A Comparison of Smoking Cessation Methods in Normal Smokers and Smokers with Chronic Obstructive Pulmonary Disease

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A COMPARISON OF SMOKING CESSATION
METHODS IN NORMAL SMOKERS AND
SMOKERS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

by

Mary Beth Mueller

A THESIS

Presented to the Faculty of
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Cigarette smoking is the most important health issue of our time and the most preventable cause of disease and death. Chronic obstructive pulmonary disease (COPD) is a frequent consequence of chronic cigarette smoke exposure. Patients with COPD who have not stopped smoking earlier in the course of their disease are particularly refractory to current smoking interventions. Most of the current smoking cessation programs are designed for an asymptomatic, non-diseased population and report moderate results at best. Recent studies suggest the idea of individualizing treatment and tailoring smoking cessation therapies to each smoker. This study investigated three smoking cessation therapies in two groups of smokers in an attempt to define which therapy was best for different types of smokers.

Thirty asymptomatic cigarette smokers and thirty smokers with COPD were randomized into one of three smoking cessation treatments: Individual, Group, or Self-help therapy. The treatment period was for four weeks and was guided by the American Cancer Society's FreshStart program.
Smoking abstinence was verified by exhaled carbon monoxide levels.

Using carbon monoxide, a split-plot analysis of variance was performed. Mean carbon monoxide levels were significantly lower post-treatment for all subjects. Individual and Group therapy were found to be significantly different than the Self-help group overall.

The same split-plot analysis of variance was performed for number of cigarettes smoked. Mean number of cigarettes smoked were significantly lower post-treatment for all subjects and normal smokers were able to reduce their cigarettes more than the COPD group. Chi-square and discriminant analysis using demographic variables, tobacco dependency and self-efficacy failed to predict success. The COPD group reported significantly increased anxiety and restlessness over the normal smokers group.

Overall, there were decreases in both carbon monoxide and cigarettes smoked. These results justify the program expense of intensive cessation treatments such as Individual and Group over Self-help therapy. Normal smokers were able to significantly reduce the number of cigarettes smoked over the COPD group but otherwise grouping effects were not found to be significant. Further research characterizing smokers and individualizing smoking cessation therapy is needed.
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CHAPTER ONE

INTRODUCTION

Overview of the Health Problem

There have been dramatic changes in the health status of Americans over the past century. At the beginning of the century, the leading causes of death were infections such as pneumonia, diphtheria, influenza, tuberculosis and gastrointestinal infections (Nebraska Health Education/Risk Reduction Program, 1986). Today, the leading causes of death are in part, self-inflicted: coronary heart disease, cancer, stroke and chronic obstructive lung disease.

Throughout life, we make many decisions that affect our health. The sum total of these decisions comprise our lifestyle. The cumulative impact of lifestyle decisions has a greater effect on the length and quality of life than all the efforts of medical care combined (U.S. Department of Health Education and Welfare, Healthy People, 1979).

It has been a quarter of a century since the Surgeon General dispelled all doubt that smoking is our greatest preventable cause of disease and premature death (U.S. Public Health Service, 1964). In 1986, a second most important Surgeon General's report appeared. It included scientific evidence to condemn cigarette smoke as one of our most important environmental hazards. The report showed
that tobacco was a serious threat not only to the lives of smokers, but to their nonsmoking spouses, children and co-workers (U.S. Department of Health and Human Services, 1986).

Indeed, cigarette smoking has been proclaimed to be the most important public health issue of our time (U.S. Department of Health and Human Services, Smoking and Health, 1987). The Royal College of Physicians in London recently concluded that cigarette smoking constitutes the largest single remaining preventable cause of death and disease. Despite widespread public health efforts to provide education and encouragement to smokers to stop, many people have great difficulty quitting even though they are well motivated (Hjalmarson, 1984).

Just about everyone agrees that the use of tobacco is damaging to one's health. Nonetheless, while the percent of smokers in the United States has declined from 42 percent in 1965 (U.S. Department of Health and Human Services, 1982) to just under 33 percent in 1983 (National Center for Health Statistics, 1984) the total number of smokers has remained almost constant. The overall prevalence of smoking among males declined dramatically after the first U.S. Surgeon General's report on smoking and health was issued in 1964 (U.S. Department of Health and Human Services, 1988). This decline has continued among males, but the speed of the decline has diminished. In some categories, such as for
women between 20 and 34 years, the percent of smokers increased from 1980 to 1983 (National Center for Health Statistics, 1984). Lung cancer now exceeds breast cancer in American females (U.S. Department of Health and Human Services (Smoking in the United States, 1986).

Health Consequences of Smoking

With the exception of the tobacco industry, few would dispute the connection between cigarette smoking and preventable morbidity and premature mortality (U.S. Department of Health, Education and Welfare, Smoking and Health, 1979). It has been estimated that there are more than 50,000 studies linking cigarette smoking to increased morbidity and mortality from cardiovascular diseases, various forms of cancer and chronic obstructive lung diseases (U.S. Department of Health and Human Services, The Health Consequences of Smoking, 1985). For example, there is epidemiologic evidence linking smoking with coronary heart disease, lung cancer, emphysema, laryngeal and esophageal cancers, cancer of the bladder, and several gastrointestinal diseases (e.g., peptic and duodenal ulcers) (Fielding, 1985).

Each year, 340,000 persons die prematurely from smoking-related illnesses. The Surgeon General has stated that unless smoking habits change, 1 in every 10 people living today could die prematurely of heart disease alone (U.S. Department of Health and Human Services, 1983). In
addition to smoking's contribution to heart disease, it is estimated that 30 percent of all cancers are caused by smoking and that 85 percent of all lung cancers are due to cigarette smoking (U.S. Department of Health, Education and Welfare, 1982).

Chronic obstructive pulmonary disease (COPD) is a frequent consequence of chronic cigarette smoke exposure. COPD refers specifically to obstructive lung disease such as chronic bronchitis and emphysema. The American Thoracic Society's definition of chronic bronchitis is the presence of a chronic, productive cough for at least three months of the year for the last two years (U.S. Department of Health and Human Services, Smoking and Health, 1987). Examination of COPD mortality rates for smokers and non-smokers suggest that 85-90% of deaths due to obstructive lung disease can be attributed to cigarette smoking (U.S. Department of Health and Human Services, 1984). In general, cigarette smokers have a 70% greater death rate from all causes than non-smokers (U.S. Department of Health and Human Services, Smoking and Health, 1987).

Economic Consequences of Smoking

The health consequences and medical costs associated with cigarette smoking have been established undeniably. Not only are cigarette smokers at markedly increased risk of morbidity and mortality, chronic obstructive pulmonary disease accounts for a sizeable amount of disability in the
labor force (U.S. Department of Health and Human Services, 1985). The costs to society of supporting wage-earners disabled from smoking-related disease and their dependents can be exorbitant. Premature deaths secondary to lung disease also has a costly impact on society. Forty two billion dollars is spent annually for medical care and lost productivity due to smoking. In addition, each individual who is a non-smoker for one year save about $837.23 due to the cost of cigarettes (U.S. Department of Health and Human Services, A Decision Makers Guide, 1985).

As a society, it seems less expensive to prevent smoking-related disease than carry the economic burden for those who become disabled and economically unproductive. If this particular health problem were controlled, medical costs could be reduced. While numerous techniques have been developed to improve the quality of life for patients with lung disease, there has been growing realization that while smoking is a prevalent and costly public problem, it is also preventable.

Declining Social Acceptability of Smoking

A great social movement has taken root to rid America of its tobacco use. The social acceptability of cigarette smoking has declined in the last two decades. Efforts still continue to promote a strongly developing social climate against smoking. Smokers who smoke in the presence of their nonsmoking friends increasingly feel as though they are a
"dragon." Much attention has been given to the airline industry regarding the recent smoking ban for passengers and support personnel on all commercial flights. Furthermore, smoke-filled environments are being established in an increasing number of public buildings. By 1979, almost half of all U.S. businesses had a policy restricting or prohibiting smoking (Windsor & Bartlett, 1984).

**Smoking and the Health-Illness Continuum**

Countless public education programs have attempted to promote effective self-regulation of illness threats, such as smoking, however, people continue to engage in behaviors which are dangerous to their health (Leventhal, Safer, Panagis, 1983). Because so many of the illnesses today are in part self-inflicted, the prevention and treatment of these illnesses involve the modification and control of behavior.

It is important to consider health as separate from illness. Many people define illness as ill health and health as lack of illness. Greenberg (1985) suggests that there is a health-illness continuum and that there are many behavioral dimensions of health and illness. Kasl (1974) suggests the major reason for distinguishing "health" and "illness" is because different sets of determinants are needed to understand them. Health behavior takes place in the absence of symptoms and forms the direction of primary health education programs. Illness behavior on the other
hand, takes place in the presence of symptoms and may sometimes be compelling enough to provide all the motivation a person may need. With regard to smoking, some smokers are healthy and have no symptomatic complaints (normal smokers), while other smokers complain of a chronic, productive cough (COPD).

The Role of Self-efficacy

While it seems that we have little control over health and illness, much of the recent smoking cessation literature (Baer, Holt & Lichtenstein, 1986; Best & Hakstian, 1978; Condieotte & Lichtenstein, 1981; Yates & Thain, 1985) discusses the role of self-efficacy in a person's ability to control their own behavior. Albert Bandura (1969, 1977a, 1977b, 1982, 1986) describes perceived self-efficacy as an individual's perception of the likelihood that they would be able to perform a specific behavior in a given situation. Self-efficacy affects what activities a person chooses to pursue, how much effort will be mobilized in a given endeavor, how long one will persevere in the face of difficulty, and the amount of stress that is experienced. Clinical experience suggests that self-efficacy plays a role in the motivation to enroll and persist in a behavior change program.

The Role of Tobacco Dependency

Tobacco dependency seems to surface as an important predictor of outcome in smoking cessation programs.
Twenty-seven percent of all smokers are considered heavy smokers in that they smoke 25 or more cigarettes a day (National Center for Health Statistics, 1985). Heavy smokers are three to four times more likely to die of cancer than non-smokers (U.S. Department of Health, Education and Welfare, 1979). Heavy smokers who have a greater dependence on nicotine offer a major challenge to smoking cessation.

Current Trends Toward Smoking Cessation

Since cigarette smoking has been recognized by the Surgeon General as the most preventable cause of disease in the United States, many Americans have quit smoking and many more smokers are eager to quit. In 1966, just 26 percent of smokers said they were trying to quit; 16 years later, the figure had risen to 37 percent (U.S. Department of Health and Human Services, Smoking and Health, 1983). The proportion of individuals who have never smoked also has risen, although more slowly, from almost 28 percent in 1960 to almost 32 percent in 1980 (U.S. Department of Health and Human Services, Smoking and Health, 1983). Yet, there are many smokers whose common denominator is their inability to stop smoking on their own. Cigarette smoking is an extremely complex and highly refractory behavior. In spite of the enormous scientific efforts during recent decades, the clinician's armamentum in smoking cessation has not improved all that much.
Despite knowledge of the health consequences of cigarette smoking, approximately one third of adults in the United States continue to smoke (Remington, Forman, Gentry, Marks, Trowbridge, 1985). Smoking cessation efforts are impeded because many of the advantages of continuing smoking are immediate, whereas the disadvantages of smoking are delayed (Klesges et al. 1988).

Research programs designed to reduce cigarette smoking have increased dramatically in the last two decades. Most programs continue to be designed for the asymptomatic non-diseased smoker. The most recent reviews suggest more promising results, particularly from multi-component behaviorally oriented treatment programs (Glasgow & Bernstein, 1981; Pechacek, 1979).

Only a small number of smoking cessation studies have been reported in which smokers with chronic disease are the target population (Sirotta, Currlan, Habif, 1985). Although it has been reported that many smokers with cardiac and pulmonary disease quit smoking when given medical advice (Pederson & Baskerville, 1983), those that do not represent a particularly difficult group to treat (Hall, Bachman, Henderson, Barstow & Jones, 1983). Quitting smoking for this segment of the population is crucial. A sizeable proportion of patients with diagnosed lung disease continue to smoke despite warnings from physicians. Long-term results of treatments for chronic cigarette smoking have
generally been discouraging (Hunt & Bespalec, 1974; Lichtenstein & Danaher, 1976). Patients with underlying chronic obstructive pulmonary disease, who have not stopped smoking earlier in the course of their disease, may be particularly refractory to current smoking interventions. Disappointing smoking cessation results for these recalcitrant smokers demonstrates the need for the investigation of different smoking cessation approaches. It is clear that smokers exhibit a high degree of individual difference. Perhaps smokers need to be further characterized and smoking cessation therapy conditions individually tailored.

**Need For Individualizing Treatment**

Cigarette smoking is a complicated behavior and highly individualized. Each individual who smokes does so for their own reasons and supports their behavior with underlying personality characteristics. Little research has been done on analysis of those personality characteristics predictive of treatment success or failure. Decisions regarding which components to use in treatment programs for individual subjects are still based on clinical intuition rather than empirical findings (Pomerleau, Adkins, Pertschuk, 1978). Pomerleau et al. (1978) also suggested that smoking cessation results might be enhanced by providing components which take into account individual subject characteristics. Their objective was to demonstrate
the role of personality characteristics in determining outcome in smoking cessation and to demonstrate empirically-based suggestions for individualizing treatment.

With rising medical costs, we need to develop a clear understanding of the "person-intervention-fit" (Pechacek, 1979). An individualized smoking cessation program can help make intervention more cost-effective and can help to decide whether certain individuals need more intensive interventions while others would do just as well with minimal contact. As with any medication regimen, health care providers should tailor smoking control strategies to the individual.

**Purpose of the Study**

This research was designed to investigate whether there would be a difference in mean exhaled carbon monoxide levels and mean number of cigarettes smoked for two randomized groups of smokers. Smoking cessation therapy was manipulated in smokers with a chronic, productive cough (COPD) and those who were asymptomatic (normal). Individual therapy was compared with group therapy and these were compared to self-help therapy. The main purpose of this study was an attempt to define the smoking cessation therapy that worked best for each of these two groups. With the information gained from this research, it was hoped that educating different types of smokers (those with and without
lung disease) about the smoking cessation therapy that may work best for them would lead to the most optimal voluntary behavioral changes. Other purposes included describing the relationship between demographic information and smoking cessation outcome.

This smoking cessation program provided the opportunity to look at 1) process (a better definition of smoking cessation therapies in different types of smokers), 2) impact (smoking cessation) and 3) outcome (prevent further progression of COPD and increase quality of life). It also focused on a more tailored smoking cessation program for smokers with individual variances. It was hoped that this study may be used to show that an individually-tailored smoking cessation paradigm can be effective in any clinic-based practice setting for different types of smokers. Practical implications to support this study include the ability to predict successful smoking cessation attempts in patients with lung disease based on their self-efficacy and tobacco dependency. Equally important, an assessment of the most effective behavior modification approach for each of these two groups of smokers was investigated.

**Assumption of the Study**

The assumption for this study was that smoking cessation effectiveness depends on further characterization of smokers. For example, it was assumed that smokers with
COPD, higher tobacco dependency and lower self-efficacy scores would find it most difficult to quit regardless of the treatment method assigned. It was not the assumption of the principal investigator that all subjects would be able to quit smoking. In fact, this research may have had an effect without any successful quitters. For example, if this study showed only a mean decrease in carbon monoxide levels or number of cigarettes smoked, it would still be considered valuable in a practical sense.

Hypothoses of the Study

The hypotheses for the present study were derived from assumptions of behavioral smoking treatment, literature on the strategies associated with treatment success and evidence implicating tobacco dependency and self-efficacy as major determinants. In accord with these sources, three smoking cessation treatment methods were compared in two groups of smokers. This study was designed to investigate the following null hypotheses:

Hypothesis 1:

There will be no significant difference (p<.05) in pre/post mean exhaled carbon monoxide levels between treatment groups when therapy (individual vs group vs self-help) is manipulated in smokers with and without COPD.

Hypothesis 2:

There will be no significant difference (p< .05) in pre/post mean number of daily cigarettes smoked between
treatment groups when therapy (individual vs group vs self-help) is manipulated in smokers with and without COPD.  

Hypothesis 3:  

There will be no difference in the frequency of success between groups when therapy is manipulated.  

Hypothesis 4:  

There will be no relationship between demographic variables and smoking cessation outcome between groups.  

Hypothesis 5:  

There will be no relationship between tobacco dependency and smoking cessation outcome between groups.  

Hypothesis 6:  

There will be no relationship between self-efficacy and smoking cessation outcome between groups.  

Hypothesis 7:  

There will be no relationship between smoking cessation withdrawal symptoms and outcome between groups.
CHAPTER TWO
REVIEW OF THE LITERATURE

Smoking and Chronic Obstructive Pulmonary Disease

Cigarette smoking is dangerous to health and has been well established as a major cause of disease. Despite this, smoking continues to be a prevalent health-defeating behavior, even among persons who have an illness related to smoking (Mausner, 1970). For many of these individuals, continued smoking is a "self-inflicted suicide" and inevitably contributes to the progressive deterioration of their condition.

Chronic obstructive pulmonary disease (COPD) is a frequent consequence of chronic cigarette smoke exposure. The American Thoracic Society's definition of COPD is the presence of a chronic, productive cough for at least three months of the year for the last two years (U.S. Department of Health and Human Services, Smoking and Health, 1987) Two disorders, emphysema and chronic bronchitis comprise the majority of cases diagnosed as COPD. Chronic bronchitis and emphysema are progressive, insidious in onset and may ultimately result in death by respiratory and/or cardiac failure.

Cigarette smoking has been implicated as the most common cause of chronic bronchitis, emphysema and lung cancer (U.S. Department of Health and Human Services,
Smoking and Health, 1987). In the airway, cigarette smoke causes an increase in mucous gland size and number. These changes result in increased mucous production leading to a chronic productive cough, the main feature of COPD. Smokers of both sexes have a higher prevalence of cough and phlegm production than nonsmokers (Sachs, Benowitz, Silver, 1987). This prevalence increases with the number of cigarettes smoked per day. These inflammatory changes may lead to airflow obstruction which is often reversible with the cessation of smoking. If the smoker continues to smoke, however, irreversible changes leading to the development of emphysema will occur. In addition, cigarette smoking paralyzes the tiny hair-like structures which clean and protect the lung. Therefore, cigarette smokers are more vulnerable to viral and bacterial pathogens and are subsequently at greater risk for developing infection. Because the development of a productive cough is so insidious, this pathologic symptom is often not viewed as a generalized danger signal.

In a study by Chetwynd and Rayner (1986), smokers were found more likely to report frequent occurrence of all symptoms. Smokers averaged 3.31/year illness episodes compared with 2.54/year among nonsmokers. Smokers made significantly greater use of general practitioners and hospitals, paid more visits to specialists, outpatient clinics and chiropractors, and had more emergency admissions
than nonsmokers. Heavy smokers reported more illnesses and greater use of health care facilities than light smokers. Overall, smokers averaged 0.81 additional visits annually to their general practitioner than nonsmokers, an increase of 16.5 percent.

Preventive elements are among the more important aspects of health care management of patients with COPD. Of the factors which have been addressed in reports of health promotion and education for patients with a respiratory problem, two have been identified as having a considerable potential for increased health benefit: appropriate use of prescribed medications and smoking cessation (Windsor et al. 1980). According to the 1974 National Ambulatory Medical Care Survey (NAMCS): 1) high levels of smoking behavior were reported by those with COPD and 2) 63% of the respondents with chronic bronchitis and/or emphysema indicated taking at least one medication for their respiratory problems.

Cessation of smoking leads to a decreased risk of mortality from COPD compared with that of continuing smokers. The risk of death for the ex-smoker is directly proportional to the overall lifetime exposure of cigarette smoke and to the total number of years since one quit smoking. However, the risk of COPD mortality among former smokers does not decline to equal that of the never smoker
even after 20 years cessation (U.S. Health and Human Services, 1984).

Hall, Sachs, Hall and Benowitz (1983), studied men and women who had cardiovascular or pulmonary disease in a smoking cessation program that incorporated some behavioral techniques. They reported low abstinence rates, which averaged about 16% at six-month follow-up.

It has been reported that many smokers with pulmonary and cardiac disease quit smoking (Pederson & Baskerville, 1983). In fact, survivors of a myocardial infarction have smoking cessation rates that average 50 percent (Sirota et al. 1985). Those smokers with pulmonary and cardiac disease that do not quit smoking represent a particularly difficult group to treat (Hall et al. 1983).

Dudley, Aickin, and Martin, (1977) and Daughton, Fix, Kass, and Patil (1980) found remarkably similar smoking cessation rates among two independent groups of COPD patients. They both found that roughly two of every three COPD patients become ex-smokers, and it appears that most of the quitting takes place soon after receiving the first pulmonary diagnosis. Less than half of the remaining patients ever succeed in breaking the habit. This leaves about one COPD patient in five unable to ever quit. Daughton et al. (1980), reported that COPD patients compared to non-disease smokers, good risks to break the habit. Having COPD is an overwhelming factor influencing the
ability to quit. Their study suggests that all COPD patients will stop smoking would be accurate in two out of three cases.

Behavioral specialists have targeted patients with COPD in pulmonary rehabilitation programs. Pulmonary rehabilitation experts readily admit that they can provide only supportive treatment for the chronically deteriorating lung conditions. Immunizations, aggressive initiation of antibiotics for infection, and strict adherence to their medicine regimen is best management that can be offered. Often, the lungs are the only limiting system for the activities of daily work and recreation (Fix, Daughton, Kass, 1981).

Prigatano, Wright and Levin, (1984), showed restriction in quality-of-life function and daily life activities in patients with COPD. In his study, the degree of physical limitation was minimal, but the degree of psychosocial limitation was more marked. Fix et al. (1981) suggests that certain psychological traits lead some people into lifestyles that predispose them to smoke and subsequently develop chronic lung disease.

Windsor et al. (1980) indicates that a significant proportion of patients with COPD are receptive to smoking behavior change and with education and support, will alter their existing behavior of smoking. Furthermore, he implies that prevention by modification of smoking behavior clearly
offers more hope than the possibility of any new treatment for respiratory disease. Unfortunately, little can be done to directly modify pre-treatment variables such as rate and years of smoking for those interested in quitting. Perhaps, participants for them whom a less favorable prognosis is predicted can be monitored throughout treatment and be given more intensive therapy.

The Utility of Pulmonary Function Testing

Current research suggests that the presence of a chronic, productive cough, with additional abnormalities in pulmonary function testing may identify a population whose lung function deteriorates at a more rapid rate than normal and who are at increased risk of death. Fix et al. (1981) suggested that smokers show reduced lung functions at all ages compared to nonsmokers.

Petty, Pierson, Dick, Hudson and Walker (1976), performed a follow-up of a prevalence study of respiratory symptoms and chronic airway obstruction after a 6 to 7-year interval. Knowledge of the presence of chronic bronchitis after the original study had no effect on subject's smoking habits, although chronic bronchitis was significantly less prevalent at follow-up among those who did stop smoking. They also showed that smokers with a forced expiratory volume in one second/forced vital capacity (FEV1/FVC) ratio in 1967 < 60% showed approximately a three-fold larger mortality rate than nonsmokers. It was clear that the
presence or absence of chronic obstructive lung disease in 1967 had no direct bearing on whether the subjects had stopped smoking by 1974. However, classification of abnormal on the basis of pulmonary function testing may have had an influence on smoking cessation. Therefore, while little attention was paid to the importance of the actual diagnosis of COPD or its symptoms, the classification of "abnormal" based on spirometric testing appeared to be a motivating factor.

After approximately age 25, measures of ventilatory function progressively decline. The rate of decline in measures of expiratory airflow with increasing age is steeper for smokers than nonsmokers. It is also steeper for heavy smokers than for light smokers. The mean annual rate of decline in forced expiratory volume in 1 second (FEV1) was 47 ml in healthy nonsmokers, 60 ml in moderate smokers and 73 ml in heavy smokers. (Olofssen, Bake & Svarsuda, 1986).

Researchers have shown that improvements in pulmonary function can occur subsequent to smoking cessation (Bosse, Sparrow, Rose & Weiss, 1981; Nemery, Moqvero, Brasseur & Stanescu, 1982). Smoking cessation can slow the rate of pulmonary function decline in patients with mild to moderate COPD. If cigarette abstinence occurs early enough, COPD patients with mild dysfunction may delay or perhaps eliminate their predicted encounter with severe pulmonary
impairment. After the cessation of smoking, the rate of lung function decline with increasing age appears to slow to approximately that seen in nonsmokers of the same age.

Since pulmonary function testing is simple and can be performed by non-physicians, it seems reasonable to encourage early identification of patients at risk. This simple procedure may be the first step in the institution of preventive and therapeutic measures that might be effective in relieving symptoms and stopping the progress of the disease.

Illness Behavior

Illness is often still viewed as a matter of random chance, not to be averted but to be tolerated and accepted (U.S. Department of Health and Human Services, 1979). People behave differently as a result of illness because it is often viewed by society as a weakness. The public is confronted with media showing us glowing and youthful beautiful women with peaches and cream complexions, perfect white teeth, and shiny, silky hair. Likewise, men are depicted as handsome and virile with muscular tan bodies, perfect teeth, and well-groomed hair. Wellness and youth are both highly valued. Furthermore, our economy is based on the "healthy employee." Even though companies or businesses make provisions for sick leave, individuals who use this provision may run the risk of not being recommended for promotion and/or salary increase. Individuals often
feel compelled to come to work regardless of how sick they feel. Rather than face the reality of illness with its feelings of guilt and lack of rewards, the individual may avoid or deny the fact that he or she is ill (Mechanic, 1978).

The thrust of our culture is directed toward physical perfection and health. It's not surprising, then, that people are taken off guard when the threat of illness becomes a reality. Suddenly there exists a tremendous threat to the individual's self-system and subsequent alteration of self. Because of this threat, the individual has to make adaptive changes depending upon the type of illness, severity of the illness and threat to the person's self-concept. Adaptation to chronic disease is a lengthy and ongoing process. The illness may force the individual to act differently than in complete health.

The social perspective of illness behavior takes into account the norms involving sickness and response to sickness. The social perspective also determines the conditions under which a person can claim illness and be released from usual social obligations. If we regard sick people as having to be "looked after" rather than helped to health, we may unwittingly reinforce their passive tendencies and encourage them to leave it all to us.

The term "illness" can be used in two ways. It can refer to the medical disease model or to any condition that
causes an individual to concern himself with his symptoms and seek help. The term "illness behavior" refers to the latter. The study of the patient's perspective is a useful aspect of the analysis of health and disease. Because illness behavior affects the utilization of medical care, the selection of patients who seek help from general practitioners, clinics, or hospitals is usually biased. (Mechanic, 1978).

Mausner (1970) found that the fact of being ill was a major consideration in patients' decisions to stop smoking. Cessation, however, was only limited to persons with severe obstructive symptoms. Probably the presence of symptoms, the knowledge of abnormal radiographic findings, the realization of the poor prognosis if their disease continued its course, and the warnings from health care professionals all contributed in varying proportions to the decision to stop smoking.

For a COPD patient, knowing their illness is irreversible may lead to feeling of hopelessness and fear of losing control. Independence and pride may be lost as patients are forced to retire, change their recreational activities and rely on others for assistance as their disease progresses. Feelings of inadequacy may result when social roles change. A major part of self image is related to body image perceptions, attitudes and feelings that we have toward our bodies (Dudley, Zitzman, Rugg, 1985).
Health Belief Model and Smoking Cessation in The COPD Patient

The Health Belief Model (Rosenstock, Strecher, Becker, 1988) contends that behavior change depends on the interaction of three psychological factors: how seriously patients perceive a disease; how much benefit the patient expects from the treatment; and how difficult, bothersome or painful the patient expects therapy to be. Because smoking is often perceived as a pleasure, the immediate discomfort of abstinence is pitted against the less immediate risk of serious disease (Fix et al. 1981). Although medical opinions of the seriousness of disease have little association with patient compliance rates, patients' views of the severity and their perceived personal susceptibility to a disease both affect compliance. Higher compliance rates are found among patients who perceive their medical risks as great. During asymptomatic periods, patients may perceive their disease as less severe and predictably, when patients are asymptomatic, medication compliance drops. Consider this example: A person may evaluate their cigarette smoking because it is a threat to lung cancer. They may deny their susceptibility, agree with the seriousness of the disease but realize the perceived treatment is poor and if they stop smoking, they lose the benefits of being a smoker. For these reasons, they may continue to smoke.
In reviewing the importance of social definitions in response to illness, it is essential to remember the character of the symptoms themselves. Much of the behavior of sick persons is direct product of the specific symptoms they experience: their intensity, the quality of discomfort they cause and their persistence. (Mechanic, 1978). Whether a person recognizes a productive cough as a symptom of an illness depends on how recognizable and the degree of disturbance. Because the natural history of the disease is not widely disseminated by medical professionals, smokers may not realize their susceptibility--that a productive cough is the initial symptom of chronic lung disease. They may also not be aware of the seriousness of this seemingly benign cough and its potential to lead to irreversible lung damage. Health care professionals need to place more emphasis on explaining the clinical course of lung disease. More effort should concentrate on having smokers appreciate that their minor chronic symptoms are caused by smoking and that nonsmokers experience fewer complaints.

Rosenstock's (1988) Health Belief Model states that if smokers do not understand the course of the disease process, they are likely to perceive that they will not be susceptible. Furthermore, they will fail to understand the seriousness of their seemingly benign chronic cough and its ultimate airflow obstruction. Due to their physiologic addiction to nicotine, they will view quitting smoking as a
barrier with little benefit. In a study by Hansen and Malotte (1986), smokers were more likely than nonsmokers to deny their susceptibility both for others and for themselves as hypothetical lifelong smokers when asked to estimate the probabilities of consequences from cigarette smoking.

In illness behavior, smokers who have COPD are already in the medical care circle. Perceived susceptibility is not an issue because the patient already has the disease. Perceived seriousness and barriers to quitting may take on greater significance (Rosenstock et al. 1988). If we look at the issue of smoking cessation from the viewpoint of the person who has COPD, one may see healthy smokers who need to quit but then continue to be healthy. On the other hand, one sees sick smokers who also need to quit but continue to stay sick. The instrumental value of quitting may not provide enough incentive or motivation to quit smoking.

**Tobacco Dependency**

Cigarette smoking continues to be an extremely tenacious addiction. Evidence now clearly indicates that nicotine, similar to alcohol and opiates, is a potent dependence-producing drug (Henningfield & Jasinski, 1983; Jaffe & Kanzler, 1979). Most smokers say they want to quit but only one in three stops permanently before age 66 (Russell & Jarvis, 1985).

Conclusions of the 1988 Surgeon's General Report are 1) cigarettes and other forms of tobacco are addicting;
2) nicotine is the drug in tobacco that causes addiction, and 3) the pharmacologic and behavioral processes that determine tobacco addiction are similar to those that determine addiction to drugs such as heroin or cocaine (U.S. Department of Health and Human Services, 1988).

The level of tobacco dependence will vary across smokers. Previous studies have shown that the higher the tobacco dependency, the more recalcitrant the smoker is to smoking cessation attempts (U.S. Department of Health and Human Services, Smoking and Health, 1987).

Glasgow, Klesges, Klesges, Somes, (1988) and Klesges et al. (1988) found in two separate studies that subjects with heavier, more recalcitrant smoking habits are the most likely to join a stop-smoking program but the least likely to quit.

Recidivism is a major obstacle to successful cessation efforts. Studies show that quitting is often a result of persistence. In one study, only 25% of the participants quit on the first try, but by the fourth attempt, 73.4% of the total participants had kicked the habit (U.S. Department of Health Education and Welfare, 1979). Patients with COPD have higher rates of quitting the smoking habit than do smokers generally, but many continue to smoke to the end. Sachs et al. (1987) reported that a typical patient referred to a lung specialist has tried 8.2 times to seriously stop
smoking in the past using a mean of 2.3 totally different techniques.

The ability to stop smoking appears to be related to the habit itself. Over 90% of all smokers begin smoking before age 20. An early age of initiation is inversely related to current smoking status, that is, the earlier one begins smoking as a teenager, the less likely that individual will be successful in giving up smoking as an adult. An earlier age of smoking initiation is strongly correlated with becoming a heavy smoker, thus further increasing the risk of premature death and disability (U.S. Department of Health and Human Services, Smoking and Health, 1987).

Daughton et al. (1980) showed that only pack-years emerged as a significant discriminant between patients at follow-up who had quit and those who continued to smoke \((p<.05)\). The only relapses occurred in heavy smokers with greater than a 55 pack-year history. Nelson (1977) showed similar findings that in a healthy population, pack-years is one of the best predictors of smoking cessation, with the heaviest smokers being least likely to quit. A well-established pattern of smoking appears difficult to change regardless of whether a heavy smoker is healthy or has COPD.

Heavy smokers, compared to lighter smokers are at increased risk of death by heart disease, lung cancer and
chronic obstructive pulmonary disease. Previous studies have shown that treatment of the primary disorder, tobacco dependence, produces better long-term cure rates than we can presently achieve for major secondary disorders caused by tobacco dependence: chronic obstructive pulmonary disease or lung cancer.

**Smoking Cessation**

On a general level, the hazards of smoking are well-known. It appears that knowledge about the health effects of smoking is not by itself a deterrent to cessation. Smoking is an overlearned behavior. Many smokers needed to learn how to smoke when they first started smoking. Experience from ex-smokers appear to support that smokers can slowly and methodically unlearn smoking behavior as they gradually weaken the series of strong associations formerly linked to smoking. Thus, behavioral modification is essential in any smoking cessation program aiming to achieve long-term success.

Numerous methods and techniques for prompting smoking cessation have been advocated and developed. However, long-term results are only moderate. One-year success rates vary less than 10% based on doctors' advice (Russell et al. 1979), to about 20% in smoking cessation clinics (Bernstein & Glasgow, 1979; Orleanse, 1980; Hughes, 1984), to a few reports of more than 30% when pharmacological adjuncts are utilized. The more promising approaches utilize a
combination of intervention techniques, and more importantly, take into account physiological dependence and the need for maintenance strategies.

In population surveys, it appears that the American public wants to quit. Of a sample interviewed, half indicated a desire to quit (American Institute of Public Opinion, 1974). A large number of people have attempted to quit in the last three decades. The percent of smokers in the United States declined from 42 percent in 1965 (U.S. Department of Health and Human Services, 1982) to just under 33 percent in 1983 (National Center for Health Statistics, 1984).

The immediate consequences of quitting smoking are very negative. A highly overlearned behavior is no longer available for reinforcement, and nicotine withdrawal symptoms may occur (e.g. increased coughing, irritability, craving, restlessness, weight gain). While long-term advantages of smoking cessation are dramatic, they cannot be guaranteed (Klesges et al. 1988).

In an attempt to determine predictors of success in a multi-component behavioral treatment program for smoking cessation, Pomerleau et al. (1978) found that those who had abstained from smoking after eight weeks of treatment had smoked at lower rates and for shorter periods of time, were less overweight, experienced fewer withdrawal symptoms, and who were more compliant with the treatment program.
Kasl (1974) showed that among the sociodemographic variables, males and older married persons have better success. Wife's disapproval of smoking increased the chance of success, but not the other way around; in fact, disapproval from friends and relatives increased the female smokers' chances of failure (Coppotelli & Orleans, 1985). The mechanisms underlying gender differences in smoking cessation maintenances have not been systematically explored, but women react more adversely to unwanted changes accompanying quitting, especially temporary moodiness and weight gain, because they find such changes to be greater social liabilities (U.S. Department of Health and Human Services, Healthy People, 1979).

Dudley et al. (1977) confirmed that patients with high psychosocial assets have several behaviors to substitute for that of smoking. These patients, he suggested, are psychologically stable and their psychologic comfort is not seriously threatened if they need to stop smoking. Daughton et al. (1980) also reported that psychosocial assets and pack-years smoking history significantly differentiated smokers from ex-smokers at follow-up.

Kasl (1974) concludes that persons who expect to be successful, are confident of their ability to quit, are accepting of treatment, and attend regularly, are more likely to quit smoking. Those who drop out of treatment at a point where they have already quit are more likely to be
successful at follow-up than those who stay in treatment; but dropouts who don't quit are almost certain to remain failures.

**Self-efficacy**

Because smoking continues to be characterized by high rates of recidivism, investigators have turned to cognitive theories such as Bandura's (1977) concept of self-efficacy. Self-efficacy is an element of Bandura's (1986) Social Cognitive Theory. Bandura holds that behavior is determined, in part, by cognitive factors which mediate eventual behavior change through expectancies and incentives. Self-efficacy is the expectancy about one's own competence to perform the behavior needed to influence outcomes.

Bandura (1977) outlines the role of self-efficacy in the paradigm of a person engaging in a behavior that will have a subsequent outcome:

PERSON -----------> BEHAVIOR -----------> OUTCOME

```
                  ↑                     ↑
        Efficacy       Outcome
        Expectations   Expectations
```

In order for a man or a woman (PERSON) to quit smoking (BEHAVIOR) for health reasons (OUTCOME), he or she must believe both that cessation will benefit their health (OUTCOME EXPECTATION) and also that she is capable of
It should be emphasized that efficacy expectations reflect a person's beliefs about capabilities and behavior-outcome links. Bandura (1982) maintains that efficacy expectations reflect a person's perceived, rather than actual, capabilities, and that it is these perceptions and not one's true abilities that often influence behavior. Bandura (1986) states that self-efficacy information is derived from four sources: enactive, or performance attainments; vicarious experience; verbal persuasion and physiological states.

When the behavior change is believed to lead to desired consequences, but the change is difficult to make, self-efficacy considerations are probably paramount. Bandura (1982) states that self-efficacy influences all aspects of behavior, including the acquisition of new behaviors or the inhibition of existing behaviors. The self-efficacy construct has been examined in the area of smoking and smoking cessation studies through a variety of survey and experimental studies. Survey studies of self-efficacy reviewed suggest strong associations between self-efficacy and behavior change progress, maintenance and relapse indicators. This research has been extremely helpful in delineating the role of efficacy expectations from outcome expectations as well as other psychological
constructs, such as stress and locus of control. Ratings of self-efficacy were found to discriminate active quitters from continued smokers, joiners of smoking cessation programs from non-joiners and successful from unsuccessful short- and long-term quitters. Experimental manipulations of self-efficacy suggest that self-efficacy may be enhanced and this enhancement is related to subsequent smoking cessation and reduction (Strecher et al. 1986).

Investigations in smoking cessation strongly support the idea that the expectation of success and perceived self-efficacy are among the most important factors affecting smoker behavior change (Condiotte & Lichtenstein, 1981; DiClemente, 1981; Yates & Thain, 1985). Condiotte and Lichtenstein (1981) also demonstrated that ex-smokers self-efficacy ratings were situation-specific, i.e., their relapses occurred in situations where self-efficacy was lowest. In contrast, individuals who were able to maintain post-treatment abstinence were found to have higher self-efficacy scores than recidivists (DiClemente, 1981).

Barrios and Niehaus (1985) showed that successful quitters reported higher self-efficacy than unsuccessful quitters. In addition, low self-efficacy has been shown to predict which smokers may relapse. Strecher et al. (1986) has shown in studies where other psychosocial constructs are examined, self-efficacy consistently emerges as a powerful predictor of behavior. It is important to understand that
the concept of self-efficacy relates to beliefs about capabilities of performing specific behaviors in particular situations, self-efficacy does not refer to a personality characteristic or a global trait that operates independently. This means that an individual's self-efficacy expectations will vary greatly depending on the particular task which confronts the individual (Strecher et al. 1986).

Chronic illnesses which involve modifying lifelong behaviors require a good deal of confidence that one can, in fact, alter their lifestyles before such an intervention is possible. A growing body of literature supports the importance of self-efficacy in helping to account for initiation and maintenance of behavior change. In the realm of chronic diseases, much more emphasis is likely to be needed on skill training to enhance self-efficacy. Where complex behavior patterns are required to maintain or restore health, enhancement of self-efficacy will usually be required. This would certainly be the case in the modification of complex lifestyle practices such as cigarette smoking.

**Individual, Group and Self-Help Treatment Methods**

The interpersonal environment significantly influences cessation of smoking. Little research, however has been devoted to mobilizing social support as an intervention modality. Most of the smoking cessation research on the
to have the potential to improve maintenance of treatment effects at different points in the cessation process (Glasgow, Schafer, O'Neill 1981). Self-help intervention may appeal to smokers who would not participate in more intensive treatment (Pechacek, 1979).

Poor follow-through under self-administered conditions is unfortunately a frequent characteristic of self-help behavior therapy programs. Pechacek (1979) has suggested that traditional group or individual treatments can possibly be used to supplement self-help interventions for the more recalcitrant smokers. Klesges et al. (1988) suggests the use of a stepped care approach. That is, perhaps lighter smokers might be treated differently (e.g. with self-help) than heavier smokers (who may be targeted for more intensive interventions group or individual sessions--once they have failed at a particular level).

**Therapist Contact**

It appears that the more complex the behavior change strategy, the more important the therapist. Glasgow et al. (1981) showed that therapist contact improved treatment effectiveness for the more detailed learning treatment program but that subjects in the more straightforward condition did as well on their own as they did with therapist assistance. Pechacek (1979) reported that the importance of a warm "client-therapist relationship" in successful smoking cessation. Glasgow et al. (1981)
topic has examined the effects of varying frequency and nature of therapist support. Results are contradictory and inconclusive. Some studies have evaluated the effects of group sessions vs individual counseling with neither approach demonstrating a clear-cut superiority (Windsor & Bartlett, 1984).

Some people find the social support of a group especially appealing. Sirota et al. (1985) found that group members rated the influence and support of fellow participants and group leaders as two of the most helpful components of his study.

One major conclusion of the 1979 Surgeon General's Report on Smoking and Health was that little is known about the millions of smokers who have quit on their own (U.S. Department of Health, Education and Welfare, 1979). It has been estimated that 95% of the over 30 million smokers who have quit since 1964 have done so on their own. If we know very little about how smokers quit on their own, less is known about ways to facilitate this self-help phenomenon. A large number of self-help smoking cessation manuals have been available commercially for years. Such approaches are believed to be worthy of scientific investigation because of easy availability, low cost, and possible client self-attribution of success rather than the therapist (Windsor et al. 1984). The role for self-help or minimal intervention is irrefutable. Self-help interventions appear
discovered that degree of therapist contact was associated both with program adherence and with self-reported treatment success.
CHAPTER THREE

METHODS

Design

The experimental design used in this study was repeated measures factorial design using a control group for comparison. Tobacco dependency and self-efficacy were to be used as covariates if homogeneity of regression occurred. This study was an experimental study because the independent variable of treatment was manipulated through random assignment. The study also had causal-comparative aspects because attributes such as being a normal smoker or having COPD, having high or low self-efficacy or high or low tobacco dependency have already occurred and cannot be manipulated. Correlational statistics were also applied to determine whether a relationship between the variables and smoking cessation outcome could be assessed. In effect, this study examined the effectiveness of three smoking cessation treatment methods in smokers who have COPD and normal smokers while trying to control for confounding variables verified by the literature review. This study was designed to answer the basic research question: What smoking cessation therapy works best for different types of smokers?
Table 3.1

**Graphic representation of study design.**

\[
\begin{array}{ccc}
R & X_1 & R \\
R & X_2 & R \\
R & X_3 & R \\
\end{array}
\]

**Definition of Variables**

The dependent variables in this study were exhaled carbon monoxide levels and self-reported number of cigarettes smoked. Operationally defined, a non-smoker was any subject with a carbon monoxide level of less than 8 and abstinence of smoking for 7 days obtained from diary cards at the posttest.

Smoking cessation therapy was manipulated as the independent variable. After determining smokers with COPD and those without subjects were randomly assigned to one of three treatment groups: 1) individual therapy, 2) group therapy, and 3) self-help therapy.

Table 3.2

**Number of subjects in each cell.**

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Therapy</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Group Therapy</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Self-help materials</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>
Other variables included demographic information such as age, sex, duration of smoking, pack-years, tobacco dependency scores, self-efficacy scores and smoking withdrawal symptoms of nicotine craving, irritability, frustration, anger, anxiety, difficulty concentrating, and restlessness.

Main Effects

There were three main effects in this study: 1) time, 2) group and, 3) treatment method. The main effects were organized into a 2x2x3 univariate factorial design. There were two levels of time, (pre-post), two levels of group effect (normal smokers and COPD) and three levels of treatment effect, (individual therapy, group therapy, self-help therapy). Again, the basic purpose of the study was to compare three levels of smoking cessation therapy in two groups of smokers before and after treatment. The treatment method effect is classified as a manipulative variable or instructor variable. In contrast, the group effect is an organismic or attribute variable.

Smoking Cessation Therapist

The smoking cessation therapist was a female Physician Assistant (graduate student and principal investigator) with over four years experience in pulmonary medicine and smoking cessation. Therapist training consisted of reading relevant background material. Therapy was standardized across groups
by following the American Cancer Society's FreshStart Facilitator's Manual.

FreshStart Program

FreshStart is a smoking cessation program sponsored by the American Cancer Society and offered in various locations throughout the nation. The American Cancer Society's FreshStart Participant's Manual is a 16-page book with an accompanying 17-page Facilitator's Guide. The FreshStart Guide consists of four sessions intended to be given in four one-hour group sessions to take place twice weekly over a two-week period. The American Cancer Society follows the intended format. The FreshStart Facilitator's Guide suggests that although the above format is suggested, the program can be very flexible as long as the core curriculum is always presented. The FreshStart Facilitator's Guide contains a summary agenda and objectives for each session followed by details of the session's content. Each session includes four phases: (1) Individual Attention, (2) Strategies and Information, (3) Review and Discussion and (4) Assignments.

Session I describes three aspects of smoking: 1) chemical addiction, 2) habit and 3) psychological dependence. It discusses approaches to stopping and physiological effects of smoking. The withdrawal symptom section of Session II was discussed at Session I in this
program since participants were asked to make the day after Session I their target quit smoking day.

Session II focuses on progressive relaxation training including a therapist-led demonstration, assertiveness and constructive thinking.

Session III asks subjects to identify and master all obstacles to staying off cigarettes. It follows with a discussion of weight management, alcohol and interpersonal support.

Session IV asks participants to name any physical improvements they have experienced, describe main pitfalls and discuss the long-term benefits of staying smoke-free.

Selection of Subjects

Sixty adult cigarette smokers from a midwestern community were recruited from approximately 200 respondents via an advertisement in the Sunday edition of the local newspaper. Selection criteria included (1) being at least 19 years of age, (2) expressing a sincere desire to quit smoking, (3) using no other forms of tobacco or nicotine and (4) having no other smoking household members.

Participants were self-selected by their interest in a smoking cessation advertisement. All 200 respondents to the newspaper advertisement left their name and phone number on an answering machine. Respondents were called and given a general description of the program and selection criteria over the telephone. Each subject was asked if they had a
diagnosis of COPD/chronic bronchitis or if they have had a
cough productive of mucous on most days of the week for at
least three months of the year for the last two years
(American Thoracic Society's definition of chronic
bronchitis--U.S. Department of Health and Human Services,
Smoking and Health, 1987). Respondents were told that this
study was designed to look at the effectiveness of three
smoking cessation treatment methods 1) individual therapy 2)
group therapy and 3) self-help therapy in smokers who have a
productive cough and those who do not. They were told the
study will involve five visits over four weeks and carried
no financial obligations.

Respondents who were eligible and willing to
participate were divided into two groups: smokers without a
productive cough (normal smokers group) and smokers with a
productive cough (COPD group). Therefore, the sample of
smokers was stratified based on symptoms and subjects were
randomly assigned to treatment groups by stratum. Thirty
subjects were randomly selected from each group by simple
random sampling and scheduled for their first visit.

Procedure

At the first visit, subjects were instructed to read
and sign two IRB-approved consent forms and keep one for
themselves. Subjects were told that all records will remain
confidential. They also completed the Demographic Pulmonary
Assessment Profile, the Fagerstrom tobacco dependency
questionnaire and the Confidence self-efficacy questionnaire. In addition, subjects were asked to report a daily baseline number of cigarettes smoked and the duration of their productive cough. All subjects were asked to provide a sample of exhaled air to confirm that they were a smoker. Group assignments were made by having the subject randomly pick a slip of paper (one slip each for Individual, Group and Self-help) out of a bag which named which therapy the subject would get. Subjects were reminded that the therapist had no control over which therapy was chosen. Subjects were told if they were unsuccessful at their quit smoking attempt, they may try one of the other groups after four weeks. Regardless of which group was chosen, everyone received the American Cancer Society's Participants' manual and also Session I at the first visit. Initial intake meetings were with one to two subjects. Subjects were also instructed how to self-monitor their smoking and withdrawal symptoms using diary cards. Subjects were asked to target the next day as their quit smoking day and attempt to quit entirely. All subjects were given a beeper number to reach the therapist at anytime day or night for the entire four weeks. Subjects were encouraged to call the therapist if they had a severe craving for a cigarette or for any reason.

Individual Therapy

Twenty subjects (10 normal smokers and 10 smokers with COPD) who chose individual therapy met with the therapist
individually at weekly intervals for thirty minutes over the four week period. At each visit, the diary for the previous week was reviewed and new information from the next session in the FreshStart Manual was discussed. A sample of exhaled air was obtained for a carbon monoxide level and a new diary card was given for the next week.

**Group Therapy**

Twenty subjects (10 normal smokers and 10 with COPD) who chose group therapy met with the therapist in groups of four to six subjects at weekly intervals for one hour for the four week period. As with the individual treatment, at each visit, the diary for the previous week was reviewed and new information from the next session in the FreshStart manual was discussed. A sample of exhaled air was obtained for a carbon monoxide level and a new diary card was given for the next week.

**Self-help Therapy**

Twenty subjects (10 normal smokers and 10 with COPD) who chose self-help therapy received the American Cancer Society's FreshStart manual and Session I. The therapist asked each self-help subject to work through the remaining sessions on their own. They were scheduled for their next visit in four weeks and were given a reminder call the third week. Other than being able to contact the therapist at any time, the subjects did not have any organized sessions during the four-week program. At the final visit, subjects
returned their diary cards for the last four weeks, reported their experiences and were asked to provide a sample of exhaled air to assess carbon monoxide levels. Subjects who did not return for their final visit were called and asked if they had quit smoking, how many cigarettes they were smoking a day, and asked to return for an exhaled carbon monoxide level.

Measures

Self-monitored Diary Card

Orleans and Shipley (1982) and Petitti, Friedman, and Kahn (1981) suggest that self-report has been recommended as the single most valid measure of smoking. The development of self-monitoring habits in a smoking program may facilitate the practice of other helpful behaviors learned during treatment. Self-monitoring may present the clearest form of continuous disruption of the smoking routine (Kamarck & Lichtenstein, 1988). This disruption may bolster awareness of smoking cues and confidence in one's ability to control the smoking habit. Pomerleau et al. (1978) found that smoking abstinence at the end of an eight-session multicomponent treatment program was associated with a larger number of completed self-monitoring forms during the program.

Subjects monitored number of cigarettes smoked and withdrawal symptoms on a daily basis throughout the four-week treatment program. Withdrawal symptoms were rated
time since smoking the last cigarette influence CO levels. Carbon Monoxide is eliminated primarily by the respiratory system; elimination half-life varies from 2 to 5 hours. False negative tests for cigarette smoking can occur if the subject has abstained from smoking for approximately eight hours or more prior to the test. False positive tests for cigarette smoking can occur in subjects who smoke marijuana, hashish, pipes or cigars. Exposure to cigarette smokers (i.e., "second hand smoke") can also produce a false positive test but is probably rare. (U.S. Environmental Protection Agency, 1979).

End-expired air CO was measured using a portable, hand-held, battery operated instrument. Breath samples were analyzed pre-test and post-test using a Vitalograph Mini-CO. Following the existing procedure manual, the Vitalograph Mini-CO was calibrated weekly by the therapist during the treatment period using CO monitor calibration gas. The calibration gas contains 50 parts per million (ppm) of compressed carbon monoxide. An accurate calibration check should read 50 ±5 ppm within one minute.

All carbon monoxide assessments were taken in the late afternoon or evening hours. Subjects were instructed to inhale deeply, hold their breath for 20 seconds and produce a full-forced expiration through a disposable sterile mouthpiece. Readings were recorded on the digital display area of the monitor in parts per million of carbon monoxide.
on a scale of 0=none (absent), 1=slight, 2=mild, 3=moderate, 4=severe. Withdrawal symptoms included craving for nicotine, irritability, frustration, anger, anxiety, difficulty concentrating and restlessness. Withdrawal symptoms and number of cigarettes smoked were summed and averaged across 1-week intervals to provide two measures: 1) average number of cigarettes smoked per day and 2) mean intensity of withdrawal symptoms. See Appendix D for diary card.

**Carbon Monoxide Levels**

An objective physiological index of recent cigarette smoking was obtained by determining the concentration of carbon monoxide (CO) in expired breath samples. Daughton et al. (1980), suggests that carbon monoxide is one of the most easily understood dangers for smokers and CO intake may represent a more immediate risk, one that can be confirmed by feedback with a monitoring device.

Approximately 10 to 20 ml of carbon monoxide is inhaled with each cigarette smoked. The CO diffuses across alveolar membranes and once absorbed, is bound to hemoglobin. Carboxyhemoglobin in the blood is in equilibrium with alveolar air after breath-holding. Therefore, the amount of CO in expired air provides a rapid and accurate non-invasive measure of carboxyhemoglobin.

The major limitation of using CO as a measure of smoking behavior is that the time of day and the length of
within one minute. A typical non-smoker would produce a carbon monoxide recording of less than 8 ppm (corrected for ambient carbon monoxide). Smokers range slightly greater than 10 ppm in a non-inhaler to well over 75 ppm in heavy smokers. A carbon monoxide reading of 8 or greater (corrected for ambient CO) will categorize the subject as a smoker. This objective measurement corroborated patient reports of smoking cessation.

Demographic Pulmonary Assessment Questionnaire

The demographic questionnaire asks age, sex, duration of smoking, questions regarding a productive cough and categorical information on the number of packs smoked per day. In addition, the investigator asked the subjects for the actual number of cigarettes smoked and the duration of their chronic, productive cough if they reported having one. The latter information was important in dividing subjects into groups based on the American Thoracic Society's definition of chronic bronchitis. Subjects must have had a chronic, productive cough for at least two years to be in the COPD group. This information was not included on the questionnaire. Pack-year history was obtained by using the categorical information on the questionnaire and multiplying by the total number of years smoked. See Appendix E for the Demographic Pulmonary Assessment Questionnaire.
Fagerstrom Tobacco Dependency Questionnaire

Fagerstrom (1978) developed an 8-item questionnaire aimed at estimating physical dependence on nicotine. The items cover various aspects of smoking behavior (number of cigarettes smoked per day, brand smoked, time of day smoking occurs, ability to control smoking in no-smoking areas and so on). Consistent and significant correlations from these indicators to the questionnaire (intended to measure physical dependence) have been established (Fagerstrom, 1984). The higher the score on the dependence questionnaire, the higher the dependency. The range of scores of the questionnaire is from 0-11 with 0-6 considered low dependency scores and 7-11 as high-dependency scores (Fagerstrom, 1984).

The Fagerstrom nicotine dependence scale enables patients to acknowledge their degree of dependence and to increase their general awareness of the dependency (addiction) concept and perhaps justify dependency as a cause of past quitting failures. See Appendix F and G for the Fagerstrom Tobacco Dependency Questionnaire and instructions for scoring.

Confidence Self-efficacy Questionnaire

Barrios and Niehaus (1985) showed that successful quitters reported higher self-efficacy ratings than unsuccessful quitters. This provides some validation for
the Confidence questionnaire as a screening device and as a rough predictor of likelihood of success in treatments.

The Confidence Questionnaire is designed to assess the magnitude, strength and generality of self-efficacy expectations in smoking situations. A modified version of the questionnaire used by Condiotte and Lichtenstein (1981) will be employed in this study. Yates and Thain (1985) used the modified version to look at self-efficacy as a predictor of relapse following smoking cessation. The two items with the largest loadings on each of the seven clusters identified in a cluster analysis by Condiotte and Lichtenstein (1981) were used to construct the 15-item questionnaire (Yates, 1985). The items contain situations incorporating both intrapersonal and interpersonal mood states.

Subjects will be instructed to designate on a 100-point probability scale (expressed in percentage units), ranging in 10 interval units, the probability that they would resist the urge to smoke in that situation. To provide an index of self-efficacy strength, the magnitude of expectancy scores across situations will be added and divided by the total number of items. Alpha reliabilities range from .69 (interpersonal negative mood states) to .94 (intrapersonal negative mood states) (Baer and Holt, 1986). Examination of the psychometric properties of the Confidence questionnaire suggest it is highly reliable and primarily unidimensional.
See Appendix H for the Confidence Self-efficacy Questionnaire.
CHAPTER FOUR

RESULTS

This study compared the effectiveness of three smoking cessation treatment methods in two groups of smokers--normal smokers and smokers with COPD in an attempt to find the best "person-intervention-fit." As previously stated, the hypotheses for this study were derived from an extensive literature review. This review revealed evidence implicating tobacco dependency and self-efficacy as major determinants and supported the need for individualizing smoking cessation therapy.

Cigarette smokers who answered a newspaper advertisement for a smoking cessation study were divided into two groups based on the presence or absence of a productive cough. Thirty smokers from each group were chosen by simple random sampling for a total of 60 subjects. Subjects were further randomized into one of three treatments: 1) Individual 2) Group or 3) Self-Help therapy. Ten subjects each from the normal smokers group and COPD group comprised the number in each treatment.

Population Description (N=60)

Twenty (33.3%) males and forty (66.7%) females participated in the study. As one group, the subjects averaged 39.667 (SD=11.515) years of age, reported a mean smoking rate of 24.3 (SD=9.487) cigarettes per day at baseline, had smoked an average of 21.917 (SD=11.053) years
and had a mean pack year history of 29.367 (SD=19.300). The
60 subjects had a mean Fagerstrom tobacco dependency score
of 6.667 (SD=1.838) and a mean self-efficacy score of 51.217
(SD=16.617).

Description by Group (n=30)

Descriptive data for the two groups: normal smokers and
COPD (n=30 in each group) is shown in Table 4.1.

Table 4.1

Means and Standard Deviations by Group for Age, Duration of
Smoking, Pack-years, Tobacco Dependency and Self-efficacy

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
<td>35.667</td>
<td>10.479</td>
</tr>
<tr>
<td>Years Smoked</td>
<td>17.500</td>
<td>9.909</td>
</tr>
<tr>
<td>Pack-Year</td>
<td>20.967</td>
<td>11.775</td>
</tr>
<tr>
<td>Tobacco Dependency</td>
<td>6.400</td>
<td>1.714</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>55.467</td>
<td>14.438</td>
</tr>
</tbody>
</table>

The thirty subjects in the normal smokers group, 9
males (30%) and 21 females (70%) averaged 35.667 (SD=10.479)
years of age, reported a mean smoking rate of 24.833
(SD=8.494) cigarettes per day at baseline, had smoked for an
average of 17.500 (SD=9.909) years and had a mean pack-year
history of 20.967 (SD=11.775). The mean Fagerstrom score
was 6.400 (SD=1.714) and mean self-efficacy score was 55.467
(SD=14.438). The thirty subjects in the COPD group
11 males (36.7%) and 19 females (63.3%) averaged 43.667 (SD=11.263) years of age, reported a mean smoking rate of 28.333 (SD=10.565) cigarettes per day at baseline, had smoked an average of 26.333 (SD=10.489) years and had a mean pack-year history of 37.767 (SD=10.489). The mean Fagerstrom score was 6.933 (SD=1.964) and mean self-efficacy score was 46.967 (SD=17.775).

As shown in Table 4.1, the majority of the means in the COPD group are higher with the exception of the self-efficacy scores. The lower self-efficacy means indicate that the COPD group had lower self-efficacy than their normal smoker counterparts.

**Description by Treatment (n=20)**

Descriptive data for the three treatments: individual, group and self-help therapy (n=20 in each treatment) is shown in Table 4.2. Descriptively, it is interesting to note that the three treatment groups look very similar.
Table 4.2

Means and Standard Deviations by Treatment for Age, Duration of Smoking, Pack-Years, Tobacco Dependency and Self-efficacy

<table>
<thead>
<tr>
<th></th>
<th>Individual</th>
<th>Group</th>
<th>Self-Help</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Age</td>
<td>40.100</td>
<td>12.953</td>
<td>41.050</td>
</tr>
<tr>
<td>Pack-Years</td>
<td>31.400</td>
<td>20.582</td>
<td>27.650</td>
</tr>
<tr>
<td>Tobacco Depen</td>
<td>6.050</td>
<td>1.820</td>
<td>6.350</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>54.900</td>
<td>19.200</td>
<td>53.850</td>
</tr>
</tbody>
</table>

Analyses of Research Hypotheses

The hypotheses were analyzed by conducting tests for homogeneity of regression, discriminant analyses and Chi-Square using the SPSSX program package. Further analyses using a 3-way, univariate, analysis of variance with repeated measures and its simple effects were conducted by using the BMDP program package.

Classification of a Non-smoker

Subjects were counted as non-smokers if they did not smoke during the last seven days of the study. The carbon monoxide cutting score for classifying smokers was set at 8 parts per million (ppm), which is somewhat restrictive given Lando's (1975) finding that non-smokers can produce reading between 5 and 11 ppm. The carbon monoxide measure was used as the final standard if indicators seemed discrepant among
reported non-smokers. Evidence of a smoking episode during the last seven days resulted in the subject's classification as a smoker.

**Hypotheses 1:**

There will be no significant difference ($p < .05$) in pre/post mean exhaled carbon monoxide levels between treatment groups when therapy (individual vs group vs self-help) is manipulated in smokers with and without COPD.

A test for homogeneity of regression using Fagerstrom tobacco dependency scores and Confidence self-efficacy scores was performed. Using a Wilk's lambda test, a significance level of .067 was reached which did not exceed the standard score of .10 for homogeneity of regression. Therefore, violation of homogeneity of regression occurred which was prohibitive for using these values as covariates.

A split-plot analysis of variance for repeated measures using carbon monoxide levels was performed. The summary of the factorial analysis is shown in Table 4.3. As seen in this table, time was the only main effect that was found to be significant at $p = .01$. Thus, there was a statistically significant reduction in carbon monoxide levels pre-treatment to post-treatment. A two-way Time x Treatment effect was significant at $p = .05$. The remaining two-way interactions (Time x Group and Group x Treatment) were not significant. There was no three-way interaction effect. When comparing pre and post carbon monoxide levels, grouping effects were not found to be significant.
Table 4.3

Split Plot Analysis of Variance for Repeated Measures Using Pre and Post Carbon Monoxide levels.

<table>
<thead>
<tr>
<th>Effect</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1,54</td>
<td>44.40833</td>
<td>44.40833</td>
<td>0.46</td>
<td>0.4993</td>
</tr>
<tr>
<td>Treatment</td>
<td>2,54</td>
<td>85.01667</td>
<td>42.50833</td>
<td>0.44</td>
<td>0.6445</td>
</tr>
<tr>
<td>Time</td>
<td>1,54</td>
<td>2332.00833</td>
<td>2332.00833</td>
<td>31.34</td>
<td>0.0000*</td>
</tr>
<tr>
<td>Time x Treatment</td>
<td>2,54</td>
<td>503.11667</td>
<td>251.55833</td>
<td>3.38</td>
<td>0.0414**</td>
</tr>
<tr>
<td>Group x Treatment</td>
<td>2,54</td>
<td>217.81667</td>
<td>108.90833</td>
<td>1.13</td>
<td>0.3291</td>
</tr>
<tr>
<td>Time x Group</td>
<td>1,54</td>
<td>165.67500</td>
<td>165.67500</td>
<td>2.23</td>
<td>0.1415</td>
</tr>
<tr>
<td>Time x Group x Treatment</td>
<td>2,54</td>
<td>43.850000</td>
<td>21.925000</td>
<td>0.29</td>
<td>0.7460</td>
</tr>
</tbody>
</table>

*Indicates statistical significance at p=.01 level.
**Indicates statistical significance at p=.05 level.

Post-hoc analyses were conducted to investigate the Time x Treatment interaction effect. Table 4.4 shows the means and standard deviations of pre-test and post-test carbon monoxide levels by treatment.
Table 4.4
Means, Standard Deviations and Significance Levels of Pre-test and Post-test Carbon Monoxide (CO) Levels by Treatment.

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Individual***</th>
<th>Group****</th>
<th>Self-Help*****</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
</tbody>
</table>

*With 2,54 degrees of freedom, the F statistic was 0.65 and p=0.5280.
**With 2,54 degrees of freedom, the F statistic was 3.08 and p=0.0540.
***With 1,54 degrees of freedom, the F statistic was 12.78 and p=0.0007.
****With 1,54 degrees of freedom, the F statistic was 23.77 and p=0.0000.
*****With 1,54 degrees of freedom, the F statistic was 1.55 and p=0.2180.

An investigation of the simple effects was performed when holding time constant and looking across treatment. The probability level for mean pre-test carbon monoxide scores was 0.5280 and for mean post-test carbon monoxide scores was .0540. While this test did not reach statistical significance at p=.05, it appears that there was a major difference between carbon monoxide values across all treatments pre-test to post-test. Further analysis investigated the simple effects when holding treatment constant and looking across time. Individual and Group therapy showed significantly different pre to post carbon monoxide levels than Self-help therapy. The change in CO
levels pre-to post-treatment for Group and Individual therapy was more substantial whereas there was no apparent change in Self-help therapy. In this study, these two treatments (Individual and Group) appeared to be more effective than Self-help therapy. However, further differentiation between these two significant treatments is not possible. As seen in Table 4.4, the largest reduction in CO levels took place in the Group therapy, followed by Individual and then Self-help therapy.

**Hypothesis 2:**

There will be no significant difference (p<.05) in pre/post mean number of daily cigarettes smoked between treatment groups when therapy (individual vs group vs self-help) is manipulated in smokers with and without COPD.

A split-plot analysis of variance for repeated measures using number of cigarettes smoked was performed. Table 4.5 shows a summary of the factorial analysis. Time was a significant main effect at p=.01. Group main effect was also significant at p=.05. Treatment effect was not significant. There were no interaction effects.
Table 4.5

Split-Plot Analysis of Variance for Repeated Measures Using Pre and Post Number of Cigarettes Smoked.

<table>
<thead>
<tr>
<th>Effect</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1,54</td>
<td>725.208333</td>
<td>725.208333</td>
<td>6.15</td>
<td>0.0163**</td>
</tr>
<tr>
<td>Treatment</td>
<td>2,54</td>
<td>529.06667</td>
<td>264.533333</td>
<td>2.24</td>
<td>0.1161</td>
</tr>
<tr>
<td>Time</td>
<td>1,54</td>
<td>6735.008333</td>
<td>6735.008333</td>
<td>100.92</td>
<td>0.0000*</td>
</tr>
<tr>
<td>Time x Treatment</td>
<td>2,54</td>
<td>148.06667</td>
<td>74.033333</td>
<td>1.11</td>
<td>0.3372</td>
</tr>
<tr>
<td>Group x Treatment</td>
<td>2,54</td>
<td>523.466667</td>
<td>261.733333</td>
<td>2.22</td>
<td>0.1187</td>
</tr>
<tr>
<td>Time x Group</td>
<td>1,54</td>
<td>60.20833</td>
<td>60.20833</td>
<td>0.90</td>
<td>0.3464</td>
</tr>
<tr>
<td>Time x Group x Treatment</td>
<td>2,54</td>
<td>0.466667</td>
<td>0.233333</td>
<td>0.00</td>
<td>0.9965</td>
</tr>
</tbody>
</table>

*Indicates statistical significance at p=.01.
**Indicates statistical significance at p=.05.

Table 4.6 shows the means and standard deviations of the number of cigarettes smoked at baseline and after treatment. All 60 participants in this study were clearly able to reduce the number of cigarettes smoked.

Table 4.6

Means and Standard Deviations of Pre/Post Number of Cigarettes Smoked.

<table>
<thead>
<tr>
<th>Time</th>
<th>Pre (N=60)</th>
<th>Post (N=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Number of Cigarettes Smoked</td>
<td>26.583</td>
<td>9.666</td>
</tr>
</tbody>
</table>
Table 4.7 shows the means and standard deviations for pre/post number of cigarettes smoked by Group. Normal smokers were able to reduce their cigarette number by slightly more than smokers with COPD. Also seen in Table 4.7, smokers with COPD smoked more than normal smokers.

Table 4.7

Means and Standard Deviations for Pre/Post Number of Cigarettes Smoked by Group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Normal Smokers (n=30)</th>
<th>COPD (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Pre number of cigarettes</td>
<td>24.833</td>
<td>8.494</td>
</tr>
<tr>
<td>smoked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post number of cigarettes</td>
<td>8.433</td>
<td>8.585</td>
</tr>
<tr>
<td>smoked</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 3:

There will be no difference in the frequency of success between groups when therapy is manipulated.

Using a Chi-Square statistic for normal smokers and COPD, it was found that in neither group was there a significant relationship between treatment and smoking cessation outcome over chance. Table 4.8 and 4.9 show the frequencies and percentage quit rates by Treatment for the two groups. In the normal smokers group, 26.7% of the subjects successfully quit smoking, whereas, 20% of the COPD group were able to quit.
Table 4.8

**Frequency Distribution of Smoking Cessation Outcome by Treatment for the Normal Smokers Group.**

<table>
<thead>
<tr>
<th></th>
<th>Non-smokers</th>
<th>Smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual (n=10)</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Group (n=10)</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Self-help (n=10)</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td><strong>TOTAL (n=30)</strong></td>
<td>8 (26.7%)</td>
<td>22 (73.3%)</td>
</tr>
</tbody>
</table>

Table 4.9

**Frequency Distribution of Smoking Cessation Outcome by Treatment for the COPD Group.**

<table>
<thead>
<tr>
<th></th>
<th>Non-smokers</th>
<th>Smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual (n=10)</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Group (n=10)</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Self-help (n=10)</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td><strong>TOTAL (n=30)</strong></td>
<td>6 (20%)</td>
<td>24 (80%)</td>
</tr>
</tbody>
</table>

**Hypothesis 4:**

There will be no relationship between demographic variables and smoking cessation outcome between groups.

**Hypothesis 5:**

There will be no relationship between tobacco dependency and smoking cessation outcome between groups.
Hypothesis 6:

There will be no relationship between self-efficacy and smoking cessation outcome between groups.

Hypotheses 4, 5, and 6 were tested using a discriminant analysis. The analysis showed that no combination of overall self-efficacy scores, tobacco dependency scores, duration of smoking, pack-year history and pre-study baseline smoking rate could differentiate those who would quit smoking from those who would not. (With 5 degrees of freedom, Wilk's lambda was .856 and p=.1249). The percent of grouped cases correctly classified as a smoker using these variables was 69.6%. The percent of grouped cases correctly classified as non-smoker was 71.4%. See Appendix I for means and standard deviations of self-efficacy and tobacco dependency by group.

Hypothesis 7:

There will be no relationship between smoking cessation withdrawal symptoms and outcome between groups.

A discriminant analysis for comparisons among normal smokers and COPD were performed on seven smoking cessation withdrawal symptoms: 1) nicotine craving, 2) irritability, 3) frustration 4) anger, 5) anxiety, 6) difficulty concentrating and 7) restlessness. The discriminant analysis showed that only two variables (anxiety and restlessness) in combination could predict smoking cessation outcome at the p=.05 level, (p=.0279). When comparing the two groups, smokers with COPD had higher anxiety (2.067 ±
1.163 vs 0.889 ±0.832) and higher restlessness (2.533 ± 0.990 vs 1.000 ± 0.970) than non-smokers during the program. See Appendix J for means and standard deviations of the withdrawal symptoms by group.

Attrition

In this study, attrition was a major influencing factor. While all post-test carbon monoxide measures were obtained either at the time of discontinuation or at the completion of the study, it is interesting to note the attrition rate in Table 4.10.

Table 4.10

A Comparison of Weekly Attrition Rates Between Normal Smokers, COPD and Individual, Group Therapy.

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>(n=30)</th>
<th>(n=30)</th>
<th>(n=20)</th>
<th>(n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Smokers</td>
<td>COPD</td>
<td>10.0%</td>
<td>23.3%</td>
<td>10.0%</td>
<td>40.0%</td>
</tr>
<tr>
<td>COPD</td>
<td>Individual</td>
<td>6.7%</td>
<td>6.7%</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Individual</td>
<td>Group</td>
<td>16.7%</td>
<td>10.0%</td>
<td>40.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>33.4%</td>
<td>40.0%</td>
<td>60.0%</td>
<td>50.0%</td>
</tr>
</tbody>
</table>

Table 4.10 shows the weekly attrition rates by group and by treatment respectively. While the comparison of total attrition percentages in the table appear to be similar, it is interesting to note the large dropout rate at Visit 2 in both the COPD group and Group treatment. Thus,
Group therapy experienced a large initial drop in membership. In this study, smokers with COPD and members of Group therapy were most likely to discontinue early.
CHAPTER FIVE
DISCUSSION AND SUMMARY

Summary

The present study randomly assigned normal smokers and smokers with COPD to one of three smoking cessation treatments. The following is a discussion and summary of the findings:

This study showed significant mean decreases in both the number of cigarettes smoked and carbon monoxide levels for all subjects in the program. Twenty-seven percent (8/30) of the subjects in the normal smokers group successfully quit smoking. In contrast, 20% (6/30) in the COPD group were able to quit. These results are consistent with current nonpharmacological smoking cessation programs.

The assumption of the investigator that there would be a difference between normal smokers and smokers with COPD was not supported. The two groups had roughly the same quit rates, however in number of cigarettes smoked, there was a significant group difference pre-test to post-test. Normal smokers were able to reduce the number of cigarettes smoked more noticeably than the COPD group. Based on the understanding of the review of the literature, a larger effect was expected. This chapter focuses on some possible explanations that could explain these results.

In discussing program evaluation, Green (1980) talks about sleeper effects. He suggests that health educators
often do not put enough effort into health education programs. If it is lifestyle change that we're after, health education programs may get the process started but because measurements may be poor or infrequent, we don't realize the trend is going on and we only measure it at a couple points in time. Even though an effect is not established at the end of the program, indeed it may happen later on. Too frequently, we pull out before we can actually see what has happened.

There are two ways to explain the results of this study: 1) It is possible that there was an effect but it was not capable of being measured based on: the right instrument was not used, the effect was not measured with enough precision, the effect was not measured often enough or over a long enough period of time. The other explanation is 2) there was not an effect, given the situation, given the subjects, in that environment with that intervention that there was not a difference between those conditions. 

Discussion of Group Effects

It was disappointing that none of the demographic variables, tobacco dependency scores or self-efficacy scores were able to predict smoking cessation outcome, within the groups. With such small samples, a few extreme scores could have skewed the results. It is possible that if a larger sample would have been used that a greater group relationship may have been established. For this study,
however, the two groups (normal smokers and COPD) were largely the same. While the mean values for each variable were generally higher for the COPD patient, both groups smoked about the same number of cigarettes at baseline, had about the same pack-year history and duration of smoking and had about the same pre-study carbon monoxide levels. The only difference between these two groups was the subjective claim of a chronic, productive cough at least for two years in the COPD group. It is apparent from the data that all 60 subjects were more homogeneous than the investigator had planned. A more heterogeneous group with a wider variety of smokers may have provided for a better expression of the group effect. This finding also colors the effect of the type of smokers in each treatment group. Group therapy had a large initial dropout rate, probably due to the homogeneity of the group.

The investigator believes that there were differences among the two groups but that they were not measured. Instead these differences were based on personal observation. If we look at number of self-reported cigarettes smoked and carbon monoxide readings, it is surprising that these values are somewhat identical—which would tend to support that self-report and physiological functions will come out fairly close together. Therefore, if people are giving a voluntary definition of a COPD patient based on a chronic cough, then we best accept it.
But to say that the subjects who have symptomatic complaints are the same as a group of people who don't profess to have a chronic cough is ridiculous. A possible way to create larger differences between groups, was to have included spirometrical criteria for eligibility criteria so as to further define COPD patients with loss of lung function. For some reason, these groups looked a great deal alike, but one of them was obviously different because they were reporting that they were coughing all the time and the other group was not.

The overall attrition rate was 37% in this smoking cessation program, however both normal smokers and COPD had approximately the same percentages. Some smoking cessation programs in the literature use a commitment fee or a deposit to increase program adherence. This research did not use this strategy, although if used, it may have had an effect on the attrition rate and should be considered for future studies. Given that cigarette smoking is a highly refractory behavior, the attrition rate is not surprising. As the program evolved, though, it was fascinating to watch the drop-out rate and listen to the various reasons for discontinuing the program. This was especially interesting in the COPD group where 40% of the participants discontinued by Visit 2. This high early attrition rate in this group could be due to the fact that these smokers are more highly
addicted, smoked for a longer number of years and had more previous smoking cessation attempts.

We should remember that the smokers in the COPD group were experienced. After a number of attempts at quitting, they could tell within the first week if this attempt was going to be successful. All of those participants who dropped out at Visit 2 had already gone back to smoking. Perhaps the environment was not right for them to quit smoking at this time. This could be explained in terms of Bandura's outcome expectation. Most smokers will say that they can quit if given the right circumstances. Once they get into a program and begin believing that, for various reasons, the time is not right for them to quit, damage to their outcome expectations may already occur. In this scenario, self-efficacy expectations may not be as important as outcome expectations which can change just as rapidly as self-efficacy.

The major reasons for discontinuation was the fear of talking about smoking within a group situation. This did not seem to be a major factor with the participants in individual therapy. Perhaps this is an example of the way illness behavior influenced this study. For example, perhaps patients with COPD have a narrow range within which they can tolerate anxiety, and these patients may be unable to tolerate the emotional stress caused by group discussions. However, these patients may be able to
tolerate carefully managed individual counselling. Patients with COPD who have socially isolated themselves in response to their illness may be extremely uncomfortable in talking about their smoking cessation efforts (Dudley et al. 1985). The social unease and stiffness that accompanies getting acquainted, not knowing what to expect, feeling a great deal of anxiety is an undue source of tension in these patients. Since both normal smokers and smokers with COPD were members of the same group and expected to interact together, it could be that subjects labelled as COPD and thrown into a group of asymptomatic smokers were thinking, "They don't know what it is like to be like me." If we think about group anxiety and COPD in terms of the Health Belief Model and its relation to chronic illness (Kasl, 1974), no amount of susceptibility, seriousness or perceived benefits may be able to overcome these barriers to achieve behavior change.

Group dynamics are an integral part of any group smoking cessation therapy. Understanding group behavior in secondary groups (groups that are task-oriented) is necessary for promoting cohesiveness within the group. Cohesiveness refers to how strongly members want to remain a part of the group and comply with group norms (Bormann, 1975). Researchers have shown that groups high in cohesiveness have greater rates of interaction and have less attrition (Brilhart, 1986). For this reason, smoking cessation within primary groups, such as work groups and
families are thought to be more effective than participants who are unfamiliar to each other.

Discussion of Measures

The Confidence Self-efficacy questionnaire and the Fagerstrom Tobacco Dependence questionnaire demonstrated no predictive validity. In this study, tobacco dependency and self-efficacy scores were not predictive of outcome. Due to the high standard deviations of these values, it appeared that these measures had little more than face validity.

With regard to the self-efficacy effect, implications for medical management are that the health care professional should have some means of interpreting how a patient perceives himself/herself to optimize behavior changes. For example, if the subject had low self-efficacy scores, then the health care professional must look for ways to improve the subjects' self-efficacy before beginning a smoking cessation program. Self-efficacy training is a tremendous opportunity for health educators. Without self-efficacy training, we may be setting smokers up for failure because we have not prepared them well.

Discussion of Health Effects

Many patients who did not give up cigarettes completely reported substantial reductions in the amount smoked. Time effects for both mean carbon monoxide levels and mean number of cigarettes smoked were seen indicating significant reduction pre-test to post-test. From the perspective of
preventive medicine, reductions of this magnitude may represent significant levels of impact in the health of all patients (Windsor et al. 1980). Statistical significance and practical significance are not always the same thing.

One issue is that getting smokers to reduce the amount that they smoke may not all be beneficial to their health, but it is beneficial if they are serious about it as being a step in the process of quitting. If we can get their addiction levels down to the point where there are not a lot of physiological problems along with the psychological problems of quitting, then a stepwise approach is clearly worth investigating. Almost all of the self-help books discuss the various strategies for quitting. These strategies include cold turkey and also two methods of reducing cigarettes as a means to stop. These two methods are 1) tapering and 2) postponing. Tapering simply means cutting down the total number of cigarettes each day until Quit Day and postponing is waiting until a progressively later time each day to have a cigarette until Quit Day.

Let's look at the carbon monoxide (CO) data in terms of clinical significance. It is known that as blood carboxyhemoglobin (COHb) levels increase, health effects become more severe (U.S. Environmental Protection Agency, 1979). Heart and lung functional changes are associated with COHb levels greater than 5%, which corresponds to approximately 27 PPM CO in exhaled air. In the present
study, the group means are well above this level before
treatment and consistently below at the end of treatment and
at follow-up and therefore demonstrates practical
significance. The weekly feedback of CO levels in the
individual and group therapy, which may have provided early
evidence of success, was commented on as being helpful by
the members of the individual and group therapy.

It was observed that several of the subjects reported
having lost or misplaced some of the diary cards. There
were no discrepancies between self-reported number of
cigarettes smoked and carbon monoxide levels. Therefore,
self-report on the diary cards are assumed to be reasonably
valid indicators of actual behavior in this sample.

The fact that individual and group therapy were
significant over self-help therapy justifies the expense of
inputs into an intensive smoking cessation program. Staff
time, resources and training materials can be significant
items of expense in any program. In this study, it was
shown that such an expense was worthwhile in being able to
change smoking behavior.

This study employed smokers that were voluntarily
asking to become quitters. Even the self-help treatment
group showed some success, although not much. However,
self-help interventions may still be justified on a
cost-effective basis for some smokers (Glasgow et al. 1981).
It is true that the Self-help group did not do as well as
Individual or Group therapy, but we should not expect much success given that it is an inexpensive treatment. However, smoking is an important and expensive health problem. Even small steps toward solving the problem can be beneficial. From this standpoint, one might begin with a self-administered program, and follow with a more complex, multicomponent behavior therapy program administered by a therapist.

Limitations of the Study

These results must be seen as specific for this population and interpreted with caution. Limitations include the small number of subjects, lack of control and the absence of even longer follow-up data. Although the present study was useful in recruiting participants, attrition rates are high and outcome modest. The cell sizes were quite small and thus the reader is cautioned about overgeneralizing from the results.

This study shares limitations with other evaluations of smoking cessation programs. To study users of a program effectively, experimental contact should have been provided beyond the program alone (6 week, 2 months, 3 months, 6 months, 1 year). Follow-up was not included in this study.

As much as one can control for nuisance variables, no experimental treatment is exactly alike for every subject in a particular condition. Environmental changes such as temperature, noise level, interruptions and inconsistent
performance of the smoking cessation therapist are all possible variables that may have affected this study. All attempts were made to control as many confounding variables as possible. Under normal conditions, it was expected that extraneous variables would operate equally.

One of the largest threats to internal validity in this study was experimental mortality. Every effort made to emphasize the importance of continuing all sessions in an attempt to reduce attrition. Subjects were encouraged to continue therapy sessions even if they had smoked with the hope that they would quit yet before all sessions were completed. If subjects did not return for their post-test carbon monoxide levels, the post-test number of cigarettes smoked was obtained by self-report, either verbally or by diary. For those subjects who did drop out of therapy, the number, type of group the subject was in and the reason for discontinuation were all recorded.

The investigation was limited only to twenty subjects in each treatment group and ten in each cell because of lack of funding and personnel. However, this sample was believed to be large enough from which to draw conclusions, or at best, trends.

All therapy sessions were conducted by the principal investigator so that inter-investigator training for smoking cessation therapy was not needed. In addition, the investigator attempted to refrain from displaying any study
expectancies. The American Cancer Society's FreshStart Facilitator's Guide was used as the investigator's manual to ensure uniform counseling. Of the measures of the dependent variable, only number of cigarettes smoked since Quit Day and withdrawal symptoms were self-reported on the diary cards. Exhaled carbon monoxide is a physiological test of smoking cessation. Therefore, because there was no observational recording of the dependent variable in this study, there was not an opportunity for observer bias to occur.

The investigator was disappointed in the value of the demographic questionnaire. It became evident that important information was not included and the investigator had to ask each and every subject for continuous data on the daily number of baseline cigarettes (the questionnaire asks for categorical data) and the duration of a self-proclaimed productive cough. Retrospectively, interesting information such as number of previous quit smoking attempts could have been obtained and analyzed to see if that might have had an effect on outcome between the two groups.

Other information that could have provided a stronger study would have been to obtain a baseline diary one week before Quit Day to objectively report the daily baseline number of cigarettes smoked rather than pure verbal self-report.
As previously mentioned, other limitations included ethical issues involving the self-help group. Therefore, any of the participants who were still smoking at the end of the study were offered treatment of their choice after the experiment was concluded. This was thought to provide an "internal" replication of the experiment as the self-help group could be compared with itself (before and after receiving the treatment). Unfortunately, none of the subjects asked for alternate forms of therapy. The investigator believes that during the four weeks of the treatment period, subjects were genuinely motivated and tried very diligently to follow program principles. After the program was over, however, it appeared that the stress of remembering not to have a cigarette and the constant struggle with temptation was too much to bear. It didn't seem to be the fact that they didn't want to quit again but just that they needed "a break." Perhaps, their too-recent experience of their attempt to quit smoking and failure damaged their self-efficacy beyond the point of readiness for another program right away. Again, useful data to have collected would have been the total number of attempts at quitting to see if this may have correlated.

Although one might wish to generalize the findings of this study to "all" smokers, strictly speaking we can generalize only from which the sample was drawn. In addition, various personological variables may affect the
generalizability of findings from this experiment--further classification of gender, extroversion-introversion, locus of control and illness behavior as well as many other factors characterizing smokers could have affected the results of this study. This study attempted to control for initial differences by incorporating control factors in the statistical analysis. Self-efficacy and tobacco dependency were tested using homogeneity of regression for their utility as covariates. Homogeneity of regression was not supported. Thus, the two groups were heterogenous with regard to these factors.

One threat to internal validity in this study is the unreliability of the measures (self-efficacy scores and tobacco dependency scores) which were to be used as covariates to control for initial differences between groups. One possible explanation for the lack of homogeneity for these two variables is the tests used to measure tobacco dependency and self-efficacy. A good instrument is one that differentiates between subjects. The usefulness of a questionnaire depends on its responsiveness--that is, its ability to detect clinically important changes, even if the changes are small (Guyatt et al. 1985). Because "construct validity" was unable to be used due to lack of a comparable standard for self-efficacy, "face validity" was relied upon. Better development of self-efficacy measures in the future may provide for more
predictive validity. As for tobacco dependency, past research has indicated that the Fagerstrom Tobacco Dependence questionnaire does have predictive capabilities. In this study, tobacco dependency scores were the closest to significance than any of the other variables used in the discriminate analysis. Therefore, one can probably dismiss the lack of predictive validity for tobacco dependency scores as due to sampling error. The sample may have been too small, there may have been a few erratic scores and the standard deviations were too wide that the tobacco dependency score was unable to predict.

Future Research

Future research should address the types of smokers who are likely to be attracted to alternative, potentially cost-effective approaches. Future research is still needed in developing effective smoking cessation programs for smokers dealing with cigarette-related chronic illnesses. A study using pharmacological therapy such as the Nicorette gum would be beneficial in smokers with COPD. Illness behavior is a complex medical phenomenon. As we develop programs for those already diagnosed with an illness, we need to think about the effect that illness behavior may have on the program. Further characterization of behavior in illness is needed. It may be of value for researchers in smoking cessation to study how group cohesiveness can be fostered. Future research is also needed to understand the
nature of adherence rates in self-administered programs (Glasgow et al. 1981). Clearly, additional research in all these areas are strongly warranted.
January 30, 1990

Mary Mueller, PA-C  
Gary Martin, Ph.D.  
HPER  
UNL

RE: IRB #262-90

TITLE OF PROPOSAL: A Comparison of Smoking Cessation Methods in Normal Smokers and Smokers with Chronic Obstructive Pulmonary Disease

Dear Ms. Mueller and Dr. Martin:

The Institutional Review Board for the Protection of Human Subjects has completed its review of your proposal, including any revised material submitted in response to our request, and has expressed it as their opinion that you have provided adequate safeguards for the rights and welfare of the subjects to be involved in this study and has, therefore, recommended your project for approval. This letter constitutes official notification of the approval and release of your project by our Board, and you are therefore authorized to implement this study accordingly.

We wish to remind you that, under the provisions of the General Assurance from the University of Nebraska to DHHS on the Protection of Human Subjects, the principal investigator or project director is directly responsible for keeping this Board informed of any changes involving risks to the subjects or others. This project is subject to periodic review and surveillance by the Board, and, as part of their surveillance, the Board may request periodic reports of progress and results. For projects which continue beyond one year from the starting date, it is also the responsibility of the principal investigator to initiate a request to the Board for annual review and update of the research project.

Sincerely,

Ernest D. Prentice, Ph.D.  
Executive Secretary, IRB

APPENDIX A
SMOKERS

19 yrs. of age or older needed to participate in a stop smoking study.

For more information call 559-6868

University of Nebraska Medical Center
CONSENT FORM

A COMPARISON OF SMOKING CESSATION METHODS IN NORMAL SMOKERS AND SMOKERS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Invitation To Participate

We invite you to participate in a research study comparing the effectiveness of three smoking cessation treatment methods.

Basis For Subject Selection

You have been selected to participate in this study because you are a cigarette smoker, over 19 years of age, who is ready to stop smoking. No other forms of tobacco or nicotine other than cigarettes will be allowed. There will be 60 participants enrolled in this study.

Purpose Of The Study

The purpose of this study is to compare the effectiveness of three types of smoking cessation methods in different types of smokers.

Explanation Of Procedures

This study will take four weeks to complete. The following are the procedures you will undergo as a subject in this study:

Study Visit 1

You will be randomly assigned (similar to flipping a coin) to one of three treatment groups: 1) individual therapy; 2) group therapy; or, 3) given only the manual and asked to return at the end of the study. Visit 1 will require 30 minutes. To confirm your smoking history, you will be asked to complete some questionnaires and provide a sample of expired air (for assessing carbon monoxide levels). There will be three questionnaires. One questionnaire will give us some basic information about you, your smoking history and your lung status. Another will give us an idea of how dependent you are on nicotine. The last questionnaire describes situations where people frequently smoke.

Subject’s Initials
You will be asked to rate the probability to resist the urge to smoke if the situation arises. Carbon monoxide is found in cigarette smoke. In order to determine whether or not you are a cigarette smoker, you will be asked to hold your breath for 20 seconds then exhale through a mouthpiece into the carbon monoxide machine. At the end of this visit, you will be given a manual to help support your quitting efforts. Your quit-smoking day will be the next day, and you will be asked to quit entirely.

**Study Visit 2-5**

If you are assigned to individual or group therapy, you will be asked to return weekly for four more counselling sessions. Group therapy will take approximately one hour, and individual therapy sessions will take about 30 minutes. You will be given diary cards to keep track of withdrawal symptoms. At each of the remaining visits, we will collect your diary cards, and you will provide us with a sample of expired air to confirm your smoking status. While participating in this study, you must refrain from using any other form or method of smoking cessation. If you were assigned to the self-help treatment method, you will be contacted after four weeks to determine whether or not you are smoking. All subjects who are unsuccessful will be offered an alternate therapy of their choice.

**Potential Risks And Discomforts**

There are side effects associated with quitting smoking. These include headache, sleep disturbance, irritability, anxiety, upset stomach, impaired concentration, frustration, depression and weight gain.

**Potential Benefits**

You may not receive any direct benefit from participating in this study. A potential benefit of participating in this study is the possibility that you may stop smoking. However, we cannot guarantee that the study will enable you to stop smoking. In fact, regardless of the treatment you receive, you will still have to try very hard in order to stop. Your efforts, however, may lead to new methods for treating tobacco dependence.
Alternatives to Participation

Alternative and partially effective ways to treat tobacco addiction already exist. These alternatives, depending upon your physician’s recommendation, may include formalized stop-smoking programs or stopping cold-turkey.

Financial Obligations

There are no financial obligations to you for participating in this study.

Compensation for Participation

There are no economic incentives or extrinsic rewards for participation in this study. It is hoped that a successful attempt at smoking cessation will be its own reward.

Assurance of Confidentiality

Any information obtained during this study which could identify you will be kept strictly confidential. The information obtained in this study may be published in scientific journals or presented at scientific meetings, but your identity will be kept strictly confidential.

Withdrawal from the Study

Participation is voluntary. Your decision whether or not to participate will not affect your present or future relationship at the University of Nebraska. If you decide to participate, you are free to withdraw from this study at any time.

If any new information develops during the course of this study that may affect your willingness to continue participating, you will be informed immediately.

Offer to Answer Questions

If you have any questions, please do not hesitate to ask, and they will be answered at this time. If you think of any additional questions later, please feel free to contact one of the investigators listed below.

Subject’s Initials
If you have any questions concerning your rights as a research subject, you may contact the University of Nebraska Institutional Review Board (IRB), telephone 402/559-6463.

YOU ARE VOLUNTARILY MAKING A DECISION WHETHER OR NOT TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE CERTIFIES THAT YOU HAVE DECIDED TO PARTICIPATE HAVING READ AND UNDERSTOOD THE INFORMATION PRESENTED. YOUR SIGNATURE ALSO CERTIFIES THAT YOU HAVE HAD AN ADEQUATE OPPORTUNITY TO DISCUSS THIS STUDY WITH THE INVESTIGATOR, AND YOU HAVE HAD ALL YOUR QUESTIONS ANSWERED TO YOUR SATISFACTION. YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP.

Signature of Subject ___________________________ Date ________________

MY SIGNATURE AS WITNESS CERTIFIES THAT THE SUBJECT SIGNED THIS CONSENT FORM IN MY PRESENCE AS HIS/HER VOLUNTARY ACT AND DEED.

Signature of Witness ___________________________ Date ________________

IN MY JUDGEMENT, THE SUBJECT IS VOLUNTARILY AND KNOWINGLY GIVING INFORMED CONSENT AND POSSESSES THE LEGAL CAPACITY TO GIVE INFORMED CONSENT TO PARTICIPATE IN THIS RESEARCH STUDY.

Signature of Investigator ___________________________ Date ________________

Investigators:

Mary Mueller, PA-C 559-7555 (day) 391-4790 (night)
Gary Martin, Ph.D. 472-1728 (day) 477-3138 (night)
### APPENDIX D

#### PATIENT DAILY DIARY

<table>
<thead>
<tr>
<th>WEEK OF STUDY:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
</table>

#### SCALE: 0 = NONE (ABSENT), 1 = SLIGHT, 2 = MODERATE, 3 = SEVERE

1. **SMOKED CIGARETTE**: 0 = YES, 1 = NO
2. **CREATED NERVOUSNESS**: 0 = NO, 1 = YES
3. **CREATED ANGER**: 0 = NO, 1 = YES
4. **CREATED Frustration**: 0 = NO, 1 = YES
5. **CREATED ANXIETY**: 0 = NO, 1 = YES
6. **CREATED DIFFICULTY IN AIMING FOR NICTINE ABILITY**: 0 = NO, 1 = YES

#### DAY DATE

<table>
<thead>
<tr>
<th>DATE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
</table>

#### ANYTHING ELSE YOU WOULD LIKE TO TELL THE DOCTOR OR CONCERNING THE STUDY?

---

**SCN**:  

**PATIENT INITIALS**:  

**DATE**:  

**DIARY REVIEWED BY**:  

---
Study Case Number: __ __ __ __ Date:______________

Participant's Initials: __ __ __

DEMOGRAPHIC PULMONARY ASSESSMENT PROFILE

Dear Participant:

Please answer the following questions as they pertain to your general health:

1. What is your age? ______

2. Are you: _____ Male _____ Female

3. Do you currently smoke:
   ___ Less than 1/2 pack per day  ___ 1/2 to 1 pack per day
   ___ 1-2 packs per day  ___ Over 2 packs per day
   Current brand: ______________________________

4. Total years smoked in all? _____ years

5. Do you have an intermittent cough (not related to a common cold)?  ____ Yes  ____ No

6. Do you frequently cough in the morning?  ____ Yes  ____ No

7. Is your cough related to mucus in your chest or throat?  ____ Yes  ____ No

8. Do you experience intermittent chest congestion?  ____ Yes  ____ No

9. Do you have shortness of breath?  ____ Yes  ____ No

10. If yes, when?
    ____ During strenuous exercise  ____ During moderate exercise
        ____ During normal activity  ____ While at rest
### APPENDIX F

#### THE FAGERSTROM NICOTINE TOLERANCE SCALE

**PATIENT INITIALS:**

**SCN:**

**SMOKING HISTORY**

<table>
<thead>
<tr>
<th>PLEASE CIRCLE THE APPROPRIATE RESPONSE</th>
<th>A (0)</th>
<th>B (1)</th>
<th>C (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. HOW SOON AFTER YOU WAKE UP DO YOU SMOKE YOUR FIRST CIGARETTE?</td>
<td>AFTER 30 MIN</td>
<td>WITHIN 30 MIN</td>
<td>--</td>
</tr>
<tr>
<td>2. DO YOU FIND IT DIFFICULT TO REFRAIN FROM SMOKING IN PLACES WHERE IT IS FORBIDDEN, SUCH AS THE LIBRARY, THEATER, DOCTOR'S OFFICE?</td>
<td>NO</td>
<td>YES</td>
<td>--</td>
</tr>
<tr>
<td>3. WHICH OF ALL THE CIGARETTES YOU SMOKE IN A DAY IS THE MOST SATISFYING ONE?</td>
<td>ANY OTHER THAN THE FIRST ONE IN THE MORNING</td>
<td>THE FIRST ONE IN THE MORNING</td>
<td>--</td>
</tr>
<tr>
<td>4. HOW MANY CIGARETTES A DAY DO YOU SMOKE?</td>
<td>1-15</td>
<td>16-25</td>
<td>MORE THAN 25</td>
</tr>
<tr>
<td>5. DO YOU SMOKE MORE DURING THE MORNING THAN DURING THE REST OF THE DAY?</td>
<td>NO</td>
<td>YES</td>
<td>--</td>
</tr>
<tr>
<td>6. DO YOU SMOKE WHEN YOU ARE SO ILL THAT YOU ARE IN BED MOST OF THE DAY?</td>
<td>NO</td>
<td>YES</td>
<td>--</td>
</tr>
<tr>
<td>7. DOES THE BRAND YOU SMOKE HAVE A LOW, MEDIUM, OR HIGH NICOTINE CONTENT?</td>
<td>LOW (≤0.6 mg or ≤0.4 mg)</td>
<td>MEDIUM (0.81 mg - 1.0 mg)</td>
<td>HIGH (≥1.1 mg)</td>
</tr>
<tr>
<td>8. HOW OFTEN DO YOU INHALE THE SMOKE FROM YOUR CIGARETTE?</td>
<td>NEVER</td>
<td>SOMETIMES</td>
<td>ALWAYS</td>
</tr>
</tbody>
</table>

ASSIGN NO POINTS FOR EACH ANSWER IN COLUMN A, 1 POINT FOR EACH ANSWER IN COLUMN B, AND 2 POINTS FOR EACH ANSWER IN COLUMN C. (NOTE THAT NOT ALL QUESTIONS HAVE AN ANSWER IN COLUMN C). THEN, TOTAL THE NUMBER OF POINTS TO ARRIVE AT THE FAGERSTROM SCORE. THE HIGHEST POSSIBLE SCORE IS 11.

**TOTAL SCORE:**

---

---
SCORING OF FAGERSTROM TOBACCO DEPENDENCE QUESTIONNAIRE

Each completed Fagerstrom Tobacco Dependence Questionnaire is to be scored using the following technique.

Questions 1 and 2 are to determine the subject's brand and type of cigarette. The nicotine content (in milligrams per cigarette) is obtained from the most recent listing of the Federal Trade Commission Report. Refer to the following pages for the Nicotine Content listing. The scoring of nicotine content is as follows:

- Low (< 0.6 mg nicotine/cigarette) = 0
- Moderate (0.6 - 1.1 mg nicotine/cigarette) = 1
- High (> 1.1 mg nicotine/cigarette) = 2

The scoring of other questions is as follows:

Question 3: within 1/2 hour = 1  
over 1/2 hour = 0

Question 4: No = 0  
Yes = 1

Question 5: the first cigarette in the morning = 1  
other = 0

Question 6: No = 0  
Yes = 1

Question 7: No = 0  
Yes = 1

Question 8: Never = 0  
Sometimes = 1  
Always = 2

Question 9: Less than 15 = 0  
16 - 25 = 1  
More than 26 = 2

Enter the score for each question in the "Completed by the Investigator Only" section on the right side of the questionnaire. Total the score of each question to get the total Fagerstrom Tobacco Dependence score.

A total score of 0 - 6 (inclusive) indicates low nicotine dependence.

A total score of 7 - 11 (inclusive) indicates high nicotine dependence.
## Nicotine Content of Two Hundred Eleven Varieties of Domestic Cigarettes

(Adapted from the Federal Trade Commission Report)

<table>
<thead>
<tr>
<th>BRAND TESTED</th>
<th>TYPE CODE</th>
<th>NICOTINE CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPINE</td>
<td>F: SP: M</td>
<td>0.95</td>
</tr>
<tr>
<td>BARCLAY 100</td>
<td>F</td>
<td>0.40</td>
</tr>
<tr>
<td>BELAIR</td>
<td>F: SP: M</td>
<td>0.74</td>
</tr>
<tr>
<td>BELAIR 100</td>
<td>F: SP: M</td>
<td>0.61</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES</td>
<td>R: F: HP</td>
<td>0.07</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES</td>
<td>F: HP</td>
<td>1.10</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES 100</td>
<td>F: HP</td>
<td>1.02</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES 100</td>
<td>F: HP</td>
<td>1.01</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES 100</td>
<td>F: SP</td>
<td>1.03</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES LIGHTS 100</td>
<td>F: SP</td>
<td>1.04</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES LIGHTS 100</td>
<td>F: SP</td>
<td>0.73</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES LIGHTS 100</td>
<td>F: SP: M</td>
<td>0.70</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES ULTRA LIGHTS 100</td>
<td>F: HP</td>
<td>0.40</td>
</tr>
<tr>
<td>BENSON &amp; HEDGES ULTRA LIGHTS 100</td>
<td>F: HP</td>
<td>0.42</td>
</tr>
<tr>
<td>BRIGHT</td>
<td>F: SP: M</td>
<td>0.52</td>
</tr>
<tr>
<td>BRIGHT 100</td>
<td>F: SP: M</td>
<td>0.52</td>
</tr>
<tr>
<td>BULL DURHAM</td>
<td>F: SP</td>
<td>1.83</td>
</tr>
<tr>
<td>CAMBRIDGE</td>
<td>F: HP</td>
<td>*</td>
</tr>
<tr>
<td>CAMBRIDGE 100</td>
<td>F: SP</td>
<td>0.08</td>
</tr>
<tr>
<td>CAMEL</td>
<td>R.: NF: SP</td>
<td>1.40</td>
</tr>
<tr>
<td>CAMEL</td>
<td>F: HP</td>
<td>1.08</td>
</tr>
<tr>
<td>CAMEL LIGHTS</td>
<td>F: HP</td>
<td>1.07</td>
</tr>
<tr>
<td>CAMEL LIGHTS 100</td>
<td>F: SP</td>
<td>0.69</td>
</tr>
<tr>
<td>CAPRI LIGHTS</td>
<td>F</td>
<td>0.83</td>
</tr>
<tr>
<td>CARLTON</td>
<td>F: HP</td>
<td>*</td>
</tr>
<tr>
<td>CARLTON 100</td>
<td>F: SP: M</td>
<td>0.11</td>
</tr>
<tr>
<td>CARLTON 100</td>
<td>F: SP: M</td>
<td>0.07</td>
</tr>
<tr>
<td>CARLTON 100</td>
<td>F: HP</td>
<td>0.05</td>
</tr>
<tr>
<td>CARLTON 100</td>
<td>F: HP: M</td>
<td>*</td>
</tr>
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F=filter, NF=non-filter, H=menthol, R=regular, HP=hard pack, SP=soft pack
* Below the sensitivity of the method (0.05 mg nicotine).
### Nicotine Content of Two Hundred Eleven Varieties of Domestic Cigarettes

(Adapted from the Federal Trade Commission Report)

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F=Filter, NF=Non-Filter, M=Menthol, R=Regular, HP=Hard Pack, SP=Soft Pack
* Below the sensitivity of the method (0.05 mg nicotine).
Nicotine Content of Two Hundred Eleven Varieties of Domestic Cigarettes
(Adapted from the Federal Trade Commission Report)

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F=filter, NF=non-filter, M=menthol, R=regular, HP=hard pack, SP=soft pack
* Below the sensitivity of the method (0.05 mg nicotine).
### Nicotine Content of Two Hundred Eleven Varieties of Domestic Cigarettes

(Adapted from the Federal Trade Commission Report)

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<tr>
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<td>F : SP</td>
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<tr>
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<tr>
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<tr>
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<tr>
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<tr>
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<tr>
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<tr>
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<td>F : SP, M</td>
</tr>
<tr>
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<tr>
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<tr>
<td>ST. MORITZ 100</td>
<td>F : SP</td>
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<tr>
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</tr>
<tr>
<td>TALL 120</td>
<td>F : SP, M</td>
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*Below the sensitivity of the method (0.05 mg nicotine).
### Nicotine Content of Two Hundred Eleven Varieties of Domestic Cigarettes

(Adapted from the Federal Trade Commission Report)

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<th>Brand</th>
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<td>TAREYTON LONG LIGHTS 100</td>
<td>F : SP</td>
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<td>TRIUMPH</td>
<td>F : SP</td>
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<td>F : SP</td>
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<tr>
<td>TRUE</td>
<td>F : SP</td>
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<td>VICEROY SUPER LONG 100</td>
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<td>F : HP</td>
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<td>WINSTON 100</td>
<td>F : SP</td>
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<td>F : SP</td>
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<td>F : SP</td>
<td>0.45</td>
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</tbody>
</table>

F=filter, NF=non-filter, M=menthol, R=regular, HP=hard pack, SP=soft pack

* Below the sensitivity of the method (0.05 mg nicotine).
APPENDIX H

CONFIDENCE QUESTIONNAIRE

Initials __________________________ Study Case Number __________________________

Date ______________________________

Below is a list of 15 situations in which people frequently smoke. Please read each one carefully. Then circle the number underneath which best describes the probability that you will be able to resist the urge to smoke in that situation in the future if the situation arises. If you are absolutely certain that you will not smoke in that situation, circle 100%. If you have no confidence in your ability to resist a cigarette in that situation, circle 0%. Please select only the percentages and do not mark between the numbers. More likely, your confidence will vary. For example, if you are pretty sure that you will be able to resist the urge to smoke if and when you want to relax, but not absolutely certain, you might circle 80%. If you are pretty sure you would not be able to resist a cigarette if that situation arises, but not absolutely sure you couldn't, you might circle 20%.

1. When you feel anxious.
   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

2. When you want to sit back and enjoy a cigarette.
   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

3. When you have finished a meal or snack.
   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

4. When you are nervous.
   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

5. When you want to feel more attractive.
   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

6. When you want to relax.
   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%
7. **When you feel smoking is part of your self-image.**

   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

8. **When you feel tense.**

   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

9. **When you are drinking an alcoholic beverage.**

   0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

10. **When you see others smoking.**

    0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

11. **When someone offers you a cigarette.**

    0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

12. **When you want to avoid eating sweets.**

    0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

13. **When you want to feel more mature and sophisticated.**

    0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

14. **When you want to keep slim.**

    0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%

15. **What is the probability that you will be able to resist the urge to smoke altogether in the future, regardless of the situation?**

    0% - 10% - 20% - 30% - 40% - 50% - 60% - 70% - 80% - 90% - 100%
APPENDIX I

Table 4.11

Means and Standard Deviations of Self-efficacy and Tobacco Dependency by Group.

<table>
<thead>
<tr>
<th>Group</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Smokers (n=30)</td>
<td>55.467</td>
<td>14.438</td>
<td>46.967</td>
<td>17.775</td>
</tr>
<tr>
<td>COPD (n=30)</td>
<td>6.400</td>
<td>1.714</td>
<td>6.933</td>
<td>1.946</td>
</tr>
</tbody>
</table>

Self-efficacy

Tobacco Dependency
APPENDIX J

Table 4.12
Means and Standard Deviations of Withdrawal Symptoms by Group.

<table>
<thead>
<tr>
<th></th>
<th>Normal Smokers</th>
<th>COPD</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(n=30)</td>
<td>(n=30)</td>
</tr>
<tr>
<td>Nicotine craving</td>
<td>1.611 1.335</td>
<td>2.400 1.298</td>
</tr>
<tr>
<td>Irritability</td>
<td>1.111 0.900</td>
<td>1.800 1.320</td>
</tr>
<tr>
<td>Frustration</td>
<td>0.944 0.873</td>
<td>1.867 1.302</td>
</tr>
<tr>
<td>Anger</td>
<td>0.444 0.616</td>
<td>1.533 1.457</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.889 0.832</td>
<td>2.067 1.163</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>0.611 0.778</td>
<td>1.667 1.447</td>
</tr>
<tr>
<td>Restlessness</td>
<td>1.000 0.970</td>
<td>2.533 0.990</td>
</tr>
</tbody>
</table>
Dear Dr. Prentice,

This letter is to inform you that my research entitled "A Comparison of Smoking Cessation Methods in Normal Smokers and Smokers with Chronic Obstructive Pulmonary Disease" has been completed. A total of 60 smokers entered the study. There were no complications.

Sincerely,

Mary B. Mueller, PA-C
Principal Investigator
REFERENCES


Nebraska Department of Health, Health Promotion and Education Division (March 1986) Nebraska Health Education Risk Reduction Survey.


