by the formation of lipid-rich plaques (atheromas) in the medium or large size arteries (Weeks, 1986). Its development is promoted in the presence of smoking by decreasing high density lipoprotein cholesterol while increasing low density lipoprotein, total serum cholesterol, and free fatty acids in the plasma. Intimal hypoxia and increased endothelial permeability in the arterial wall may be produced by the presence of carbon monoxide. Lipid deposition may occur
subsequent to this (US Department of Health and Human Services, 1991).

As the disease progresses, lipid particles continue to accumulate while undergoing oxidative changes, eventually forming a lipid-rich core protruding out from the intima. The mature fibrous plaque, surrounded by a "cap" of connective tissue, may eventually encroach into the lumen of the artery, compromising blood flow. Subsequently, degenerative changes occurring in the "cap" may produce rough areas that are prone to the development of thrombi. Distal regions of the coronary arteries may occlude, resulting in angina, myocardial infarction or death (Weeks, 1986).

**Coronary Artery Bypass Graft Surgery (CABG)**

CABG surgery is the therapy of choice for treating CAD in the following conditions: severe angina pectoris in spite of maximal medical therapy, critical obstruction in one or more vessels in the presence of poor functional capacity and extensive angina during stress testing, left main coronary artery stenosis, or critical obstruction of proximal left anterior descending artery with significant obstruction of one other major vessel in the presence of angina/ischemia (Andreoli, Zipes, Wallace, Kinney & Fowkes, 1987). CABG surgery offers many benefits to patients. Angina is relieved in 75 - 90% of patients, tolerance of physical activity increases, left ventricular function improves, the incidence of MI decreases and in
most cases, a prolongation of life is noted (Allen, 1990). The greatest limitation of this surgery, however, is that it does not impede the atherosclerotic process. The long term success of CABG depends on the patency of the grafts. The literature reveals that after two months, 90% patency rates can be expected but this falls to 80% and 60% one to five and 10 - 12 years post operatively, respectively (Campeau, 1988).

Health Consequences of Smoking in the CABG Population

Evidence from the literature supports the role of smoking as a risk factor for the development of atherosclerosis in native and bypassed coronary arteries in the postoperative CABG population. FitzGibbon, Leach and Kafks (1987) studied 340 patients postoperatively comparing those who continued to smoke with those who abstained. Angiograms one and five years after bypass revealed that grafts were unchanged in 39% of the smokers and 52% of the nonsmokers. Grafts showing significant narrowing or complete obstruction were consistently higher in the smokers ($\chi^2 = 16.5$, df = 3, $p < 0.001$).

Solymoss, Nadeau, Millette, Bling and Campeau (1988) studied 173 grafts in 143 patients who were undergoing a subsequent CABG surgery. Thrombosis was observed in 69% of grafts in 72% of patients. Stepwise logistic regression analysis revealed that smoking after the graft
procedure was a significant factor (F value of 10.00, p value of 1.000 for the goodness-of-fit test (Brown), in the development of thrombosis.

Cavender, Fisher, Gersh, Coggin and Myers (1992) followed 139 smokers randomized to CABG surgery (versus medical therapy) and found that the 10 year survival rate was 84% in those who quit smoking compared with 68% in those who continued to smoke. Continued smoking increased the relative risk of death by 1.73.

**Smoking Cessation in the Non CABG Population**

Fiore, Novetny and Peirce (1990) estimated that, of the 17 million Americans who quit smoking each year, only 10% of them remain abstinent for more than one year. Baer and Marlatt (1991) reviewed the literature and described the following regarding relapse. Withdrawal symptoms are typically reported after cessation, diminishing fairly rapidly with ongoing cravings absent after two to four weeks. However, transient periods of urges to smoke continue. Relapse tends to occur in situations involving stress and negative affect and in those that involve socializing and the use of other drugs (including alcohol).

The literature reveals a multitude of factors that influence smoking behaviour after an attempt to quit. Several studies suggest that smoking history, in particular heavier smoking, predicts greater chances of relapse

A variety of retrospective studies suggest that negative affect is a precipitant for relapse (Marlatt and Gordon, 1980; Lichtenstein, Antonuccio, and Rainwater, 1977); including anxiety, anger, depression (Shiffman, 1984) and stress. Glasgow and Lichtenstein (1987) reviewed behaviourally based smoking cessation studies conducted over the previous 10 years and concluded that the following factors are related to relapse: stress, the experience of negative affect, low self efficacy for smoking cessation maintenance, a lack of social support, the presence of other smokers and the consumption of alcohol.

Social influences have emerged as a factor impacting relapse among smokers (Morgan, Ashenberg, & Fisher, 1988; Ginsberg, Hall, & Rosinski, 1991; Baer, & Lichtenstein, 1988). Collin, Emont and Zywiak (1990) surveyed 107 smokers recruited from a smoking cessation program and followed them at three and six months after the program. A multivariate regression analysis revealed that the following factors (listed with their respective beta weights) were important predictors of long term quitting: social support influences from friends partners and coworkers (B = .27), social hinderances from friends, partners and coworkers (B = .31),
nicotine dependence ($B = -.20$) and alcohol consumption and perceived stress ($B = .20$).

Smoking cessation may be causally linked to the experience of illness. Herderschee (1992) conducted a retrospective follow-up study on 100 patients after transient ischemic attack (TIA) or small stroke to determine variables related to smoking cessation. Age, gender, amount of cigarettes, hospital admission, and persistence of symptoms were not statistically significant factors in the cessation group; however the investigator speculated that this may have been partially attributable to the small sample size. Thirty percent stopped after the TIA or small stroke; however half of these people resumed smoking (the exact restart time frames are not reported). It was speculated that the illness event itself was an important factor in the patient's decision to quit smoking.

Studies by Frid et al., (1991); Hay & Turbott, (1970); and Scott & Lamparski, (1985), have identified severity of CAD and age as predictors of smoking cessation. A similar trend was noted by Fisher, Lichtenstein, Haire-Joshu, Morgan and Rehberg (1993) who reviewed several studies and concluded that the likelihood of quitting increases with the seriousness of CV disease. Similarly, the Framingham Study (Freund, D'Agostino, Belanger, Kannel and Stokes, 1992) analyzed a range of
demographic, behavioural, and health-related variables in relation to smoking cessation in a sample of 1178 female and 1506 male smokers. Using logistic regression models, they found that males were 1.9 times more likely to quit smoking after developing CAD compared to females; however there was an increased probability that both males and females would quit if they had been hospitalized for CAD in the preceding two years. The investigators suggested that the development of acute symptoms (for example, chest pain) or medical conditions requiring hospitalization were important factors facilitating smoking cessation.

Frid, Ockene, Ockene and Merriam (1991) studied 84 smokers undergoing coronary angiography and compared the extent of their CAD with their smoking status eight to 12 months later. A significant relationship emerged between the severity of CAD and the probability of smoking cessation (20.8% probability for zero vessels versus 76% for three vessels).

Duncan, Cummings, Sid Hudes, Zahnd and Coates (1992) interviewed 245 patients who had quit smoking during the previous year to determine their reasons for quitting. Seventy-seven percent cited “health reasons”; 91% of those who quit had one or more smoking-related symptoms (respiratory, chest pain and/or cough) and 47% had a smoking-
related diagnosis (angina, asthma, etc). On a six point likert scale, subjects rated their diagnoses (mean score = 4.14) as more important than their symptoms (mean score = 3.13) in their decision to quit smoking. Health status concerns were also shown to be associated with smoking cessation in a study by Halpern and Warner (1993). They surveyed 7,700 current and former smokers to elicit their reasons for quitting. Sixty-four percent of current smokers and 59% of former smokers identified concern for present health as a reason for smoking cessation. Eighty percent of current smokers and 74 % of former smokers indicated that future health was a reason for quitting.

In summary, the literature studying the general population provides support for the following factors as an impetus for smoking cessation: availability of social support, the presence of disease, the development of acute symptoms, reported concerns for health, and severity of CAD. Relapse is associated with greater nicotine dependence, the presence of anxiety, stress, depression, and social cues to smoke.

**Smoking Cessation in the CABG Population**

In spite of compelling reasons to stop smoking, a number of adult continue to smoke after CABG (Leaman, Brower, and s Meester (1982); Cavaender et al., 1992, Hermanson, Omenn Kronmal & Gersh, 1988;
Aish, Lindgren, Costello, & Brown, 1991). Berg, Kirk and Bain (1988) surveyed 45 smokers undergoing CABG surgery. Of the 33 patients who smoked within a year of surgery but quit preoperatively, 17 restarted after discharge from hospital (mean time of 37.4 weeks). A similar trend was noted by Scott and Lamparski (1985) who studied 79 male veterans and found that only 26 (33%) reported successful smoking cessation after a myocardial infarction or CABG. Of the 53 subjects who relapsed, 32% resumed smoking before discharge or during the first month after hospitalization. Thirty percent of the smokers abstained from cigarettes for at least a month after the cardiac event but relapsed during the first year. Similarly, Baile, Bigelow, Gottlieb, Stitzer & Sacktor (1982) found that 38% of the 66 post MI patients they followed resumed smoking before hospital discharge (approximately 1 1/2 - 2 weeks after admission).

Clinical experience leads this investigator to believe that patients experiencing acute symptoms preoperatively may feel susceptible to a smoking-related illness and may express an intention to quit. This inference is supported by a study conducted by Strecher, Becker, Kirscht, Eraker and Graham-Tomasi (1985). They studied veterans participating in a smoking cessation program and discovered that perceived susceptibility to illness from smoking was significantly related to a desire
to quit smoking but not to changes in smoking consumption. Bursey (1995) studied a smaller, convenience sample of 32 smokers after CABG, noting that 29 (90.63%) intended to quit smoking permanently when surveyed two to three weeks after discharge. Six to seven weeks after discharge, 10 (31.25%) of the patients had resumed smoking, although nine of them indicated that they intended to quit smoking permanently. The major limitation of this study was its small sample size.

Crouse and Hagaman (1991) contacted 135 patients who were smokers before one of the following procedures: CABG, percutaneous transluminal coronary angioplasty, or angiography alone. Controlling for the number of stenosed vessels (≥ 50%), 55% of the surgery patients, 25% of the angioplasty patients and 14% of the angiography patients reported that they had quit smoking. As surgery patients require a longer recovery period, they may abstain from cigarettes a longer period of time and may therefore be able to cope with the craving stage of smoking cessation. It is also possible that patients undergoing different procedures receive different messages regarding their morbidity which may subsequently affect their smoking cessation behaviour.

In summary, many CABG patients intend to quit smoking after surgery, however, approximately one-third of them relapse. Severity of
CAD and the presence of symptoms may influence smoking behaviour, however, this requires further investigation.

**Physical and Psychosocial Symptoms Reported Pre and Post CABG Surgery**

Patients with ischemic heart disease who are preparing for CABG surgery may experience a range of symptoms which vary in intensity. Conversely, they may not experience any symptoms. An appreciation for the range of symptoms that patients experience is valuable in terms of how this may relate to their decision to quit smoking and to smoking behaviour postoperatively.

Chest pain (angina pectoris) is the most common indication for CABG surgery. Myocardial revascularization results in the relief of angina in 70 to 90% of patients, affording complete relief to 60% to 70% of these patients and partial relief to the remaining 30% to 40% (National Institute of Health, 1981).

During the immediate postoperative period, incisional pain in the chest or leg vein donor sites is common. The sternotomy, chest and crural wounds heal within two months, during which time they become hyperesthetic and may feel numb and sensitive to touch at the same time (Engblom, Hamalainen and Kallio, 1993). The sternum may still be
painful in one third of the patients six months after surgery. King and Parrinello (1988) reported that pain was the most commonly cited post operative complaint in the 34 patients they studied. The pain was reported to decrease in the first eight weeks after surgery. Redeker (1993) surveyed 129 post op CABG patients during their hospitalization, three to five weeks and six weeks after discharge. Initially, the most commonly reported symptoms (listed in order of prevalence) were pain, edema, fatigue, sleep disorders, dypsnea and anxiety. By six weeks post op, sleep disorders were the most common complaint, followed by edema, pain and fatigue. In addition to those symptoms, the following has been reported by patients postoperatively: shoulder pain, loss of appetite, dull ache in the upper body (postpericardiotomy rheumatism) (Vargas, Cukier, Tera-Filho, Hueb, Teixeira and Light, 1992; Walton and Holt, 1988) and arrhythmias (Engblom, Hamalainen, Lind, Mattlar, Ollila, Kallio, Inberg and Knuts, 1992).

Psychosocial outcomes postoperatively vary to a greater degree than physical symptoms. Immediately post op, many patients experience anxiety, mistaking incisional pain for angina. Other symptoms that are commonly documented in the literature include depression, low self-esteem, impotence and social withdrawal (Allen, 1990). Patients (n= 318)
reported the following psychosocial symptoms in the first six months after surgery: sadness/depression (40%), anxiety (38%), and anger/resentment (35%) (Jenkins et al., 1983). Gundale, Reeves, Tate, Raft and McLaurin (1980) interviewed 30 patients who were working prior to CABG. When surveyed one to two years after surgery, 83% were unemployed and 57% were sexually impaired. The investigators do not report any information regarding subjects who may have retired after surgery versus being unable to work.

Some researchers however, have elicited different findings. Kornfeld, Bozman, Tate, Raft and McLaurin (1980) followed 100 patients for 4 1/2 years after surgery and found that 75% of them reported improvement in their overall pleasure of life, reduced nervousness and heightened mood. These results may be attributed to the longitudinal design.

The physiological and psychological symptoms experienced by patients after CABG are of interest in the context of how they may relate to smoking behaviour. The presence of smoking-related symptoms (angina, respiratory complaints) and the experience of anxiety and depression, in the CAD and general population respectively, have been associated with smoking behaviour. It is unclear whether the experience
of these symptoms (presence of absence) influences smoking behaviour in the CABG population.

**Summary of Literature Review**

Smoking is among the risk factors that have been associated with many negative health states, including ischemic heart disease. Smoking is a major risk factor for the development of atherosclerosis in native coronary arteries and may contribute to the demise of coronary artery bypass grafts. In view of this, it is imperative that patients are successful in their efforts to stop smoking permanently after undergoing CABG.

The physical and psychosocial symptoms experienced by CABG patients pre and post operatively, reveal that preoperative symptoms commonly experienced include chest pain (angina) and dyspnnea. Postoperative symptoms include pain, fatigue, weakness, dyspnea, anxiety and depression. These symptoms generally lessen over time. The incidence of angina is greatly reduced postoperatively. The association between these variables and smoking behaviour in the CABG population is unclear.

Smoking cessation is a complex process, as evidenced by the plethora of factors that influence one's decision to quit smoking and to maintain abstinence. Although not unanimously agreed upon, recent
illness and concern regarding one's health are generally well supported in the literature as an impetus for smoking cessation while negative affect, social cues to smoke, and a greater degree of nicotine dependence have been associated with relapse. Studies that targeted CAD patients suggest that the presence of disease and its associated symptoms may influence the decision to quit smoking.

Studies conducted in the CABG population reveal that although many smokers intend to quit smoking postoperatively, substantially fewer are successful. The factors that influence their smoking behaviour postoperatively have not been well studied.

**Conceptual Framework**

The conceptual framework for this study (Figure 1) examines the role of two central factors (psychosocial and physiological) in relation to smoking behaviour. The psychosocial element consists of social influences, mood state, and concern for health. The physiological element is represented by the presence or absence of symptoms (angina, dyspnea and incisional pain), severity of disease, and smoking history. The definitions for each of these elements are given below.

The framework was developed by the investigator. All of the elements outlined are supported in the literature as factors that influence
smoking behaviour in the general population. As they are relevant issues in the CABG population, it is reasonable to speculate that they may influence smoking behaviour after surgery. The strength and direction of these influences will be explored in this study.

**Definitions**

**Mood State:** refers to the experience of anxiety and/or depression.  
**Anxiety** refers to heightened musculoskeletal tension, including somatic tension and observable psychomotor manifestations as measured by the Anxiety subscale in the Profile of Mood States (POMS)  
**Depression** refers to sadness, guilt, emotional isolation, futility, and feelings of personal worthlessness, as measured by the Depression subscale in the POMS  
**Social Influences** refers to the presence of smokers in the subject's social network, as measured by the Post Discharge Questionnaire (PDQ)  
**Concern for Health:** refers to expressed concern for Health, as measured in the PDQ  
**Physiological Symptoms:** includes the frequency and intensity of angina, dyspnea and incisional pain experienced by the subjects post CABG, as measured by the PDQ  
**Severity of Disease:** refers to the severity of coronary artery disease, as
measured by the grade of the left ventricle and the number of bypass grafts completed, the type of angina they are experiencing (according to the New York Heart Association Functional Class) as well as the preoperative triage priority the patient has been assigned (elective to urgent) as determined by the Cardiovascular Triage coordinator.

The patient's perception of the nature of their CAD will also be elicited. **Smoking Behaviour:** refers to the whether or not subjects have smoked with in the six weeks following surgery, as measured by the PDQ. **Smoking History:** refers to the duration of the smoking habit (number of years), average amount consumed in the previous six months, the number of attempts to quit in one’s lifetime and the timing of the last cigarette preoperatively, as measured by the PDF.
Symptoms
Dyspnea
Angina
Incisional Pain

Physiological
Severity of Disease
Smoking History

Post-operative
Coronary
Artery Bypass
Population

Smoking Behaviour after Surgery

Psychosocial
Social Influences
Mood State
Anxiety
Depression
Concern for Health

Figure 1. - Conceptual Framework
Research Questions
This study explored the effects of physiological and psychosocial factors on smoking behaviour of patients approximately six weeks after CABG, using bivariate and multiple regression analysis. The specific questions addressed in this study were:

In a sample of adults who smoked cigarettes within 6 months prior to undergoing CABG:

1. What is the effect of anxiety on postoperative smoking behaviour?
2. What is the effect of depression on postoperative smoking behaviour?
3. What is the effect of reported concern for health on postoperative smoking behaviour?
4. What is the effect of social influences on postoperative smoking behaviour?
5. What is the effect of the experience of angina on postoperative smoking behaviour?
6. What is the effect of the experience of dyspnea on postoperative smoking behaviour?
7. What is the effect of the experience of incisional pain on postoperative smoking behaviour?
8. What is the effect of severity of disease on postoperative smoking behaviour?
9. What is the effect of smoking history on postoperative smoking behaviour?
10. What is the simultaneous effect of psychosocial and physiological
factors on postoperative smoking behaviour?
Chapter Two - Methodology

Design

A descriptive correlational design was used in this study. This type of design is used to examine the relationships that exist in a situation occurring in the past or the present (Burns, & Grove, 1993). This type of design is appropriate as the purpose of this study was to determine the effect of the following independent variables: anxiety, depression, concern for health, social influences, chest pain, incisional pain, dyspnea, severity of disease, and smoking history on the dependent variable, smoking behaviour after surgery.

Setting

The setting for this study was an acute care teaching hospital in a Metropolitan city as well as the subjects' home (or at an alternative place more convenient for them). The hospital has a programmatic focus in the prevention, treatment and rehabilitation of heart disease and offers a full range of surgical and non-surgical interventions. At the time of this investigation, the hospital was performing approximately 850 CABG surgeries each year. Retrospective estimates provided by the hospital's surgical triage coordinator revealed that for the time period six months
previous to this study, approximately 13% of these patients smoked cigarettes preoperatively.

Sample

A convenience sample of adult CABG patients were recruited for this study. The rule of thumb of including five subjects per variable studied (Bentler, 1993) guided the determination of the optimal sample size. It was anticipated that nine core variables would be examined in the study, leading to a desired total sample size of 45.

The following inclusion criteria were used for the selection of the subjects:

1. Adult male and females (> 19 years of age)
2. Self reported smoking of at least two cigarettes in the last six months prior to hospitalization for surgery.
3. Admitted to hospital for initial CABG.
4. Able to communicate in written and spoken English.

Exclusion Criteria

1. Quit smoking 6 or more months prior to CABG.
2. Reported smoking of smokeless tobacco.
3. Repeat CABG
Instrumentation

Three instruments were used in this study. The first, the Personal Data Form (PDF), elicited data regarding sociodemographic variables as well as data related to smoking status, smoking history and severity of disease. The second, the Profile of Mood States (POMS) measured the presence of anxiety and depression, and the third, the Post Discharge Questionnaire (PDQ) measured concern for health, severity of cardiovascular disease, social influences, physiological symptoms (chest pain, dyspnea, incisional pain) and current smoking behaviour. Prior to data collection, two health care professionals who work with this population and two patients who matched the inclusion criteria were asked to review the instruments. As well, a pretest of the instruments developed by the investigator was conducted utilizing the first five subjects enrolled in the study. Their feedback was considered in determining face validity. Minor changes were made to the instrument based on the feedback of the health care professionals and the subjects. The health care professionals and the patients who reviewed the instruments commented that the question “what is your understanding of the nature of your heart disease?” was unclear; therefore the question was changed to “how severe do you think your heart disease is?”.
**Personal Data Form**

The PDF (see Appendix A) was designed by the investigator in order to gather information to describe the sample in terms of their age, marital status, gender, employment status and smoking history. The smoking history/status section was reviewed by an investigator who has designed and utilized tools similar to this one in the past. Based on this feedback, the question inquiring about smoking history was modified slightly from “at what age did you start smoking?” to “at what age did you start smoking regularly?”

In order to obtain a measure of the severity of the patient’s disease, the investigator also collected data from the patient’s medical records regarding the grade of the left ventricle, the number of bypass grafts completed, priority for surgery and CCS class.

**The Post Discharge Questionnaire**

The PDQ (see Appendix B) was developed by the investigator to measure a number of variables emerging from the literature that may influence smoking behaviour postoperatively. The questionnaire begins by eliciting information regarding the dependent variable, current smoking behaviour. Subjects were asked to circle appropriate responses or to enter information in a blank space regarding their smoking status and if
applicable, the average number of cigarettes smoked and number of attempts to quit. This section of the instrument was reviewed by the aforementioned investigator to assess face validity.

The independent variables social influences, concerns for health, symptoms and severity of disease were also measured using this tool. These sections of the tool were reviewed by an expert in cardiovascular patient management in order to assess face validity. Changes to the question inquiring about severity of disease were made as discussed previously.

Social influences were measured by eliciting data regarding the smoking status of the subjects' social contacts and of persons living with the subject. The questions inquiring about the number of smokers living with the patient and the amount of time spent with these smokers used likert-type scales with responses ranging from "none to all".

Concern for health was measured using a visual analogue anchored by "not at all concerned" and "very much concerned" and a likert-type scale to measure how frequently the subjects' experienced concerns (ranging from "almost never" to "almost always").

The intensity of the physiologic symptoms (angina, dyspnea and incisional pain) was measured with visual analogue scales anchored by
“no pain” and “pain as bad as it could possibly be”. Likert-type scales (response choices ranging from “never” to “always”) were used to measure the symptoms’ frequency.

Scaling and Scoring

Likert Scales

Response choices in likert scales generally address agreement, evaluation, or frequency (Burns and Grove, 1993). Values are placed on the response options and later summed to obtain a score for each subject. Although the values obtained are technically ordinal level, the summed score is generally treated as an interval level measurement (Burns and Grove, 1993). Numerical values ranging from one (most negative) to five (most positive) were assigned to the responses, and the scores for each variable were calculated.

Visual Analogues

Visual analogue scales are used to scale stimuli such as mood, attitudes, and severity of symptoms (Burns and Grove, 1993). The scale is 100 mm in length with anchors placed at right angles to either ends of the scale. The anchors “not at all” and “as severe as it could possibly be” represent extreme opposite ranges of the severity of the symptom being measured. The subject was asked to place a mark at a point on the
horizontal line that best represents their opinion about their experience. The response was then quantified by measuring the distance between the left end of the scale and the mark. A numerical score was generated for each variable such that the higher the score, the greater the severity of the symptom experienced for the subject. It has been argued that visual analogue scales generate not only interval level data but ratio level data as well (Sennott-Miller, Murdaugh, & Hinshaw, 1988). The variables studied with this tool tend to be labile and are measured only once, and therefore reliability and validity are difficult to evaluate. Visual analogue scales have been used successfully to measure subjective pain experiences in various client populations (Huskission, 1983; Striner & Norman 1992; Jensen & Koroly, 1992) including the CABG population (Watt-Watson, 1996; Puntulilo & Weiss, 1994).

Profile of Mood States

The variable mood state (anxiety and depression) was assessed utilizing the Profile of Mood States. The POMS (Appendix C) consists of 65 adjectives (originating from 100 different adjectives and reduced by factor analysis) describing feeling and mood. The scale measures six dimensions of mood, however this study only utilized the subscales of anxiety and depression. The subjects were asked to rate their feelings
during the previous week according to a five point Likert-type scale ranging from “Not at all” to “Extremely”. Other time periods can be used, provided that the examiner ensures that respondents understand the specific time period being used (Keyser & Sweetland, 1987; L. Lee, personal communication, November 1, 1996). This study asked subjects' about their experiences since their surgery, which was an average time period of six weeks. Scores were obtained for each variable, representing the extent to which it has been experienced by the subject. Internal consistency reliability coefficients are reported as .90 -.92 for anxiety and .95 for depression. Adequate test-retest reliability (.70 for anxiety and .74 for depression) and construct, concurrent, and factorial validity have been reported (Keyser & Sweetland, 1987). The POMS depression and anxiety subscale correlated with the Beck Depression Scale (.61) and the Manual Anxiety Scale (.80) respectively (McNair, Lorr, and Droppleman, 1971). The POMS has been used extensively in research to measure mood states (Conn, Taylor and Wiman, 1991; Giese and Schomer, 1986; Jenkins et al, 1983).

The POMS was reviewed by two nursing professionals who work with the study population as well as seven CABG patients (two prior to
commencing the study and five of the subjects first enrolled in the study). No changes were recommended by the reviewers.

**Data Collection Procedure**

Data collection in this study took place on two occasions. After obtaining the participant’s consent to participate, demographic data and information regarding the patient’s smoking history were elicited during the patient’s hospital stay (using the PDF). Approximately six weeks postoperatively, the investigator interviewed the subjects individually at which time they completed the PDQ and the POMS.

Patients who met the inclusion criteria were approached by the Clinical Nurse Specialist/Nurse Practitioner in the Cardiovascular Surgery ward, or her delegate before their discharge from hospital and were informed about the study (see Appendix D). Their interest in listening to an explanation of the study was elicited. If they agreed to listen to an explanation, the investigator met with each patient to explain the study and its associated responsibilities using a standard explanation form to ensure that accurate, consistent information was offered to potential participants (see Appendix E). If the subject agreed to participate in the study, a written consent (see Appendix F) was obtained. A copy of the consent was given to the patient at that time. The PDF was completed
and an appointment was made for a follow up interview at a place convenient for the patient, approximately six weeks after discharge.

During the follow up interview, the investigator provided verbal instructions regarding the completion of the POMS and the PDQ, which were collated together as a single questionnaire. The participants were requested to read the written instructions for the questionnaire and were encouraged to ask questions of the investigator if clarification of the information was required. The questionnaire required approximately 10 - 15 minutes to complete. The investigator was present to answer any questions.

**Protection of Participants’ Rights**

The protocol for this study was approved by the Human Subject Review Committee at the University of Toronto and by the Nursing and Hospital Research Committees at the study site. Once the proposal was approved, a letter was sent to the Nurse Practitioner/Clinical Nurse Specialist at the site, outlining the purpose of the study and explaining the procedure for data collection (see Appendix G).

Informed consent was required from the subjects participating in the study. The information sheet explaining the study and the consent form were reviewed with each subject one to two days prior to their
discharge from hospital. If the patient decided to participate, he/she was asked to sign the consent form. The participants were assured that anonymity would be ensured by coding the questionnaires. They were also told that their name would not appear on any form or in any report of the study, and that results would be described only in terms of the entire group of subjects. As well, they were assured that their individual responses to the questionnaires would not be shared with their physicians or other health care providers. The participants were told that their participation or their refusal to participate in the study would not affect the care they received at the hospital. They were also reminded of their right to refuse to answer any question(s) and to withdraw from the study at any time.

Confidentiality

Participants were requested not to put their names on the questionnaires. Completed questionnaires were given to the investigator who together with the thesis supervisor, had access to the individual responses. The questionnaires were coded and a list of subjects' names and code numbers were kept in a locked file. The questionnaires were kept in a separate locked file in the Faculty of Nursing. The original data
and the consent forms will be retained for six years, and then will be destroyed.

Risks and Benefits

Participation was completely voluntary. The subjects had the option not to answer any questions they chose to and to withdraw from the study at any time. The potential benefit for the participants included an opportunity to reflect on their smoking behaviour post operatively. The investigator recognized that there existed an element of risk for subjects to acknowledge that they have not been able to quit smoking after surgery and for them to explore some of the reasons why. When this occurred, the investigator reiterated that this information would not be shared with anyone else. The subject was then offered a referral to an appropriate health care professional or an outside agency (depending on the subject's preference) for smoking cessation counseling.

Data Analysis

The demographic characteristics of the sample as well as the major variables under study were described in terms of average values and variability within the sample. This included the results of a reliability analysis of multi-item scales. Bivariate and multiple regression analyses were utilized in order to determine the strength and direction of the
relationship between each independent variable and the dependent variable (smoking behaviour). As well, the simultaneous effects of the independent variables on the dependent variable were analyzed. Bivariate regression analyzed separately, the effect of each independent variable on the dependent variable. Multiple regression analyzed the simultaneous effects of several independent variables on the dependent variable. Logistic regression analysis was also conducted since the dependent variable was dichotomous. The results of the multiple and logistic regression were similar. The results of the multiple regression are given for their ease of presentation and understanding.
Chapter 3

Results

The purpose of this study was to investigate the influence of social influences, mood state (anxiety and depression), concern for health, physiological symptoms (dyspnea, chest pain and incisional pain) and severity of disease on smoking behaviour within six weeks after coronary artery bypass graft surgery. A descriptive correlational design was used. Data collection took place on two occasions. During the patient’s hospital stay, demographic data and information regarding the patient’s smoking history were obtained. Approximately six weeks later, the investigator interviewed the subjects to determine their smoking status and to complete the data collection for the remaining variables.

The results of the investigation are reported in terms of the response rate, demographic variables as well as the variables of concern in the conceptual framework. This includes the results of a reliability analysis of multi-item scales. The results of the regression analysis are presented in relation to each research question. Two types of regression analysis were performed for the research questions that inquired about the effects of several different variables. The first type of regression involved bivariate regression, where each independent variable’s
effect on the dependent variable was investigated separately. The second type of analysis consisted of multiple regression in which the simultaneous effects of several independent variables on the dependent variable, smoking behaviour, were examined. In this analysis, a set of independent variables that reflected a category of factors as specified in the study conceptual framework (e.g. severity of disease and social influences) and that could not be represented in a single index (due to low internal consistency), were included.

Response Rate

Forty men and women from an urban teaching hospital agreed to participate in this study. Participants were recruited from a population of patients undergoing CABG surgery who had smoked at least two cigarettes in the six months preceding their surgery and who met the other study criteria. Thirty-eight participants (95%) completed all portions of the study. Two subjects (5%) did not complete the follow-up questionnaires. One withdrew from the study, stating that he was “too busy” to participate in the follow-up interview. The other subject expired four weeks following surgery. The target sample size was not obtained as the investigator was not able to gain access to a second study site, as originally planned. Data were collected for 13 months from a single site. In an effort to proceed
with the remainder of the investigation in a timely manner, data collection stopped after 13 months.

**Demographic Data**

Table 1 summarizes the sociodemographic data characterizing the study sample. The 38 subjects who completed all components of the study included 28 men (74%) and ten (26%) women. Subjects ranged in age from 43 to 74 with a mean of 57.84 years (SD = 8.68). The majority were married (n = 24, 63%) and were either employed (n = 15, 40%) or on a leave of absence (n = 11, 29%).
Table 1

Sociodemographic Characteristics of the Sample (n = 38)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (in years):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-50</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>51-60</td>
<td>13</td>
<td>34</td>
</tr>
<tr>
<td>61-70</td>
<td>12</td>
<td>32</td>
</tr>
<tr>
<td>71 &amp;&gt;</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>28</td>
<td>74</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Married/Common-Law</td>
<td>28</td>
<td>74</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Widowed</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td>Unemployed</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Leave of Absence</td>
<td>11</td>
<td>29</td>
</tr>
<tr>
<td>Retired</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>13</td>
</tr>
</tbody>
</table>
Reliability of Multi-item Measures

An internal consistency reliability analysis was conducted on each multi-item scale that measured the variables in the conceptual framework by calculating Cronbach's alpha coefficient. The reliability analysis had two purposes. First, the internal consistency of multi-item scales had to be established as measurement error could influence the results obtained in the correlation and regression analysis. Items that detracted from the internal consistency reliability of multi-item scales were excluded before computing a total scale score. Second, the internal consistency of items measuring different aspects of the same concept was examined for the purpose of data reduction. Items that demonstrated consistency were combined into a single measure/score to quantify the concept of interest.

All items comprising the anxiety subscale of the Profile of Mood States (POMS) were internally consistent except the item “shaky”. This item had low correlation coefficients with other items and had a low item-to-total correlation (<.30). Therefore, it was deleted from the total scale score. The standardized Cronbach’s alpha reliability coefficient was .88 after deleting this item. The items on the POMS subscale that measured depression were internally consistent. The standardized Cronbach’s alpha coefficient was .90.
Physiological symptoms included the experience of angina, incisional pain and dyspnea. The intensity and frequency of each symptom was measured separately. The items measuring the intensity and frequency of each symptom demonstrated internal consistency, with the following Cronbach alpha values: angina (.88), dyspnea (.84) and incisional pain (.83). Therefore, the items measuring the intensity and frequency of each symptom were combined to create a total score measuring the patients' experience of each symptom.

The concept of concern for health was measured with two items that inquired about the intensity and frequency of the subject's concern for their health. The two items were internally consistent, with a Cronbach's alpha coefficient of .66. An alpha coefficient value of less than .70 was accepted as only two items were used to measure this variable.

The items measuring the concept of social influences included: number of smokers living with the subject, number of other social contacts who smoke and the amount of time spent with them. These items were not internally consistent. The Cronbach's alpha coefficient was .50, indicating that they do not reflect a common core concept. Therefore, these items were kept separate and the influence of each on smoking behaviour was examined individually.
The items measuring smoking history included the number of years smoked, the average daily consumption of cigarettes and the number of attempts to quit in one's lifetime. These items were not internally consistent as the Cronbach's alpha coefficient was .27. Each was examined separately to determine the relationship of each component of this variable to smoking behaviour after surgery.

Measures for “severity of disease” did not demonstrate internal consistency. The Cronbach’s alpha coefficient was .39. These measures, which included the patient’s perception of the severity of their disease, their CCS Class, priority for surgery, grade of left ventricle and number of grafts bypassed, were therefore be examined separately.

Descriptive Statistics for Variables in the Conceptual Framework

**Smoking History**

Smoking history was measured using four items: average number of years smoked, average daily consumption of cigarettes during the six months preceding surgery, number of attempts to quit in the subjects' lifetime and the timing of the subject's last cigarette before surgery.

Subjects reported that they had smoked from 17 to 59 years. The mean duration of smoking was 40.9 years (SD = 10.58). The average daily consumption of cigarettes ranged from .5 to 75. The mean number
of cigarettes consumed was 19.1 (SD = 15.1). Subjects reported that they had attempted to quit from 0 to 50 times during their life. The mean number of attempts was 5.2 (SD = 8.6). Forty-two percent of subjects reported that the last cigarette they consumed preoperatively occurred during the 24 hours preceding surgery. Eighty-one percent of the subjects (n = 31) did not quit until some point during the month preceding surgery.

**Severity of Disease**

Severity of disease was measured using the following variables: New York Heart Classification of Angina, priority for surgery, grade of left ventricle, number of bypass grafts completed and the patient's perception of the severity of their disease. Table 2 summarizes the data collected for these variables. The most frequent response in each of the categories were as follows: class three angina (55.3%), grade two left ventricle (52.6%), three grafts bypassed (42.1%), elective priority for surgery (50%) and perceived their illness to be as severe as it could possibly be (44.7%).
Table 2

Severity of disease variables - Frequency and Percentage Distributions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade of Left Ventricle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 1</td>
<td>13</td>
<td>34.4</td>
</tr>
<tr>
<td>Grade 2</td>
<td>20</td>
<td>52.6</td>
</tr>
<tr>
<td>Grade 3</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>Grade 4</td>
<td>2</td>
<td>5.3</td>
</tr>
<tr>
<td>Number of Bypass Grafts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>28.9</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>42.1</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>28.9</td>
</tr>
<tr>
<td>Priority for OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>19</td>
<td>50</td>
</tr>
<tr>
<td>Elective Priority</td>
<td>8</td>
<td>21.2</td>
</tr>
<tr>
<td>Urgent</td>
<td>11</td>
<td>28.9</td>
</tr>
<tr>
<td>Emergency</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Severity of Disease - Patient’s Perception</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all severe</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>Somewhat severe</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>moderately severe</td>
<td>15</td>
<td>39.5</td>
</tr>
<tr>
<td>As severe as it could possibly be</td>
<td>17</td>
<td>44.7</td>
</tr>
<tr>
<td>CCS Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 1</td>
<td>5</td>
<td>13.2</td>
</tr>
<tr>
<td>Class 2</td>
<td>7</td>
<td>18.4</td>
</tr>
<tr>
<td>Class 3</td>
<td>21</td>
<td>55.3</td>
</tr>
<tr>
<td>Class 4</td>
<td>5</td>
<td>13.2</td>
</tr>
</tbody>
</table>
Symptoms

The subject's experience of dyspnea, angina and incisional pain were measured by eliciting their perception of both the intensity and frequency of each in the six weeks following surgery. The intensity (0 - 10) and frequency (0 - 3) scores were then combined to create a single measure for each symptom which indicated the severity or magnitude of the symptom experience post surgery. Total possible scores ranged from 0 to 6.5 (average of total possible scores for intensity and frequency combined). The intensity of angina was reported in a range from 0 to 5.3 (using a visual analogue scale from 0 to 10). The mean response was .27 (SD = .98). The frequency of angina was reported in a range from never (1) to often (3). Eighty-four percent of patients reported that they “never” had angina in the past six weeks. Combined, the severity of angina ranged from zero to 3.65, with a mean of .22 (SD = .69).

Incisional pain frequency ranged from zero (never) to three (always). The largest percentage of subjects (37%) reported that they experienced incisional pain at least “sometimes”. Twenty-one percent never experienced incisional pain. The intensity of incisional pain ranged from zero to 9.9. The mean score was 3.8 (SD = 3.2). Combined, the
severity of incisional pain ranged from a score of zero to 6.05 with a mean of 2.6 (SD = 2.0).

The frequency of dyspnea ranged from zero (not at all) to three (always). The greatest percentage of subjects (40%) never experienced dyspnea. Thirty-four percent experienced dyspnea at least “sometimes”. The intensity of dyspnea ranged from zero to nine, with a mean of 2 (SD = 2.4). Combined, the severity of dyspnea varied from zero to six, with a mean of 1.5 (SD = 1.6).

**Mood State**

The experiences of anxiety and depression were derived from the total scores of the eight items measuring anxiety and the 15 items measuring depression. Total possible scores for each individual item ranged from 0 to 4 (not at all to extremely). Average total anxiety scores ranged from .11 to 3.67. The mean response was 1.3 (SD=.89). Average total depression scores ranged from 0 to 2.6. The mean response was .63 (SD=.69).

**Social Influences**

Social influences were determined by measuring the number of smokers the patient lived with, the number of other smokers with whom the subject was in contact, as well as the amount of time they spent with
those smokers. The number of smokers living with the patient ranged from zero to two. The majority (52.6%) of patients did not live with a smoker. The number of other social contacts who smoked ranged from none to all. Seventeen (44.7%) patients reported that at least some of their social contacts smoked. About fifty-three percent of the subjects reported that they spent sometime with these social contacts who smoke. Table 3 summarizes the data collected for the variables representing social influences.
Table 3

Social Influences - Frequency and Percentage Distributions (n=38)

<table>
<thead>
<tr>
<th>Number of smokers living with patient</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20</td>
<td>52.6</td>
</tr>
<tr>
<td>1</td>
<td>14</td>
<td>36.8</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Number of other social contacts who smoke

| None                  | 7 | 18.4 |
| Some                  | 17| 44.7 |
| Half                  | 9 | 23.7 |
| Most                  | 4 | 10.5 |
| All                   | 1 | 2.6  |

Amount of time spent with other smokers

| None                 | 10| 25.3 |
| Sometimes            | 20| 52.6 |
| Often                | 3 | 7.9  |
| most of the time     | 4 | 10.5 |
| All of the time      | 1 | 2.6  |
Concern for Health

The intensity and frequency of the subjects' perceived concern for their health was elicited to measure this variable. A total score for concern for health was obtained. Scores for concern ranged from 0 to 6.5. The mean score was 3.3 (SD=2.4).

Smoking behaviour after Surgery

To determine smoking behaviour after surgery, subjects reported whether or not they had smoked in the six weeks following surgery, and if they had, when the first cigarette was consumed as well as how much they were currently smoking. (Table 4).

Table 4
Smoking Behaviour after surgery

<table>
<thead>
<tr>
<th>Smoking</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>25</td>
<td>65.8</td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>34.2</td>
</tr>
</tbody>
</table>

Timing of smoking after surgery (n=13)

- within one week: 3 (23)
- Between 1 and 2 weeks: 3 (23)
- >2 weeks, < 4 weeks: 2 (16)
- > 4, <6 weeks: 5 (38)
Thirty-four percent of subjects had resumed smoking following surgery. Of these, the largest number of patients (38%) started four to six weeks following surgery. Consumption ranged from one to 13 cigarettes per day. The mean number of cigarettes consumed was 5.6 (SD=3.8).

**Data Analysis - Inferential Statistics**

In order to examine the effects of the physiological and psychological factors, as specified in the conceptual framework, on the patients' smoking behaviour after surgery, bivariate and multiple regression analysis were conducted. Recognizing that the small sample size ($n=38$) may have impacted on the sensitivity of multiple regression to detect statistically significant effects of the independent variables on the dependent variable, bivariate regression was conducted (Table 5). Entering each independent variable separately into the analysis reduced the potential for the true effect of the independent variables to be obscured and provided results to answer research questions one to nine. The multiple regression analyses was conducted to determine if any of the independent variables had an effect on the dependent variable when the variables reflecting a category of factors were examined simultaneously (Table 6). The results are presented in relation to each research question.
Table 5
Bivariate Regression Analysis of the effect of physiological and psychological factors on smoking behaviour after CABG surgery

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Beta (p value)</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physiological Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angina (Frequency)</td>
<td>-18 (NS)</td>
<td>.03</td>
</tr>
<tr>
<td>Angina (Intensity)</td>
<td>-02 (NS)</td>
<td>.00</td>
</tr>
<tr>
<td>Incisional Pain (Frequency)</td>
<td>-33 (.04)</td>
<td>.11</td>
</tr>
<tr>
<td>Incisional Pain (Intensity)</td>
<td>-23 (NS)</td>
<td>.05</td>
</tr>
<tr>
<td>Dyspnea (Frequency)</td>
<td>-28 (.09)</td>
<td>.08</td>
</tr>
<tr>
<td>Dyspnea (Intensity)</td>
<td>-22 (NS)</td>
<td>.05</td>
</tr>
<tr>
<td><strong>Smoking History</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg amount smoked previous 6 mos</td>
<td>.08 (NS)</td>
<td>.00</td>
</tr>
<tr>
<td>Avg No. of attempts to quit</td>
<td>-05 (NS)</td>
<td>.00</td>
</tr>
<tr>
<td># of years smoked</td>
<td>.21 (NS)</td>
<td>.04</td>
</tr>
<tr>
<td><strong>Severity of Disease</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade of LV</td>
<td>-28 (.09)</td>
<td>.08</td>
</tr>
<tr>
<td># of bypass grafts</td>
<td>-07 (NS)</td>
<td>.01</td>
</tr>
<tr>
<td>Patient's Perception</td>
<td>-09 (NS)</td>
<td>.01</td>
</tr>
<tr>
<td>CCS Class</td>
<td>.01 (NS)</td>
<td>.00</td>
</tr>
<tr>
<td><strong>Psychosocial Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>.06 (NS)</td>
<td>.00</td>
</tr>
<tr>
<td>Depression</td>
<td>.17 (NS)</td>
<td>.03</td>
</tr>
<tr>
<td>Concern for Health (Frequency)</td>
<td>-.16 (NS)</td>
<td>.03</td>
</tr>
<tr>
<td>Concern for Health (Intensity)</td>
<td>-.14 (NS)</td>
<td>.02</td>
</tr>
<tr>
<td>Concern for Health (Total Score)</td>
<td>-.15 (NS)</td>
<td>.02</td>
</tr>
<tr>
<td><strong>Social Influences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amt of time spent with other smokers</td>
<td>.20 (NS)</td>
<td>.04</td>
</tr>
<tr>
<td># of smokers living with subject</td>
<td>.19 (NS)</td>
<td>.04</td>
</tr>
<tr>
<td># of other social contacts who smoke</td>
<td>.22 (NS)</td>
<td>.05</td>
</tr>
</tbody>
</table>
Table 6

Multiple Regression Analysis of the effect of physiological and psychological factors on smoking behaviour after CABG surgery

<table>
<thead>
<tr>
<th>Dependent Variable - Smoking Behaviour after surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variable</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><strong>Physiological Factors</strong></td>
</tr>
<tr>
<td>Angina</td>
</tr>
<tr>
<td>Dyspnea</td>
</tr>
<tr>
<td>Incisional Pain</td>
</tr>
<tr>
<td><strong>Smoking History</strong></td>
</tr>
<tr>
<td>Avg amount smoked previous 6 mos</td>
</tr>
<tr>
<td>Avg No. of attempts to quit</td>
</tr>
<tr>
<td># of years smoked</td>
</tr>
<tr>
<td><strong>Severity of Disease</strong></td>
</tr>
<tr>
<td>Grade of LV</td>
</tr>
<tr>
<td># of bypass grafts</td>
</tr>
<tr>
<td>Patient's Perception</td>
</tr>
<tr>
<td>CCS Class</td>
</tr>
<tr>
<td><strong>Psychosocial Factors</strong></td>
</tr>
<tr>
<td>Anxiety</td>
</tr>
<tr>
<td>Depression</td>
</tr>
<tr>
<td>Concern for Health</td>
</tr>
<tr>
<td><strong>Social Influences</strong></td>
</tr>
<tr>
<td>Amt of time spent with other smokers</td>
</tr>
<tr>
<td># of smokers living with subject</td>
</tr>
<tr>
<td># of other social contacts who smoke</td>
</tr>
</tbody>
</table>
Research Question 1
What is the effect of anxiety on postoperative smoking behaviour?

No statistically significant effect of anxiety on postoperative smoking behaviour was observed in either the multiple regression (Table 5) or the bivariate regression (Table 5) analysis.

Research Question 2
What is the effect of depression on postoperative smoking behaviour?

No statistically significant effect of depression on postoperative smoking behaviour was observed in either the multiple regression (Table 6) or the bivariate regression (Table 5) analysis.

Research Question 3
What is the effect of reported concern for health on postoperative smoking behaviour?

No statistically significant effect of concerns for health on postoperative smoking behaviour was observed in either the multiple regression (Table 6) or the bivariate regression (Table 5) analysis.

Research Question 4
What is the effect of social influences on postoperative smoking behaviour?
The number of smokers living with the patient, the number of other social contacts who smoke, and the amount of time spent with other smokers did not have statistically significant effects on smoking behaviour, when the effects were examined simultaneously (Table 6) or separately (Table 5).

Research Question 5
What is the effect of the experience of angina on postoperative smoking behaviour?

No statistically significant effect of angina on postoperative smoking behaviour was observed in either the multiple regression (Table 6) or the bivariate regression (Table 5) analysis.

Research Question 6
What is the effect of the experience of dyspnea on postoperative smoking behaviour?

No statistically significant effect of the severity of dyspnea experience on postoperative smoking behaviour was observed utilizing multiple regression (Table 6). Results of the bivariate analysis suggested a trend toward the frequency of dyspnea negatively influencing smoking behaviour after surgery ($B = -0.28, p = 0.09$).
Research Question 7

What is the effect of the experience of incisional pain on postoperative smoking behaviour?

Multiple regression revealed no statistically significant effect of the severity of the experience of incisional pain on postoperative smoking behaviour. Results of the bivariate analysis indicated a moderate, negative effect of incisional pain frequency on smoking after surgery ($B = -.33$, $p = .04$).

Research Question 8

What is the effect of severity of disease on postoperative smoking behaviour?

Grade of left ventricle was the only component of severity of disease that demonstrated a statistically significant effect on smoking behaviour after surgery (using multiple regression). The effect was moderate but negative (Tables 5, 6). The remaining components of severity of disease (CCS Class, patient’s perception of severity of disease, priority for surgery, number of bypass grafts) did not demonstrate a statistically significant effect.
Research Question 9
What is the effect of smoking history on postoperative smoking behaviour?

Smoking history did not demonstrate a statistically significant effect on smoking behaviour after surgery in either the multiple regression (Table 6) or the bivariate regression (Table 5) analysis.

Research Question 10
What is the simultaneous effect of psychosocial and physiological factors on postoperative smoking behaviour?

When the simultaneous effects of all the physical and psychological variables on smoking behaviour after surgery were tested, grade of left ventricle (B = -.46, p = .05) and frequency of incisional pain (B = -.33, p = .04) were the only variables that showed statistical significance.

Additional Data Analysis
As only two independent variables demonstrated statistically significant effects on the dependent variable, the investigator performed additional data analysis to determine if there were any relationships between any of the independent study variables that might account for the lack of significant effects of the independent variables on the dependent variables. The results are presented in table 7.
Table 7

Correlation Coefficients for Relationships among Independent Variables

<table>
<thead>
<tr>
<th>Concerns for Health and:</th>
<th>r value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.39</td>
<td>.02</td>
</tr>
<tr>
<td>Number of years smoked</td>
<td>.48</td>
<td>.00</td>
</tr>
<tr>
<td>Smoking predischarge</td>
<td>-.37</td>
<td>.00</td>
</tr>
<tr>
<td>Number of attempts to quit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade of LV</td>
<td>.37</td>
<td>.02</td>
</tr>
<tr>
<td>Priority for Surgery</td>
<td>-.36</td>
<td>.03</td>
</tr>
<tr>
<td>Number of bypass grafts</td>
<td>.37</td>
<td>.02</td>
</tr>
<tr>
<td>Priority for Surgery and:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount smoked postoperatively</td>
<td>.67</td>
<td>.01</td>
</tr>
<tr>
<td>Timing of smoking after surgery</td>
<td>.68</td>
<td>.01</td>
</tr>
<tr>
<td>CCS Class</td>
<td>.41</td>
<td>.01</td>
</tr>
<tr>
<td>Anxiety and:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>.79</td>
<td>.00</td>
</tr>
<tr>
<td>Number of other social contacts who smoke</td>
<td>.56</td>
<td>.00</td>
</tr>
<tr>
<td>Age</td>
<td>-.35</td>
<td>.00</td>
</tr>
<tr>
<td>Depression and:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of other social contacts who smoke</td>
<td>.46</td>
<td>.00</td>
</tr>
<tr>
<td>Angina (Frequency)</td>
<td>.34</td>
<td>.04</td>
</tr>
<tr>
<td>Incisional pain (intensity)</td>
<td>.34</td>
<td>.04</td>
</tr>
</tbody>
</table>
Concern for health was correlated with age, number of years smoked and smoking predischarge. Number of attempts to quit preoperatively were correlated with some of the severity of disease variables. Priority for surgery was correlated with CCS class and both amount smoked postoperatively and timing of smoking after surgery. Anxiety and depression were highly correlated. Anxiety and depression were also correlated with number of social contacts who smoke, age and angina and incisional pain. The following correlations were also found. Number of smokers living with the subject and the amount of time spent with other social contacts who smoke ($r = .38, p = .02$). Smoking behaviour after surgery and gender were also correlated ($r = .45, p = .005$).

**Summary**

The relationships between the dependent variable (smoking behaviour after surgery) which was measured by return to smoking and nine independent variables (dyspnea, angina, incisional pain, severity of disease, smoking history, social influences, anxiety, depression and concerns for health) are central to the conceptual framework. Grade of LV showed a moderately strong inverse relationship with smoking resumption after surgery, as did frequency of incisional pain. Smoking
behaviour after surgery was not significantly affected by the physiological and psychosocial variables, as hypothesized by the study framework.

Correlation coefficients demonstrated significant relationships between the physiological and psychosocial variables, considered the independent variables in the study conceptual framework.
Chapter 4
Discussion of Results

The conceptual framework for this study guided the exploration of the influence of physiologic (incisional pain, dyspnea, angina, severity of disease, smoking history) and psychosocial (social influences, mood state, concerns for health) factors on smoking behaviour after coronary artery bypass graft surgery. The results will be discussed in relation to the conceptual framework and the literature that was reviewed to construct the conceptual framework.

The Sample

The sample size for this study was relatively small \( N = 38 \), and was not entirely representative of the general population of adult CABG patients who smoke preoperatively. However, various demographic characteristics were represented, including gender, age, marital status and occupation. The majority of the participants were male, married, employed, or on a leave of absence with an average age of 58 years. The Heart and Stroke Foundation of Ontario (1997) reports that men undergo CABG surgery in a ratio of 4:1 compared to women and that this surgery is gaining the most prevalence in people 65 years and older. A review of 1392 CABG cases at the institution from which the sample
was drawn revealed that 22% (n = 301) were female and 78% (n = 1092) were male. The average age for this sample was 62.95 years and the median age was 64 (SD = 10.41). The study sample reflects a group of patients who have a slightly greater number of females (26%) represented and who are somewhat younger than the target population. These characteristics may have produced a selection bias in the study. As stated earlier, the results therefore have limited generalizability.

Smoking behaviour after surgery

Approximately two-thirds of the participants reported that they had not resumed smoking within the six weeks following surgery, while about one-third had resumed smoking. This is fairly consistent with other literature examining smoking behaviour after CABG surgery. Bursey (1995) noted that 31% (n=10) of subjects were smoking when interviewed 2-3 weeks following surgery. Berg, Kirk and Bain (1988) conducted a study with a longer follow-up period and found that approximately 50% of their sample (n=17) resumed smoking at a mean time of 37 weeks postoperatively. Scott and Lamparski (1985) followed patients up to a year after surgery and reported successful smoking cessation in only 33% (n=26) of their subjects. Thirty-two percent of those who relapsed did so
in the first month following surgery. This suggests that higher rates of relapse may have been captured with a long follow-up period.

**Physiological Factors**

**Symptoms**

The symptoms of interest in this study were: dyspnea, incisional pain and angina. On average, patients reported a low level of dyspnea severity (mean value = 1.5); 34% did not experience dyspnea while 66% reported at least some dyspnea. This sample's experience of dyspnea is of slightly greater magnitude when compared with the results of similar studies. Redeker (1993) followed 129 adult CABG patients in the first six weeks following surgery, studying the experience of various symptoms in the weeks following surgery, measured as a self-reported single dimension. The investigator found that dyspnea was experienced to varying degrees in the weeks following surgery. During the first three weeks after surgery, 71% of the sample did not experience shortness of breath while from three to five weeks 53% were not experiencing dyspnea and by six weeks, 80% were still not experiencing dyspnea.

The study participants reported a small to moderate rating for the severity of incisional pain. These reports were generally aligned with the experience of pain as reported in the literature. Incisional pain was the
most commonly reported physical symptom in most postoperative patients (Hamalainen and Kallio, 1993; Redeker, 1993; Tack and Gilliss, 1990). The current investigation yielded results that are also consistent with a study by Elliott and Harrop-Griffiths (1996) who studied the pain experiences of 43 patients after surgery and reported mean pain scores of 4/10 (using a visual analogue). This represented the experience of a small to moderate amount of pain.

Approximately 79% of the participants did not experience any angina postoperatively, while a very small proportion of the sample experienced angina. On average, the participants reported a small magnitude of angina experienced after surgery, which is consistent with other research studies that report angina relief in 70% to 90% of patients (National Institutes of Health, 1981). The current study did not measure the experience of angina before surgery, however a retrospective review of the clinical profile of the study participants indicated that approximately 90% of them experienced at least some angina prior to surgery.

The frequency of incisional pain had a moderately strong inverse relationship with smoking behaviour after surgery. Other studies have found that the experience of illness and physiological symptoms such as angina or respiratory symptoms impacted on their decision to quit
smoking (Freund et al, 1992; Duncan et al, 1992). The influence of incisional pain on smoking behaviour was not specifically analysed. In view of the fact that no statistically significant effects of the other physical symptoms on smoking behaviour after surgery were found, it may be possible that the physical symptoms that prompt initial quitting do not provide the same impetus for continued smoking cessation. The results may also be attributable to the small sample size and low variability in the subjects' responses, specifically smoking behaviour after surgery. As well, although face validity was tested and affirmed by several health care professionals, the validity of the tools used to measure these variables was not conclusively established.

**Severity of Disease**

Four measures were used to determine severity of disease: grade of LV, CCS class, priority for surgery and the patient's perception of the severity of their disease. The most frequent responses were as follows: class three angina (55%), grade two LV (52%) three grafts bypassed (42%), elective priority for surgery (50%) and patient perception of illness as "severe as it could possibly be" (45%). As these measures did not demonstrate internal consistency, the influence of each on smoking behaviour was examined separately. Grade of left ventricle was the only
variable that demonstrated a relationship with smoking behaviour after surgery. Other literature has shown severity of CAD as an impetus for smoking cessation (Hay and Turbott, 1970; Frid et al, 1991; Scott and Lamparski, 1985). In this study, grade of LV showed a moderate, inverse relationship with smoking behaviour, indicating that the greater the grade of the LV, the less likely the patient was to smoke. In the clinical setting, grade of LV is one of the factors that determines both CCS Class and priority for surgery. CCS class is one of the factors that determines priority for surgery and these two factors were correlated \((r = .41)\). It was surprising, however, that Grade of LV was the only measure of severity of disease that demonstrated a relationship with the dependent variable. These results may be explained by the small sample size as well as low variability in the scores on severity of disease measures. Sixty-eight percent of subjects had class three or four angina, 71% had three or more grafts bypassed and 71% were categorized as elective or elective priority for surgery. Alternatively, perhaps severity of disease does offer the same impetus for smoking cessation maintenance as it does for initial smoking cessation.

Studies by Frid et al (1991); Hay & Turbott, (1970); and Scott & Lamparski, (1985), have identified severity of CAD as a predictor of
smoking cessation. In this study, the objective measures of severity of disease (grade of LV, CCS class, priority for surgery) were not correlated with the subjective measure of the same (patient's perception of severity of disease) by the patient. It is possible that some of the subjects had an unrealistic view of the seriousness of their illness. This may have influenced their perception of the level of threat smoking posed to their health and its influence on their disease progression. This may have ultimately influenced their smoking behaviour after surgery. This postulation is consistent with the tenets of the Health Belief Model (Becker, 1974). This model suggests that the likelihood of taking preventative action is related to perceived susceptibility and perceived severity of the condition.

**Smoking History**

Smoking history was measured by the number of years smoked, amount smoked in the last six months, number of attempts to quit and the timing of the last cigarette preoperatively. The sample was relatively homogeneous with respect to these variables. Most subjects had a strong smoking history (mean consumption of 20 cigarettes per day for 41 years) and the majority did not quit smoking until the month preceding surgery. The mean number of attempts to quit was five. The literature generally
supports addiction as a strong factor influencing smoking relapse (Curry, Marlatt, Gordon & Baer, 1988; McBride, Peirie, & Curry, 1992; Simon, Browoner, & Mangano, 1992). One of the smoking history variables, number of attempts to quit preoperatively, was correlated with three measures of severity of disease, including grade of left ventricle. This implies that there may be an indirect effect between smoking history and postoperative smoking behaviour. Other smoking history variables did not demonstrate a statistically significant relationship with smoking behaviour after surgery in this study sample. It is possible that the small sample size and the low variability between subjects with respect to smoking history obscured possible relationships with the dependent variable. As well, rates of longer term relapse may have been underestimated due to the relatively short follow up period. Berg, Kirk and Bain (1988) followed subjects up to a year after surgery and found that more than 50% relapsed during that time. In the general population, it has been estimated that up to 90% of people relapsed in the year following cessation (Fiore, Novetny and Peirce, 1990).

Social Influences

Social Influences were evaluated by measuring the number of smokers living with the patient, the number of other social contacts who
smoke and the amount of time spent with other social contacts who smoke. No statistically significant effect of social influences on smoking behaviour was found. In contrast to this, the literature generally supports social influences as a factor that influences relapse among smokers (Morgan et al, 1988; Baer and Lichtenstein, 1988; Collin et al, 1990). In this study, it is interesting to note that 47% of subjects (n=18) lived with at least one other smoker. Forty-four percent (n=8) of this subsample relapsed within the first six weeks following surgery. Unfortunately, the study did not evaluate the amount of time the subjects spent in the presence of smokers. Many of the subjects revealed to the investigator that their friends and family members refrained from smoking in their presence during the weeks following surgery. As well, many subjects stated that they did not socialize outside of their homes in the first six weeks following surgery to the same degree they had preoperatively. Therefore, the true impact of social influences on smoking behaviour may not have been captured.

**Mood State**

Total scores for anxiety and depression were computed from the eight items measuring anxiety and the 15 items measuring depression. Total anxiety scores ranged from .11 to 3.67, while depression scores
ranged from 0 to 2.6, representing scores ranging from low to moderate. The experience of anxiety was reported with greater relative severity than depression (mean response of 1.3 versus 0.63 respectively). Consistent with the current study, the literature cites the experience of anxiety and depression as common in the weeks following surgery and was reported respectively by 38% and 40% of patients in the first six months following surgery (Jenkins et al, 1983). Redeker (1993) reported the experience of anxiety and depression as occurring on average in 24% and 25% of the sample, respectively in the first six weeks following surgery.

In this study, the experience of anxiety and depression in the weeks following surgery did not demonstrate a statistically significant effect on smoking behaviour. The small sample size once again may have contributed to this finding. As well, it is uncertain whether or not these symptoms would have persisted in the weeks and months following surgery and if this would have impacted on rates of relapse. In the general population, the experience of negative affect, including anxiety and depression is supported as a precipitant for smoking relapse (Marlatt and Gordon, 1980; Lichtenstein, Antonuccio, and Rainwater, 1977).

Furthermore, anxiety and depression were highly correlated \( r = .79 \) in
this sample. This multicollinearity may have contributed to the lack of significant effects of these psychological variables on smoking behaviour.

**Concern for Health**

Concern for health was measured by combining scores for the intensity and frequency of the subjects' perceived concern for their health. Subjects reported moderate scores for this variable. The intensity and frequency of the subjects' perceived concern for health did not have a statistically significant effect on smoking behaviour after surgery. Concern for health is often cited as a reason for smoking cessation (Duncan, Cummings, Sid Hudes, Zahnd and Coates 1992; Halpern and Warner, 1993). Continued concern for health, however, may not offer as strong an impetus for smoking cessation maintenance. In a study by Scott and Lamparski (1985) 33% of their subjects reported a successful smoking cessation after a myocardial infarction or CABG surgery, a time when one would expect to be concerned about one's health. However, of the 53 subjects who relapsed, 30% abstained from smoking for at least a month after the cardiac event but relapsed during the first year.

The subjective measure of severity of disease was not well correlated with the objective measures of the same. It is possible that some of the subjects had an unrealistic perception of the severity of their
illness. This may have influenced the degree to which they were concerned for their health and may have ultimately impacted on their smoking behaviour after surgery.

Limitations of the Study

This investigation of the impact of physiological and psychosocial factors on smoking behaviour following CABG surgery found that grade of LV and frequency of incisional pain had statistically significant effects. Failure to find significant effects among variables under study may be due to sample bias, methodological errors or theoretical weaknesses. Errors that are common in studies with small sample sizes relative to the number of variables under investigation will be discussed as well as errors specific to this study.

The relatively small and non-random sample used for this study may have resulted in sampling bias. Demographic characteristics that were compared to those of the target population did not match completely, whereby the participants were somewhat younger and included more females than the accessible target population. The results are therefore not generalizable to the general population of adult smokers undergoing CABG. The investigator is unaware of any research that had established
population parameters and therefore, sampling error cannot be determined.

The relatively small sample may have been problematic in the context of multiple regression. To obtain meaningful results, the use of multiple regression necessitates a substantial case-to-variable ratio (Tabachnick and Fidell, 1989). These authors recommend ideally obtaining 20 cases for each independent variable (IV) under study. They suggest that with fewer than 100 cases, the width of errors in estimating correlation or regression coefficient may be such that the power will be unacceptably low. At a bare minimum, 5 times more cases than independent variables are required. Higher cases-to-IV ratios are recommended when the dependent variable (DV) is skewed, effect size is thought to be small or measurement error is expected from unreliable sources. If the desired number of cases cannot be obtained, the authors suggest creating IVs that are composites of several others. This was done in this study with the variables angina, dyspnea, incisional pain and concern for health. However, 18 variables in total were measured. Therefore, 85 cases should have been included to substantiate the power of analysis. Unfortunately, in this study, the investigator was able to gain access to only one study site, instead of two sites as was originally
planned. It therefore became unrealistic to obtain a larger sample size in a timely manner.

The relatively short follow-up (six weeks) may have contributed to the lack of significant results. Follow-up at six months to one year may have captured higher rates of relapse. The experience of the various physiologic and psychosocial variables may have changed over this period of time and therefore may have revealed other relationships among variables.

Self report and the potential for subjects to offer socially desirable responses may have influenced the study results. The investigator noted that approximately 90% of the subjects who were approached about the study offered the unsolicited statement that they were not going to smoke after surgery. Almost every subject who was not smoking during the follow-up interview prefaced the interview by proudly stating that they had not started smoking again. Two issues are of interest here. The investigator worked as a Nurse Practitioner/Clinical Nurse Specialist in the postoperative cardiac surgery ward. Although the potential subjects were initially approached by the investigator’s delegate, many of the subjects that participated in the study were also patients of the investigator. This may have influenced both the subjects’ responses (increasing socially
desirable responses) as well as actual behaviour. The subjects knew the investigator as a health care practitioner who would be conducting a follow-up interview in six weeks time to determine their smoking behaviour. This may have influenced their behaviour, conceivably by discouraging relapse in those who otherwise may have started smoking again.

The validity and reliability of some of the instruments used in this study that were developed by the investigator, in particular those consisting of one item, were not conclusively established. This may have affected the accuracy of the measures obtained in the study. A literature search did not reveal the existence of instruments that measured all of the study variables (with the exception of the POMS for anxiety and depression). The investigator, therefore, constructed several items and attempted to establish measurement validity by the choice of well tested measurement scales (visual analogue, likert scales) as well as by assessing face validity of the tools developed by the investigator. Nonetheless, measurement error could not be ruled out and may account for the non-significant effects, since measurement error attenuates the correlation/regression coefficients.
The use of multiple tests to seek meaningful results can result in type I error. Both bivariate and multiple regression were utilized in the data analysis and therefore, the possibility of committing a type I error must be acknowledged.

The diversity of the variables under study and the investigator's desire to examine a large number of possible influences for smoking behaviour after surgery necessitated the creation of a conceptual framework. Although each concept under study was supported in the literature that examined either the general or CABG population, this conceptual framework had not been studied previously. Originally, the framework sought to explore the effect of the various independent variables on the dependent variable, smoking behaviour after surgery, however further analysis revealed that relationships existed between some of the independent variables. For example, age was correlated with concerns for health, employment status, grade of LV and anxiety. Number of attempts to quit preoperatively was correlated with grade of LV, priority for surgery, and number of bypass grafts. Priority for surgery was correlated with the amount smoked postoperatively (although these results were based on a very small number of cases who relapsed, n = 13). Priority for surgery was also correlated with timing of smoking after
surgery and CCS class. Concern for health was correlated with number of years smoked and smoking predischarge. Grade of LV was correlated with smoking behaviour predischarge and the number of attempts to quit preoperatively. Anxiety and depression scores were correlated with the number of social contacts who smoke. Multicollinearity may account for the observed lack of effect of some of the independent variables on the dependent variable. Although it is not possible to quantify the mediating influences of the various independent variables, in this study with a small sample size, it is reasonable to conclude that instead of a direct, relationship between the independent variables and dependent variable, indirect relationships/effects may have taken place. These could be proposed and tested in future studies with a larger sample size.

Conclusion/Summary

This study explored the influence of physiological and psychosocial symptoms on smoking behaviour in the first six weeks following CABG surgery. Statistically significant relationships were found between both the grade of LV and the frequency of incisional pain and smoking behaviour after surgery. These limited results are largely attributable to the small sample size. Repeating the study using a larger sample size is recommended. This study does, however, provide some direction for
nursing practice, theory and research, and will be discussed in the following chapter.
Chapter 5
Summary, Implications, and Conclusion

Summary

A convenience sample of 38 adult (>19 years) subjects who had undergone an initial CABG surgery, had reported smoking at least two cigarettes in the last six months prior to surgery and were able to communicate in written and spoken English were selected from a large teaching hospital. Prior to the subject’s discharge home, data regarding sociodemographic and smoking history variables were collected. Approximately 6 weeks after surgery, data regarding current smoking behaviour, social influences, concern for health, physiological and mood state symptoms, and severity of disease were collected. Data analysis involved bivariate, multiple and logistic regression analysis. Variables reflecting a category of factors were examined together in the multiple regression. In the bivariate regression, the effect of each independent variable on the dependent variable were examined separately.

Results of the study revealed that the grade of left ventricle (one measure of severity of disease) and frequency of incisional pain imparted a moderately strong inverse effect on smoking behaviour after surgery. No other physiological or psychosocial variables were found to
significantly impact on smoking behaviour post surgery. However, a number of the physiological and psychosocial variables were correlated with each other.

Implications for Practice, Theory and Research

Implications for Theory

This study did not utilize a theoretical framework but rather a conceptual framework. A framework is an abstract, logical structure that guides an investigation and provides a link between the results of the study and the core body of knowledge in the field of study (Burns and Grove, 1993). A theoretical framework is constructed from an integrated set of concepts, and relational statements, based on a theory that has been tested through research. A conceptual framework is a set of proposed relational statements. The conceptual framework in this study was constructed by the investigator in order to explore a variety of concepts that were supported in the literature as factors that influence smoking behaviour after surgery. Only two of the independent variable measures had a significant effect on the dependent variable, owing largely to the effect of the small sample size. This study therefore did not provide significant support for the conceptual framework. Correlational analysis however, did reveal relationships between some of the independent
variables. This suggests that indirect relationships may be taking place. These relationships could be tested further with a larger sample size in future research.

Implications for Practice

The small, non-random sample limits generalizing results to the larger population of adult, CABG surgical patients. The implications for practice, therefore, must be viewed as only preliminary.

This study revealed that 34% of the subjects had resumed smoking 6 weeks after surgery. Other literature has found that true rates of relapse may not be realized until up to a year after surgery. The investigator has speculated that the smoking behaviour of some patients may have been influenced by the knowledge that their behaviour was going to be monitored. Perhaps other patients would be less likely to relapse if they knew a health care professional would monitor their behaviour up to a year after surgery. This follow-up might take the form of a monthly telephone call from a health care professional to inquire about their smoking status and to offer advice/support regarding smoking cessation maintenance strategies.

Telephone follow-up at frequent intervals, as well as a “24 hour help line” would also potentially benefit patients in regards to the
management of their symptoms. Six weeks after surgery, patients were still experiencing at least some levels of anxiety (100%), depression (87%), dyspnea (34%) and incisional pain (37%).

The measures for severity of disease revealed that the subjects' perception of the severity of their disease was not well correlated with objective measures of the same (CCS class, grade of LV, number of bypass grafts and priority for surgery). It is possible that some of the subjects had an unrealistic view of the nature of their illness. This may have influenced their perception of the level of threat that smoking posed to their health and may have ultimately influenced their smoking behaviour after surgery. It therefore seems plausible that, prior to discharge, patients may benefit from more in-depth education regarding the relationship between making positive life style changes and improving the long term patency of coronary artery bypass grafts.

Eighty-one percent of patients did not quit smoking until up to one month preoperatively. Jones (1985) suggests that smoking cessation at least six weeks prior to surgery can improve pulmonary function, reduce postoperative respiratory morbidity and improve immune function. Considering that many surgical candidates wait for three to six months prior to surgery, they should be strongly advised to quit smoking.
immediately. The patients could be supplied with literature to assist them with smoking cessation as well as receiving a referral to a smoking cessation program.

Social influences have been shown to have an effect on relapse after smoking cessation. Many of the subjects revealed to the investigator that their friends and family members refrained from smoking in their presence in the first six weeks following surgery. Social influences may therefore have been helpful in preventing relapse after surgery. Perhaps educating patients and their family regarding the importance of refraining from smoking in the patient's presence would enhance smoking cessation maintenance.

Implications for Research

Suggestions for further research include the following:

1. Retest and refine/revise tools to measure physiological symptoms, severity of disease, smoking history, social influences and concern for health in order to enhance reliability and validity. Face validity of the tools developed by the investigator was assessed, however, measurement error could not be ruled out.

2. Replicate the study with a minimum sample size of 85 subjects (5 multiplied by 18 variables in total). Alternatively, one could reduce the
number of variables under study and repeat the investigation. In the multiple regression analysis (when variables measuring the same factor were included simultaneously), the inclusion of fewer cases than 5 per variable may render the power as unacceptably low, increasing the width of errors in estimating correlation or regression coefficients.

3. Replicate the study employing a research assistant who is unknown to the subjects to reduce the potential incidence of socially desirable responses on the part of the subjects.

4. Follow-up subjects up to one year after surgery to capture more accurate rates of relapse and possibly reveal other relationships among variables.

Limitations of the Study

The limitations of the study include: a relatively short follow-up period, lack of conclusively established validity of study tools, potential for socially desirable responses and potential for relationships between independent variables to effect the relationships between the same and the dependent variable. However, the most important factor influencing the results is the relatively small sample size in the context of multiple regression analysis. The case-to-IV ratio was smaller than recommended
by Tabachnich and Fidell (1989) and as such, the results must be viewed with caution.

Summary/Conclusion

A descriptive correlational study of 38 adult CABG surgical patients who had smoked at least two cigarettes in the six months prior to surgery was conducted to examine the effect of anxiety, depression, concern for health, social influences, angina, incisional pain, dyspnea, and severity of disease on smoking behaviour in the first six weeks after surgery.

Results indicated that grade of LV and intensity of incisional pain were the only independent variables that had a statistically significant effect on smoking behaviour after surgery.

The major limitation of the study was the small sample size, however, in spite of that, several implications for theory, nursing research and practice were relevant. In an effort to increase higher rates of smoking cessation maintenance, nurses have a role to play in following patients at regular intervals after their discharge from hospital, educating them regarding the severity of their disease in relation to risks associated with continued cigarette smoking, assisting them to quit smoking preoperatively and encouraging their friends and family members to abstain from smoking in their presence postoperatively, especially in the
weeks following surgery. Replicating the study using a larger sample size, an investigator unknown to the subjects, better validated tools and employing a longer follow-up period is recommended to capture more meaningful results.
References


Substance Abuse, 5, 247-256.


249-262.


Appendix A

Personal Data Form

Hospital Code: ____
Subject Code: ____

Please complete the following form by writing your answer in the space provided or by circling the appropriate response. Do not put your name on this form. Thank you

1. Age _____ (years)

2. Marital Status
   i) Single
   ii) Married
   iii) Common-Law
   iv) Divorced/Separated
   v) Widowed

3. Gender
   i) Male
   ii) Female

4. Current Employment Status
i) Employed

ii) Unemployed

iii) On Leave of Absence

iv) Retired

v) Other (please specify)

5.) At what age did you start smoking?

______________

6.) In the last six months, on average, how many cigarettes did you smoke every day?

_______ cigarettes every day.

7a.) Have you ever attempted to stop smoking?

   i) yes

   ii) no

7b.) If yes, how many times have you tried?

_____ times.

8.) Are you currently smoking?
i) yes

ii) no

9.) If yes, please indicate how many cigarettes you smoke a day, on average:_________.

10.) If you are not currently smoking, when did you quit?
   i) up to one month before the surgery
   ii) over one month and up to 3 months before the surgery
   iii) over three months and up to six months before the surgery
   iv) after the surgery

11.) How bad do you think your heart disease is?

(Circle the appropriate response)

Not at all bad    somewhat bad    very bad    as bad as it could possibly be
Appendix B

Post Discharge Questionnaire

The purpose of this questionnaire is to find out about what you have experienced since your surgery. Please answer the following questions by writing your answer in the space provided or by circling the appropriate response. There are no right or wrong answers.

Today's Date___________ Your Surgery Date__________

1.) Since your surgery, have you smoked?
   Yes____ (please answer question # 2)
   No_____ (proceed to question # 3)

2.) Since your surgery, when did you start smoking?
   i) within one week after surgery
   ii) between one and two weeks after the surgery
   iii) more than two weeks but less than four weeks after the surgery
   iv) four weeks or more after the surgery

3) Since your surgery, on average, how many cigarettes have you smoked each day? Please specify_______

4.) Since your surgery, have you tried to quit?
   i) yes
   ii) no

5.) What is your living arrangement?
i) I live alone

ii) I live with other people

6.) How many people who live with you smoke cigarettes? 

_______ people

7.) Of the people you see frequently, about how many smoke? (Please circle the appropriate response):

i) none

ii) some

iii) half

iv) most

v) all

5.) Since your discharge, how often have you spent time with smokers?

i) not at all

ii) sometimes

iii) often

iv) most of the time

v) all of the time

6.) The following is a list of symptoms you may have experienced since your surgery. Please indicate on average, how bad these symptoms were while you were moving around (eg. turning in bed, getting out of bed, walking, etc). Please place a mark at the point on the scale that best represents your opinion:
a) Chest Pain (angina)

No pain as

As bad it could possibly be

b) Shortness of breath (feeling out of breath)

None

As bad as it could possibly be

c) Pain from your incision(s)

None

As bad as it could possibly be

7.) Please indicate how frequently you have experienced the following symptoms since your surgery by circling the appropriate response.

a) Chest Pain (Angina)

i) almost never

ii) sometimes

iii) often

iv) almost always
b) Shortness of Breath (feeling "out of breath")

i) almost never

ii) sometimes

iii) often

iv) almost always

c) Pain from your incision(s)

i) almost never

ii) sometimes

iii) often

iv) almost always

8.) How concerned are you about your personal health?

Not at all | Very much concerned

Concerned

9.) On average, how often do you worry about your health?

i) almost never

ii) sometimes

iii) often

iv) almost always
Appendix C

Sample Questions from The Profile of Mood States (POMS)

(Reproduced with Permission, EDITS, San Diego, California)

Below is a list of words that describe feelings people have. Please read each one carefully. Then fill in ONE circle under the answer to the right which best describes HOW YOU HAVE BEEN FEELING DURING THE PAST WEEK INCLUDING TODAY. (In this study, subjects were asked to reflect on the previous six weeks). The numbers refer to these phrases.

0 = Not at all
1 = A little
2 = Moderately
3 = Quite a bit
4 = Extremely

Examples of Items:

Anxiety:
Tense..................0 1 2 3 4
Restless..............0 1 2 3 4

Depression:
Unhappy...............0 1 2 3 4
Discouraged.........0 1 2 3 4
Gloomy...............0 1 2 3 4
Appendix D

Verbal Explanation of Study Given to Patient by Nurse Practitioner/Clinical Nurse Specialist or Delegate

Jennifer McDonald is a nursing graduate student at the University of Toronto. She is conducting a study to find out more about smoking and coronary artery bypass graft surgery. All information is confidential.

Jennifer would like to meet with you to explain the study in detail. Listening to the explanation does not mean you have agreed to participate in the study. You can decide after listening to the explanation. If you decide not to meet with Jennifer or not to participate in the study, the care you receive in the hospital will not be affected.

Can I give Jennifer your name so that she can meet with you to describe the study further?

(if no) Thank you for your time.

(if yes) I will give Jennifer your name
Appendix E

Investigator's Explanation of the Study Given to the Subjects

Hello, my name is Jennifer McDonald. I am a registered nurse and a graduate student in the Faculty of Nursing at the University of Toronto. I am conducting a study, under the supervision of Professors Souraya Sidani and Dorothy Craig, as part of the degree requirements for a Master of Science degree. The purpose of this study is to gain a better understanding of smoking behaviour after surgery.

The study involves the completion of two short questionnaires, one before you leave the hospital and the other, approximately six weeks after your surgery. The first questionnaire will ask you about your age, marital status, gender, employment status, as well as information about your smoking history. The second questionnaire will ask you to respond to a series of questions to determine if you have experienced some symptoms since your surgery. Finally, you will be asked about your social contacts and if you have experienced any unpleasant symptoms since your surgery such as angina, incisonal pain and shortness of breath. The questionnaires will take approximately 10 - 15 minutes in total to complete.

If you decide to participate in the study, I will read some of your medical notes to learn about your heart disease and the surgery you had.
All information provided will be kept confidential, and will not be shared with your physician or any of the hospital staff. If you decide to participate, you are free to refuse to answer any question(s) or to leave the study at any time. Your name will not appear on any of the forms used to record your answers. You will not be identified in any report of the study, and the results will be reported for the entire group only.

There are no risks known to be associated with participation in this study. You may not benefit directly, however the information you provide may help other patients who undergo surgery similar to yours.

If you decide to participate in the study, you will be asked to sign a consent form and will receive a copy of the signed form. I will then make an appointment to visit with you at your home or at another place convenient for you approximately six weeks after your surgery.

Participating in this study is completely voluntary.

Do you have any questions? Are you willing to participate in the study?

(if no) Thank you for your time.

(if yes) Please read this consent form and sign it if you have no further questions.
University of Toronto Letterhead

Appendix F

Subject's Consent Form

I have been asked to take part in a study being conducted to gain a better understanding of smoking after heart surgery. This study is being conducted by Jennifer McDonald, under the supervision of Professors Souraya Sidani and Dorothy Craig, as part of the Masters of Science in Nursing degree at the University of Toronto.

The knowledge gained from this study may assist health care professionals to plan effective smoking cessation programs for patients after coronary artery bypass graft surgery.

I understand that I will have to complete two different questionnaires, one in the hospital before my discharge and one at my home or a place convenient for me, approximately six weeks after the surgery. I understand that these questionnaires will take about 10 - 15 minutes in total to complete.

I understand that, if I consent to participate, Jennifer will review my medical record to learn more about my heart and the surgery I had.

I understand that all information will be kept confidential, and that my individual answers will not be shared with anyone who works at the hospital. My name will not be released to anyone and I will not be
identified either during this study, or during any written report or presentation of the study results. All results will be reported only for the entire group of subjects.

I understand that there are no known risks associated with this study and that I may not benefit from this study. I am aware that I may refuse to answer particular questions, or choose to withdraw from the study at any time without this affecting the care I receive in the hospital or during follow up appointments.

I have read and understand the above and give my consent to participate in the study and to have my medical records reviewed by the investigator.

Date Subject's Signature Witness
University of Toronto Letterhead

Appendix G

Letter to the Nurse Practitioner/Clinical Nurse Specialist, Cardiovascular Surgical Unit

156 St. George St
Toronto, ON
M5S 2G1

Date

Nurse Practitioner/Clinical Nurse Specialist

Hospital Address

Toronto, ON

Dear [Name]:

I am a graduate student in the Faculty of Nursing at the University of Toronto. The Nursing Research Committee at [hospital name] has given approval to commence my research study which will explore some of the factors that influence smoking behaviour after coronary artery bypass graft surgery. The study will be conducted under the supervision of Professors Souraya Sidani and Dorothy Craig in the partial fulfillment of the requirements for the Degree of Master of Science.

This study will require participants to complete three different questionnaires, one before their discharge and two approximately six
weeks after their discharge. The questionnaires will require a total of approximately 10 - 15 minutes of their time. The subjects chosen for the study will be adults who can speak and read English and who have smoked cigarettes within six months prior to an initial coronary artery bypass graft surgery. The knowledge gained from this study may assist health care professionals to plan effective smoking cessation programs for patients after coronary artery bypass graft surgery.

In carrying out this study, your assistance would be appreciated to identify appropriate potential subjects for this study. You would be requested to approach these patients, on my behalf and to provide them with a brief explanation of the study (included with this letter). If a patient agrees to hear more about the study, I will meet with them to explain the study in further detail and to answer any questions they may have. It is anticipated that your assistance will be required for approximately three months.

I will contact you in the near future to arrange a convenient time to discuss the study with you and your staff and to answer any questions or concerns you may have. If you require further information, please contact me at the above telephone number.

Thank you very much

Jennifer McDonald
Jennifer McDonald  
47 Westminster Avenue  
Toronto, ON  
M6R 1N3  

September 4, 1998  

Dear Ms. Burwich:  

I am completing a master's thesis at the University of Toronto entitled "The influence of psychosocial and physiologic factors on smoking behaviour after coronary artery bypass graft surgery: A descriptive correlational study". One of the tools used in this study was the Profile of Mood States, copies of which I purchased from EDITS last year. I am seeking permission to allow inclusion of five items from the POMS, for purposes of illustration in the thesis and permission for the National Library to make use of this thesis (i.e., to reproduce, loan, distribute, or sell copies of the thesis by any means and in any form or format). Within the thesis, I will include the proper citation as to the source of the POMS items and the phrase "Reproduced with permission."  

These rights will in no way restrict republication of the material in any other form by you or by others authorized to you.  

If these arrangements meet with your approval, please sign this letter where indicated below and return it to me at your earliest convenience either at the above address or by fax (905) 458-3383), Attention: Michael Frayne. Thank you for your assistance in this matter.  

Yours Sincerely,  

Jennifer McDonald  

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:  

[Signature]  
[Print Name]  
[Date]