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EXAMINATION OF COMPLIANCE BEHAVIOR IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

By

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ABSTRACT

EXAMINATION OF COMPLIANCE BEHAVIOR
IN PATIENTS WITH
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By

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Chronic obstructive pulmonary disease (COPD) affects over fourteen million Americans, altering both the length and the quality of their lives. Compliance to a prescribed regimen is a patient responsibility which influences the patient's prognosis and functional capacity. Reported levels of compliance for patients with COPD are extremely low. The purposes of this study were (1) to describe a sample of COPD patients relative to their compliance behavior, as well as levels of social support, health self-determinism, clinical severity of COPD, depression and perceptions of the impact of COPD upon their daily life, (2) to test the associations between the above variables, (3) to develop a variable to serve as an indicator of the degree of congruence between clinical severity and perceptions of impact of COPD, and (4) to test theoretical models constructed to link the study variables.

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Questionnaires measuring study variables and measures of pulmonary function (FEV_1) were obtained from a sample of eighty COPD patients from five clinical sites in the southern half of Michigan's lower peninsula.

Path analysis did not support the theoretical models constructed to predict perceptions of impact of disease or self-reported compliance behavior. Correlational analysis did result in the observation of significant relationships between depression and other study variables including social support, perceived impact of disease and clinical severity of disease. Perceived impact was shown to be significantly related to social support, health self-determinism and clinical severity of disease.

Additional findings indicate that the sample of COPD patients in this study were extremely ill individuals who reported less than optimal patterns of compliance to therapeutic recommendations. The subjects reported high levels of depression and a significant relationship between depression and the degree of realism with which they viewed their disease. Implicationss for alternative models for viewing compliance behavior in patients with chronic degenerative disease are addressed.

This dissertation is dedicated to my husband, Darrell, and my daughters Nancy, Carol and Amy, with sincere appreciation for their constant support and assistance.

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My friends and my family provided the encouragement to keep me going on this research during those times when it was most difficult. I would like to thank Barbara Given and Clare Collins for their counsel and their friendship. Manfred Stommel provided most valuable statistical consultation. And I am most grateful to my family for their tolerance of all of the complications that the student role can bring to family life and for their belief in me.

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CHAPTER I

INTRODUCTION

Compliance of patients to the recommendations of health care providers has been an issue of interest in health care since the days of Hipprocrates. Compliance to the therapeutic recommendations of health care providers by patients with chronic obstructive pulmonary disease (COPD) is the problem upon which this research is focused. Petty and colleagues (1973) state that compliance to therapeutic recommendations functions to both slow the progression of the disease and increase the tolerance for physical activity of patients with COPD. Nevertheless, rates of compliance for patients with COPD have been documented as being low (Milazzo, 1981). Failure to follow therapeutic recommendations results in a more rapid and severe disease course, along with more severe physical limitations for the COPD patient.

Need for the Study

Chronic Obstructive Pulmonary Disease (COPD), a term that includes emphysema, chronic bronchitis, bronchiactasis and a

variety of other conditions, is by far the leading chronic lung disease. COPD is a progressively debilitating disease that ranks second only to heart disease as a cause of disability in the United States. The mortality rate of COPD has increased by 60% from 1968 to 1978 and accounted for 60,000 deaths in 1981 (American Lung Association, 1982). Morbidity from COPD results in approximately 34 days of restricted activity per 100 persons per year (Bashear, 1980). It has been reported that deaths attributed to COPD are doubling every five years, as the incidence of this disease, currently affecting more that fourteen million Americans, continues to increase at an alarming rate (Diethorn, 1985).

The economic impact of COPD is staggering. Total costs for COPD were estimated to be $4.55 billion in 1972. Of this total figure an estimated $803 million was spent for direct costs of hospital treatment, physician service, and prescribed drugs. Indirect costs were estimated at $3.05 billion for disability payments and $645 million for death benefits (U. S. Government Task Force, 1977).

The duration of an existence with COPD is marked by varying degrees of dyspnea which are triggered by both physical and emotional exertion. As the disease progresses, difficulty in breathing is experienced even during periods of inactivity and emotional calm. The patient with COPD faces a number of years of living an extremely restricted existence and often avoids both physical and emotional exertion to the extent of virtual

self-seclusion (Goldenson, Dunham & Dunham, 1978). COPD has been characterized as "striking people in middle-age, disableing them with unremitting shortness of breath, destroying their ability to earn a living, resulting in frequent use of the health care system and disrupting the lives of family members for decades before death eventually occurs" (Jensen, 1983).

Compliance behavior in COPD. Research has demonstrated that through conscientious adherence to a regimen including medication, regulated exercise and reduction of modifiable risk factors, the person afflicted with COPD may slow the progress of the disease and increase their tolerance for physical activity (Petty, Hudson & Neff, 1973). Risk factors which the individual may control include smoking behaviors, exposure to environmental irritants and factors leading to respiratory infection, and daily lifestyle and coping patterns. Other risk factors which are beyond the control of the individual include aging, family history, sex and alpha-1 antitrypsin deficiency (American Lung Association 1977; Hugh-Jones & Whimster, 1978).

The treatment of COPD consists of medication, regulated exercise and avoidance of those risk factors within the patients control. The COPD patient visits their physician periodically for the purpose of monitoring of the disease state and supervision of treatment. Hospitalization is required only during acute respiratory infections and extreme shortness of breath. Because treatment is largely self-managed by the COPD patient, high levels of compliance to the prescribed treatment

regimen are essential for optimal control of the disease state. The issue of patient compliance is of pivotal importance in the management of COPD. The issues surrounding the failure of patients to follow therapeutic recommendations, noncompliance, have been cited as the most significant problem facing medical practice today (Eraker, Kirscht & Becker, 1984).

The treatment regimen for COPD is exceedingly complex (see Appendix A for sample treatment plan). Almost every aspect of the COPD patients daily life must be altered in some way in order to comply with the prescribed treatment and the regimen must be conscientiously followed for the remainder of the patient's life. Those studies which have been conducted regarding the compliance rates of individuals with COPD have found those rates to be exceedingly low.

The Problem on Noncompliance. Two major problems arise from the noncompliant behaviors of patients. The interpretation of clinical trials and the efficacy of prescribed treatments is made more difficult when patients fail to conscienously follow recommendations. Additionally, from the perspective of both the physician and the patient, the clinical importance of noncompliance relates to the degree to which it interferes with the achievement of the therapeutic goal (Eraker, Kirscht & Becker, 1984).

There has been extensive research on various aspects of patient compliance across a variety of medical situations, and a number of factors have been isolated which consistently appear

to be associated with low levels of compliance. Among those factors are complexity of the treatment regimen, the number of lifestyle changes necessitated by the treatment regimen, and the length of time that the treatment regimen must be followed.

A large number of factors have been hypothesized to be related to the compliance behaviors of patients and have been the focus of compliance research. Early compliance research was focused on a search for relationships between patient knowledge and levels of compliance. Some studies have defined patient knowledge in relation to the prescribed treatment regimen and others have measured the general medical knowledge of subjects. Although knowledge has been generally acknowledged as a factor which is related to the decisions which are made by patients regarding their behavior, the documented effect of knowledge on compliance has been inconsistent. Research data has demonstrated inconclusive results ranging from no relationship (Kirscht, Kirscht & Rosenstock, 1981; Cummings, Becker, Kirscht & Levin, 1982) to positive relationships between compliance behavior and patient level of knowledge (Jette, 1982; Mumford, Schlesinger & Glass, 1982).

The beliefs held by patients regarding their disease, the treatment prescribed and their ability to carry out the regimen has constituted another major focus of compliance research (Becker, 1974). Although several studies have shown that patient beliefs are of consequence in the prediction of their self-care behaviors (Becker, 1974; Becker & Green, 1977;

Kirscht, Kirscht & Rosenstock, 1981), practical and theoretical shortcomings have been demonstrated in the exclusive association of compliance with the health beliefs of patients (Leventhal, Meyer & Gutman, 1980).

If the knowledge which patients possess about their medical regimen and the beliefs they hold regarding the value of that regimen are not consistently related to the self-care behaviors they exhibit, researchers are still left with unanswered questions relative to why some patients comply with recommendations and others do not. The answers to those questions appear to be related to those factors which are associated with patient motivation (Cox, 1985).

The Relationship of Motivational Factors to Compliance

The characteristics of motivation and problems in the measurement of motivation are discussed by Keller (1983). Keller defines motivation in terms of the magnitude and direction of behavior, what a person will do, and makes a distinction between motivation and ability which is defined as what a person can do. Weiner (1980) categorizes ability and effort respectively as stable and variable human characteristics that serve as two types of internally oriented attributions for the cause of given performance outcomes. Historically, various theories of motivation have tended to incorporate specific personal or environmental variables, but until recently almost none have tried to systematically incorporate both (Weiner, 1980).

Although motivation theories are rich in concepts which may be associated with the actions which individuals take on their own behalf, until recently few of these concepts have been integrated into systematic research related to compliance behaviors. Motivation is described by Cox (1985, p. 177) as "an important antecedent variable and correlate of the client's cognitive and affective responses to a health concern". Many individual attributes have been brought to attention by motivation theories which would appear to be related with the inclination of patients to take self-care actions in their own behalf. Among those patient attributes are individual perceptions of social support, the perceptions of health related self-determinism, self-perceptions of the impact of the disease upon the personal life of the subject, the actual clinical severity of the disease and the relationship of that severity to the individual's perceptions of disease-related impact, and the level of depression exhibited by the individual.

Perceptions of Social Support. During the past several decades social support has been the focus of considerable research. Studies have linked the presence of social support to the decreased need for medication to stabalize asthma (DeAraujo, VanArsdel, Holmes & Dudley, 1974), decreased emergency room visits for asthma attack, positive adjustment to emphysema (Barstow, 1975), high levels of compliance to a hypertensive regimen (Glanz, Kirscht & Rosenstock, 1981), and high levels of

life satisfaction in chronic disease patients (Brown, Rawlinson & Hilles, 1981).

Social support has been conceptualized in terms of structure and function (House & Kahn, 1985). The structural properties of social support have been defined in terms of the numbers of supportive persons encountered by an individual, the frequency of contact with those supportive persons and the density of the network of supportive persons (e.g., degree to which supportive persons have relationships with one another as well as the individual for whom support is being assessed) (Kahn and Antonucci, 1980).

Weiss (1974) has defined the functional properties of social support as including; (1) attachment, (2) social integration, (3) reliable alliance, (4) guidance, (5) reassurance of worth, and (6) opportunity for nurturance. Attachment is defined as feelings of intimacy, peace and security such as are found in relationships with spouses and very close friends. Social integration denotes a sense of belonging to a group with whom one shares common interests and social activities. Reliable alliance is defined as knowing that one can count on receiving assistance in times of need and guidance refers to having relationships with persons who can provide knowledge, advice, and expertise. Reassurance of worth denotes a sense of competence and esteem which is obtained through interactions with other people. The opportunity for nurturance is defined as the state of feeling responsible for the care of others.

In spite of the frequently documented beneficial effects of social support, those effects have not been found to be universal and individual differences in response to social support have been observed. Recent research has postulated and found evidence for interactive effects of social support and locus of control (Lefcourt, Martin & Saleh, 1984) which might serve to explain the inconsistent results encountered by researchers who have studied social support as an isolated concept.

Health Self-Determinism. Recent theories in motivation and the attendant research (Deci, 1975, 1980; Deci & Ryan, 1980; Fisher, 1978; Harter, 1980) suggest that human needs, desires and the process of choosing are fundamental motivational components and that motivation is not a static global trait, but rather a multidimensional construct that is situation specific. The operationalization of motivation that has dominated health behavior research thus far has excluded these important dimensions and considerations; as a result, the potential explanatory power of motivational concepts in health behavior has gone largely untapped.

Attempts to describe and measure the motivational components of health behavior have resulted in a theoretical construct referred to as health self-determinism (Cox, 1985). The concept of health self-determinism is derived from Deci's (1975, 1980) cognitive evaluation theory of intrinsic motivation. This theory suggests that human beings demonstrate a need to

experience themselves as competent and self-determining in their interaction and adaptation to the environment. The experience of feeling competent and self-determining is seen as providing an intrinsic reward for the individual, which then reinforces the behavior.

Perceived Impact of Disease. The perceived severity of illness and the number of alterations in daily life style have been found to be factors related to the degree of compliance in some early research studies of compliance behavior (Charney et al, 1976; Becker, 1974; Francis, Korsch & Morris, 1969). The perceptions of an individual with respect to the severity of his illness may differ from the clinical measures of the amount of physical dysfunction which is actually present. According to Leventhal and his colleagues (1980), "regardless of their 'accuracy', illness representations can interact with disease processes in ways that are subtle".

The behavior of the individual, however, is a manifestation of the overall impact of illness, reflecting the effects of both clinical and subjective dimensions, as well as their interactive effects, on daily activities. Measurement of an individuals behavior should therefore reflect the perceptions of the person in relation to the severity of his illness as well as the actual amount of clinical dysfunction which is present.

Clinical Severity of Disease. As lung function becomes increasingly altered from normal as a result of the disease process in COPD, the patients physical capabilities become

diminished. Shortness of breath and dyspnea increasingly accompany physical exertion and emotional upheavel. With increasing incidence of shortness of breath and dyspnea, the COPD patient consciously avoids physical exertion in an effort to decrease these uncomfortable and frightening symptoms. The result of decreased physical activity is degenerative changes in the musculoskeletal and circulatory systems. Physical changes in the respiratory, circulatory and musculoskeletal systems result in decreased ability of the individual with COPD to participate in normal work, social and household activities.

In COPD the clinical severity of disease may be measured in several ways. Two common tests have been routinely used to diagnose and measure severity of the disease. These are pulmonary function tests and the evaluation of arterial blood gasses. Pulmonary function testing is used to evaluate the purely mechanical abilities of the patient with regard to ventilation. The forced expiratory volume in one second (FEV_1) is a measure of the volume of air which the patient is able to forcefully expire in one second. Pulmonary function tests in the COPD patient reveal a decreased forced expiratory volume per second (FEV_1). As a diagnostic tool forced expiratory volume per second is compared to norms which have been derived for persons of a similar age, sex, and body size.

Congruence Between Clinical Severity and Perceived Impact of Disease. The perceptions of an individual regarding the severity of their disease may differ from the actual severity of

physical dysfunction caused by the disease process. Some people perceive that they are much more ill than clinical measures would indicate, while others perceive their disease state to be far less severe than actually exists. The degree to which an individuals perceptions are congruent with the physical reality of their disease state is a variable which has not been studied relative to compliance behavior. Perceived physical reality is a closely related concept which has been defined by Brillhart (1986, p.9) as "an accurate concept of the condition or state of the body that has been determined by reality testing, observation, and the opinions of reliable authorities".

Depression. The Diagnostic and Statistical Manual of Mental Disorders (DSM-III) of the American Psychiatric Association is the major psychiatric classification guide for medical practitioners. The DSM-III lists several diagnostic categories of depression characterized by an unhappy mood and loss of interest or pleasure in almost all usual activities or pastimes. This condition is relatively persistent and manifested by "appetite disturbance, change in weight, sleep disturbance, psychomotor agitation or retardation, decreased energy, feelings of worthlessness or guilt, difficulty concentrating or thinking, and thoughts of death or suicide, and suicide attempts (page 210)."

Patients with COPD have been documented as frequently experiencing states of depression (Post & Collins, 1980). These patients have been characterized as individuals who "complain

vociferously, refuse to follow the prescribed treatment regimen and alienate their families and the treatment staff" (Dudley & Pitts-Poarch, 1980). One common manifestation of depressive states is a lack of motivation. Depression frequently occurs in patients with COPD (Rowlett and Dudley, 1978), accompanied by both low levels of motivation and poor compliance to the prescribed treatment regimen.

Purposes of the Study

The purposes of this study, focusing on the compliance behaviors reported by a sample of COPD patients, are fourfold. Those purposes include;

(1) To describe a sample of COPD patients relative to levels of reported compliance to a therapeutic regimen, as well as levels of social support, health self-determinism, perceptions of the impact of COPD upon their daily life, levels of clinical severity of disease, and levels of depression,

(2) Using compliance as a dependent variable, to examine associations between compliance and the above variables,

(3) To develop a variable to serve as an indicator of the degree to which an individual's perceptions of their disease state are realistic in terms of their clinical disability. The association of this variable with levels of reported compliance to the therapeutic regimen will also be investigated, and

(4) To examine theoretical models of the linear, additive effects of the above variables to compliance to a therapeutic regimen in a group of patients with COPD.

Models to be Tested

The theoretical models to be tested are depicted in Figure 1. As shown in this model, the clinical severity of the disease affects the level of depression exhibited by the patient with COPD in such a manner that higher levels of clinical severity are associated with higher levels of depression. Both the level of depression and level of perceived social support are theorized to affect the perceived impact of the disease. High levels of depression are theorized to be associated with higher perceptions of impact of the disease on daily life, while high perceptions of social support are theorized to be associated with lower levels of perception of impact of the disease.

Perceptions of impact of the disease on daily life and the clinical severity of disease are both variables which affect the variable referred to as congruence between perceptions of impact (perceived severity) and the clinical measure of severity (clinical severity). Because this measure may no longer be viewed as being comprised as independent measures, it is necessary to truncate investigation of the first theorized model at this point.

Investigation of a second model is resumed with the hypothesis that the level of compliance to the therapeutic regimen is affected by both the level of congruence between the

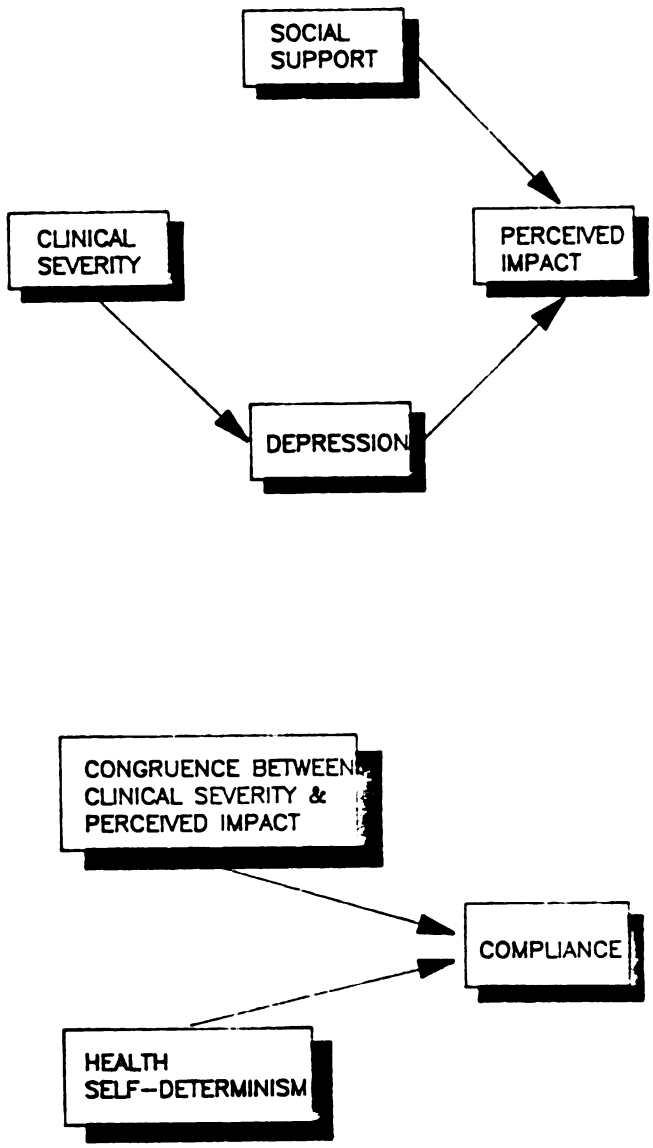

Figure 1. Theoretical models to be tested in this study.

clinical severity of disease and perceived impact of diseas and the level of health self-determinism reported by the COPD patient. It is theorized that high levels of congruence between clinical severity of disease and perceived impact of disease and high levels of health self-determinism will be associated with high levels of compliance to the therapeutic regimen.

Research Hypotheses

The following hypotheses will be tested in this research study;

I. The individual who perceives higher levels of social support will perceive lower levels of impact of the disease upon their daily life.

II. The individual who exhibits higher levels of depression will perceive higher levels of impact of the disease upon their daily life.

III. High levels of clinical severity of disease will be associated with high levels of depression in the patient with COPD.

IV. High levels of health self-determinism will be associated with high levels of compliance to the therapeutic regimen.

V. High levels of congruence between the clinical severity of disease and the perceptions of impact of the disease will be associated with high levels of compliance to the therapeutic regimen.

Definition of Terms

The following definitions will be used throughout this study;

Chronic Obstructive Pulmonary Disease (COPD) Patient: A patient who is medically diagnosed and under medical treatment for COPD, emphysema or chronic bronchitis.

Social Support: The degree to which the COPD patient reports patterns of (a) attachment, (b) social integration, (c) reliable alliance, (d) guidance, (e) reassurance of worth, and (f) opportunity for nuturance resulting from their interactions with other people as measured by the Social Provisions Scale (Russell and Cutrona, 1984).

Stated Compliance: The extent to which the patient reports that he/she carries out the therapeutic recommendations of health care providers concerning prescribed medications, behavioral modification (stress management, cigarette smoking, relaxation techniques), exercise, methods of preventing infection and follow-up care.

Perceived Impact of Disease: The number of changes necessitated by symptoms of COPD which are reported by the patient in relation to social activities and functional ability to perform customary activities of daily living.

Clinical Severity of Disease: The COPD patient's level of lung capacity as measured by pulmonary function tests (e.g. FEV_1) relative to norms established relative to age, body size and gender of the individual.

Congruence between Clinical Severity of Disease and Perceived Impact of Disease: An index indicating the magnitude to which the patient's clinical severity of disease is consistent with perceptions of the impact of the disease on daily living activities.

Health Self-Determinism: The type and strength of the COPD patients motivational status relative to (a) perceived competency in health matters, (b) internal/external cue responsiveness, (c) self-determinism in health judgment, and (d) self-determinism in health behavior as measured by the Health Self-Determinism Index (HSDI) (Cox, 1985).

Depression: The degree to which the COPD patient reports symptoms of appetite disturbance, change in weight, psychomotor agitation or retardation, feelings of worthlessness or guilt, difficulty concentrating or thinking, and thoughts of death or suicide as measured by the Beck Depression Inventory (Beck, Ward, Mendelson, Mock & Erbaugh, 1978).

Summary

In summary, compliance to a therapeutic regimen as recommended by health care professionals serves to enhance the quality of life of patients with COPD. Nevertheless, reported levels of compliance of COPD patients are low and present problems for both patients and health care providers. The following concepts are theorized to be facets which influence the self-care behaviors of COPD patients; social support, health

self-determinism, perceptions of the impact of the disease on daily life, clinical severity of disease, congruence between clinical severity and perceived impact, and levels of depression.

Chapter II will present a review of compliance literature with reference to studies of social support, health self-determinism, perceptions of disease impact, severity of disease and depression as they relate to compliance. In Chapter III a discussion of methodology will be presented with reference to the sample, measures, procedures, design, hypotheses and analyses of this study.

Chapter IV contains a discussion of the analyses of descriptive measures, associations between study measures and testing of the theorized models. Limitations of study and implications of findings relative to practice and further research will be presented in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

Compliance to a therapeutic regimen as recommended by health care providers is the focus of this study. Variables hypothesized in the theoretical models to be associated with self-care behaviors which indicate compliance include social support, health self-determinism, perceptions of the impact of disease, severity of disease, congruence between perceptions of impact and clinical severity of disease and depression. Each of these concepts will be reviewed relative to (a) conceptual definitions, (b) operationalization of the concept, (c) studies relating the concept to compliance and, when available, (d) specific research involving patients with COPD.

The Concept of Compliance

Noncompliance has been cited as possibly being the most significant problem facing medical practice today (Eraker, Kirscht & Becker, 1984) with estimates of noncompliance averaging approximately 50% for chronic disease patients. The degree to which noncompliant behaviors interfere with the achievement of therapeutic goals substantiates the importance of the problem to both patients and health care providers.

Attesting to the importance of understanding compliance behaviors are approximately 700 research studies conducted through 1984, examining the relationship of over 200 variables to the behaviors exhibited by patients (Morisky, Green & Levine, 1986).

Conceptual Definitions of Compliance. Compliance has consistently been conceptualized as the pattern of behaviors which patients exhibit reflecting adherence to the therapeutic recommendations of health care providers. In current health care practice there has been an increasing emphasis on the importance of the patient's individuality in dealing with medical treatment. As a result, there has been criticism of use of the term "compliance". It has been stated that "compliance" connotes an attitude which is patronizing and dictatorial on the part of health care providers. Alternative terms have been suggested to express the notion of patient behaviors which reflect the recommendations of health care providers. In spite of the criticisms of the use of the term compliance, the fact remains that compliance is the most widely recognized descriptor of patient behavior in current literature.

Operationalization of Compliance. Even though compliance has been consistently conceptualized in a uniform manner in the literature, the ways in which compliance has been operationalized have varied widely in empirical studies. The differences in operationalization have been those which focus on variance in (1) the number of behaviors which are measured to

indicate compliant behavior and (2) the absolute number of occurences of positive self-care behaviors required to reflect compliance. For example, some studies have observed only appointment keeping or medication taking behaviors to determine compliance while others have examined a grouping of behaviors which reflect the total regimen of patients with a chronic disease. The amount of adherent behavior required to define a patient as compliant also varies from one study to another. Marston (1970) cites studies in which the omission of one medication dose is termed as noncompliance, while other studies define any individual taking more than 50% of their prescribed doses as compliant.

Methods for determining compliance vary even more widely than the numerical interpretation of those techniques. Methods which have been used to demonstrate compliance behavior include (1) formal documentation such as appointment records and immunization certification, (2) direct observation of patients, (3) physiologic measures such as urine or blood assays for the presence of prescribed medication, (4) pill counts, (5) self-reports by patients, (6) positive health outcomes such as controlled hypertension and (7) combinations of the above methods.

The most objective of these methods for determination of compliance are formal documentation, physiologic measures and direct observation. While formal documentation offers a relatively simple and inexpensive objective measure, most

patient behaviors are not subject to formal recording (Cummings, Kirscht, Becker & Levin, 1982). Direct observation of patient behaviors would be highly impractical and expensive in all but rare instances. Physiologic measures also have disadvantages related to cost and the frequent influence by factors unrelated to patient levels of compliance.

In a comparative study of three methods of measuring patient compliance, Cummings and his colleagues (1982) reported that blood chemistry studies of 116 end-stage renal disease patients contained a substantial proportion (over 70 percent) of residual error. Health outcomes, such as control of blood sugar in diabetics or blood pressure in hypertensives, may also be affected by factors other than the compliance behavior of the patient and are not considered reliable measures by many researchers (Lorig & Laurin, 1985). Eraker, Kirscht & Becker (1984) point out that there is not a straight forward link between health outcomes and compliance, and caution against focusing on health outcomes without consideration of the natural course of the disease in question and the total environment of the individual patient.

Use of self-report by patients to measure compliance has been criticized due to lack of confidence in the veracity of patients. Even Hipprocrates has been quoted as stating that "the physician should keep aware of the fact that patients often lie when they state that they have taken certain medications" (Gordis, 1979). It has been stated that patients will tend to

overestimate their own compliance behavior because of forgetfulness, fear or embarrassment (Cummings, Kirscht, Becker & Levine, 1984; Gordis, 1976; Patrick, 1986). Patient self-report, however, holds some distinct advantages as a measure of compliance behavior. Self-report is relatively inexpensive and readily available through either patient interview or questionnaire techniques. And, even while reports of compliant behavior may arouse suspicion, the reports of noncompliant behavior are generally regarded as an accurate portrayal of patient actions.

Feinstein and colleagues (1979) compared interview responses and pill counts and found good agreement between methods among those classified as poor compliers, while finding considerable discrepancy in those classified as compliant. Eraker, Kirscht and Becker (1984) conclude that even though "patients often tend to overestimate adherence...it is always worthwhile to ask because the substantial number of patients who do admit to noncompliance are usually providing correct reports".

Determinants of Non-Compliance. Pioneer studies in the area of compliance research were designed to isolate those sociodemographic characteristics of patients which might serve to indicate that the patient was at high risk of noncompliant behaviors. Such factors as age, sex, income, occupation, education, religion, marital status, race and ethnic background of patients were analyzed by researchers in hopes of finding a consistent profile of the patient who is likely to be

noncompliant to medical recommendations. The results of these studies have been inconclusive and disappointing

Haynes (1976) published a critical review of the determinants of patient compliance which contained a detailed analysis of 185 original compliance studies. Relationships between compliance and sociodemographic features of patients were reported in far fewer studies than were findings of no relationship. For example, seven studies reported relationships between age and compliance while 30 failed to find such a relationship, six reported relationships between sex and compliance and 25 found none, eight studies found relationships between education and compliance behavior while 23 studies sought but did not find such relationships. Reviews of compliance research document that no single sociodemographic variable has consistently been associated with either compliant or noncompliant self-care behaviors of patients (Haynes, 1976; Patrick, 1986; Marston, 1970; Gillum & Barsky, 1974; Becker, 1979).

Associations have also been sought between patient levels of knowledge about their disease and/or treatment regimen and their levels of compliance to health care recommendations. Becker (1979) summarized the hypotheses of a large number of early compliance studies in his statement that "it seemed most reasonable to speculate than an explanation for poor compliance would rest upon the patient's inadequate understanding of, or knowledge about, various aspects of the regimen". Again,

however, there have not been consistent empirical findings which would verify the presence of such relationships.

Haynes (1976), in an extensive literature review, concluded that "there appears to be no relationship between patients knowledge of their disease or it's therapy and their compliance with the associated treatment regimen". Another review of literature concerned with associations between knowledge and compliance (Taglacozzo & Ima, 1970) concludes that "knowledge of illness and it's consequences appears to be relevant only in the case of an illness characterized by few problems in self-management, less past illness experience and less demanding treatment".

Characteristics of both the illness and the treatment regimen have also been studied in relationship to compliance behaviors exhibited by patients. While still not exhibiting total consistency, findings in these areas have yielded more conclusive results than those studies of patient knowledge and sociodemographic relationships to compliance. Although it has been stated (Haynes, 1976) that it is "not possible to identify a noncomplier by diagnosis, nor by features of the disease", a few specific generalizations can be made based on consistent empiric findings.

Patients whose illness does not produce physical symptoms exhibit consistently lower rates of compliance than patients experiencing symptoms. Sackett (1976) reports that patients with symptoms will keep approximately 80% of their appointments

while symptomless patients keep only about 50% of theirs. In the case of compliance with prescribed medications, Becker (1979) cites a number of studies whose results he typifies as being both positive and consistent in predicting that the presence of symptoms is associated with higher levels of medication taking.

The differences between acute and chronic illness have also been associated with consistently varying rates of patient compliance. Illnesses which require a patient to adhere to a prescribed treatment regimen for longer periods of time, such as in the case of chronic disease, have been found to be related to lower rates of compliance than acute illnesses of shorter duration.

The differences observed between compliance rates for chronic and acute illnesses may be attributable to differences in both the numbers of recommendations and the length of time that they must be followed. Acute illnesses for which compliance rates have been studied include situations such as ear infection or respiratory infection for which recommendations are few (e.g., one medication) and of limited duration. Recommendations for patients with a chronic disease are frequently complex, involving multiple medications and life style alterations, and those recommendations remain in effect for the duration of the patient's life.

Davis and Eichhorn (1963) conducted a longitudinal study of 397 cardiac patients in rural Indiana and found that 30% of

those interviewed did report some discrepancy between the recommendations of their doctors and their own behavior. The complexity of the reported regimen was found to effect reported compliance in this study. Patients who were required to take three or more health related actions reported compliance rates of 65% while those with one or two recommendations reported compliance rate of over 90%

Number and type of recommendations are also reported by Marston (1970) to effect compliance, with greater numbers of recommendations and more inconvenient recommendations associated with lower rates of compliance. Sackett (1976) reports that only about 50% of patients on long-term medications are found to be compliant with recommendations.

The greatest number of compliance studies have focused on fairly stable patient characteristics, such as sociodemographic factors and knowledge, or on characteristics of the disease and/or treatment regimen, such as duration, complexity and presence or absence of symptoms. In an effort to develop a more refined model of patient self-care behaviors Rosenstock (1974) formulated the Health Belief Model.

Based on a value-expectancy model, the Health Belief Model contained three primary elements; the individuals evaluation of the health condition (perceived susceptibility and perceived severity), the individuals evaluation of the recommended health action (efficacy and feasibility, costs and barriers), and the presence of a stimulus which would serve to trigger the

recommended action. This was the first attempt in compliance research to account for the effect of patient motivational factors.

Compliance Studies Relating to COPD. A large number of articles in the literature (Ries, 1987; Kimbel, Kaplan, Alkalay, & Lester, 1971; Dudley, Glaser, Jorgenson & Logam, 1980) outline the importance of comprehensive rehabilitation programs for patients with COPD. In spite of the fact that these programs emphasize the importance of the active participation of the patient, there is little documentation of compliance patterns of COPD patients in current literature. One form of compliance behavior which is emphasized for the COPD patient is smoking cessation. The documented success rates of stop-smoking programs is low, ranging from 10 to 20% and it is estimated that only approximately 17% of patients counseled by their physicians to stop smoking will do so (Ostrow, 1985).

The compliance rates of asthma patients (n = 19) to a prescribed nebulizer treatment was monitored by Spector (1985) through the use of a nebulizer chronolog, an electronic device which automatically triggers into memory a record of each time the nebulizer is activated. Results of this precise objective measure indicated a mean compliance rate of 47.4%, i.e., medications were taken four times a day as prescribed by the 19 subjects only 47.4% of the time.

Milazzo reported on a study of compliance rates in a group of 18 COPD patients at the May 1981 meeting of the American Lung

Association. Unpublished data from Milazzo's study documents mean compliance to non-medication treatments including exercise, postural drainage and utilization of diaphragmatic breathing techniques as 63%. Compliance to medication taking was reported as ranging from 85 to 275%. Compliance in this study was measured by the numbers of entries in diaries kept by subjects of medication utilized in the period of one week, with percentages over 100 percent indicating use of medications in excess of prescribed dosages.

Another unpublished study of the compliance rates of COPD patients (King, 1982) measured the overall rates of compliance to multiple facets of the therapeutic regimen, including patterns of medication usage. In this study any use of medications which differed from the therapeutic recommendations, either over or under usage, was considered to be noncompliant behavior. Stated compliance rates of 31 COPD patients in this study ranged from 41% to 98,%, with a mean compliance rate reported to be 68%.

Study of the compliance related behaviors of patients is acknowledged to be of importance from the perspective of both health care providers and the patients who are recipients of their recommendations. The measurement of patient behaviors with the goal of determining compliance has been attempted in a variety of ways. Primary differences in determination of compliance levels have been in (1) the number of behaviors measured and (2) the specification of the precise magnitude of

adherent behavior which will be termed as compliance. Compliance rates of many patients have been documented as being far below optimal levels and in those studies of COPD patients levels of compliance have been reported to be only between 45% and 65% of optimal.

Because patient well-being in a chronic disease such as COPD is dependent upon the self-management of a variety of behaviors, it would appear to be important to attend to the greater constellation of pertinent actions which are uniformly recommended to COPD patients in determining their levels of compliance behavior. The most subjective measure of compliance, self-report of patients, is acknowledged to be less precise than objective clinical measures. Nevertheless, self-report of noncompliance is reported to be an accurate representation of patient behavior. Additionally, self-report provides an inexpensive, unobstructive method of collecting information of multiple self care behaviors of chronic disease patients.

The Concept of Social Support

Conceptual Definitions of Social Support. The term social support emerged in research literature in the 1970"s and was intuitively appealing to scholars involved in the study of human behavior. The concept was not new, however, having been the focus of Rogers (1942) many years earlier when he placed supportive behavior central to his theory of counseling. Conceptually, social support has been a generic term for which literature documents lack of consensus regarding definition.

Lin, Simeone, Ensel and Kuo (1979) have defined social support globally as "support accessible to an individual through social ties to other individuals, groups and the larger community". House and Kahn (1985) cite definitions of social support which emphasize the structural qualities of support, such as the numbers of social contacts and the interrelatedness between those contacts, and those definitions which emphasize the functional qualities of support. The functionally based definitions focus on "the degree to which the relationships involve flows of affect or emotional concern, instrumental or tangible aid, information and the like" (House and Kahn, 1985).

Schaefer, Coyne and Lazarus (1981) recognized the presence of multiple components of social support and studied the relationship between social network size and three varieties of perceived social support (tangible, emotional and informational) to stressful life events, psychological symptoms and health status. Their research demonstrated differential relationships between the components of support and outcome, substantiating the multidimensional nature of the concept of social support. Wallston, Alagna, DeVellis and DeVellis (1983) also recognized multiple facets of the concept of social support and attempted to order definitions in current literature along three dimensions; (1) qualitative versus quantitative, (2) instrumental versus instrumental and (3) those based on the source of support.

Robert Weiss (1974) proposed a comprehensive view of what individuals receive through their relationships with other people. Although not set forth as a model of "social support", the model defines six different affiliative needs which are satisfied through social relationships. Table 1 provides definitions for the six provisions of social relationships as described by Weiss.

Weiss postulated that it was necessary for an individual to experience relationships which provide all six of the social provisions in order to exhibit optimum adjustment. He stated that although the importance of different provisions may vary from person to person, the lack of any provision would result in a particular form of distress. Additionally, Weiss postulated that different types of social relationships become specialized and may serve to provide varying social provisions. For example, work relationships might be expected to provide reassurance of worth, while friendships might provide reliable alliance and social interaction.

Cobb's (1976) conceptualization of social support closely parallels the six definitions of social provisions postulated by Weiss (1974). Cobb hypothesized that social support was comprised of (1) emotional support which leads a person to believe that they are cared for and loved (attachment), (2) network support which leads a person to believe that they have a defined position in a network of communication and mutual obligation (social interaction), (3) esteem support which leads

Table 1. Definitions of Social Provisions (Weiss, 1974).

Attachment	Provided by relationships where the person receives a sense of safety and security.
Social Interaction	Provided by a network of relationships where individuals share interests and concerns.
Reassurance of Worth	Provided by relationships where the individual's skills and abilities are recognized by others.
Reliable Alliance	Provided by relationships where the individual can count on assistance under any circumstances.
Guidance	Provided by relationships with trustworthy and authoratitive others who provide advice.
Nurturance	Provided by relationships where the individual feels responsible for the well-being of another person.

a person to believe they are esteemed and valued (reassurance of worth), (4) instrumental support which guides the person to better coping and to maximizing their participation and autonomy (guidance), (5) material support which provides the person with necessary goods and services (reliable alliance), and (6) active support which provides active care taking (nuturance).

Operationalization of Social Support. Although conceptual definitions differ to some degree from study to study, the majority of definitions do address social support as a multifaceted construct which has both structural and functional qualities. The structural aspects of an individual's perceived

support group have been addressed in terms of quantitative characteristics such as size, accessibility, frequency of contact, stability over time and density. The functional aspects of social support have been addressed most frequently in terms of qualitative characteristics and have sometimes been differentiated into functional aspects of support which are tangible (or instrumental) and functional aspects of support which are emotional.

The object of social support measures has been to gauge the support which an individual perceives as being available to themself. Operationalization has varied, however, from one or two global items such as marital status and living arrangement which have been assumed to infer support to scales of from 50 to 100 items composed specifically to tap the multiple facets theorized to make up social support. Recent discussions in the literature by a number of researchers in the area of social support (Levy, 1986; Wortman, 1984; House and Kahn, 1985; Thoits, 1982; Wallston, Alagna, DeVellis and DeVellis, 1983) have appealed to researchers to employ multiple measures of support for a variety of reasons.

Wortman (1984) emphasizes the importance of measuring support in a way that will permit assessment of distinct types of support because available evidence suggests differential impact of varying types of support. House and Kahn (1985) urge attention to both the structural and functional properties of support because of their logical and empirical interrelatedness.

A wide variety of methods for measuring social support have been reported in the literature. The Social Relationship Scale utilized by McFarlane, Neale, Norman, Roy and Steiner (1981) required subjects to list supportive persons and their relationship relevant to specific stress producing situations and rate the degree of helpfulness of each person listed. Kaplan (1981) used seven sets of vignettes in a story format depicting varying degrees of social support qualities and subjects were asked to mark the vignette most like their perception of their own situation.

A social support questionnaire developed by Norbeck (1981, 1983) requires that subjects list significant support persons and their relationship to the subject. The subject then responds to eight questions regarding the amount of perceived support received from each of the listed persons in situations calling for either tangible or emotional support. Gore (1978) used a thirteen-item index covering the individual's perception of spouse, friends and relatives as either supportive or unsupportive (8 items), frequency of activity outside the home (3 items) and opportunities for interactions (2 items).

A psychometric review of social support scales (Rock et al, 1984) documented that many scales are developed without utilization of acknowledged measurement technology with regard to scaling, reliability and validity. Another review of social support scales (House & Kahn, 1985) cites the frequent neglect of researchers to measure both the structural and functional

dimensions of social support. Both the failure to utilize and report appropriate psychometric properties of social support scales and the failure to measure the multiple dimensions of social support have been cited as factors resulting in a limited understanding of an important concept (Wortman, 1984; House & Kahn, 1985; Barrera & Ainlay, 1983; Kahn & Antonucci, 1980).

Studies of the Relationship of Social Support to Compliance. Social support has been widely acknowledged as a factor in the health and well-being of patients. Haynes and Sackett (1979) reviewed 22 research articles in which support relevant variables were measured in relation to patient levels of compliance. One study was reported which gave evidence contrary to the hypothesis that social support is positively associated with compliance, six studies found no association and 15 reported positive relationships.

In one early longitudinal study, Davis and Eichhorn (1963) studied compliance rates of cardiac patients as they persisted over a four year time span. In this study group (n = 369) 52 percent reported being highly influenced by family and friends. Fifty percent of those patients reported being highly influenced by friends and relatives continued compliant behavior over the four years as compared to 34 percent of those patients who reported that they were only slightly influenced by family and friends.

The supportive effect of pharmacy services on a group of 50 patients with hypertension was studied by McKenney and

colleagues (1973). Patients were randomly selected for a control group (n = 25) or a study group (n = 25) where each subject was seen once monthly by a pharmacist for a period of five months. The pharmacist evaluated problems reported by the patients, therapeutic responses to medicinal and diet prescriptions, and served as an additional support person for the patient. Patients in the control group received their customary care without seeing the pharmacist. Compliance was analyzed using a two-way contingency table and chi square analysis. Compliance rates in the study group were significantly greater (x^2 = 14.487, $p < .001$) than for subjects in the control group.

Haynes (1976) reported on a group of 38 Canadian steelworkers who were hypertensive and were neither compliant with their medication regimens nor at goal blood pressure six months after starting treatment. Lay support in the form of encouragement and reinforcement were provided every two weeks to subjects in the study group whose average compliance had risen by 21.3 percent over a six month period while average compliance in the control group fell by 1.5 percent.

Nelson (1978) studied a group of 142 patients under treatment for hypertension to determine levels of compliance. Interviews with patients included five items concerning the subjects rating of the frequency that family members reminded them to take prescribed medications and how much they assisted the patient in following the treatment plan. Multivariate

analysis of data did not indicate a connection between social support as measured by these five items and the subjects level of compliance.

Research on patient compliance with antihypertensive medication was also conducted by Hershey (1980). Hershey used a questionnaire to measure components of the Health Belief Model and interviews to determine patients compliance with medication taking prescriptions. A random sample of 132 patients from existing hypertension programs revealed no significant relationship between compliance and support given the patient by their family. Support given by the family was measured by one item on the questionnaire which was administered.

Experimental research designed to test the theory that emotional support should operate to increase compliance was reported on by Caplan (1979). A sample of 483 hypertensive patients were randomly assigned to a control group, a social support group and a partner group. In the social support group especially prepared nurses met with the patient, explained the regimen and how to follow it, provided encouragement by praising compliant behavior and provided the patient the opportunity to express anxiety or concern. In the partner group, a partner selected by the patient met with the nurse who explained the patients regimen, benefits to the patient and family of the patients compliance, ways of helping the patient achieve compliance, and the need to provide encouragement and reassurance to the patient. A positive correlation was found

between social support from the nurse in the social support experimental group and self-reported compliance ($r = .30$, $p < .05$).

The influence of spousal support on medication compliance of 150 men participating in the Coronary Primary Prevention Trial was analyzed by researchers at the University of Iowa (Doherty, Schrott, Metcalf and Iasiello-Vailas, 1983). The compliance of men having low support averaged 70%, significantly lower than the high support group which averaged 96% ($t = 3.64$, $df = 29$, $p < .001$).

In a longitudinal study of 432 hypertensive patients (Glanz et al, 1981) social support was used as one of four educational interventions aimed at producing change in compliance behavior. Compliance, as measured by patients self-report when interviewed, was reported by 36.9 percent of patients as having been positively effected by the social support intervention which involved a meeting with the patient, nurse and a social support person during which the social support person was instructed by the nurse in specific aspects of the patients regimen and their assistance was solicited in aiding the patient in carrying out the regimen.

Studies of Social Support in COPD Patients. Interviews conducted by Barstow (1975) with a sample of emphysema patients resulted in the reported finding that the "single most important influence on adjustment was the presence of a supportive significant other in the home". Barstow did not report on

measures used in gathering information from patients nor are study statistics reported. No measure of compliance behavior is reported in Barstow's study.

Avery (1972) examined the use of social support techniques with asthmatic patients. Comparing asthmatic patients placed in discussion groups focusing on the ways the patients could present asthma attacks with controls drawn from the same emergency room population, they found that subsequent visits to the emergency room by patients in the discussion groups during the next four months were half the number made by controls.

DeAraujo (1974) studied the average daily steroid doses needed to stabelize severe asthmatic patients (n = 36) in relation to stress and social support. Psychological assets of patients were measured using the Berle Index. Patients with little stress and much support needed 5 mg/day and those with little stress and little support needed 6.7 mg/day. Patients with much stress and much support needed 5.6 mg/day and those with much stress and little support needed 19.6 mg/day.

Fifty-nine COPD patients took part in an experimental study designed to investigate differences occurring in patients who took part in pulmonary rehabilitation groups and self-help groups (Jensen, 1983). After measures of social support and life stress were obtained, patients were randomly assigned to one of the two experimental groups or to a waiting-list control group. Patients were classified as either "high risk", those with high life stress and low social support, or "low risk",

those with low life stress and high social support. Six months after initiation of the study, a records review showed that high risk control patients were hospitalized more often than low risk patients and for more days than high risk patients in rehabilitation and self-help support groups.

Discriminent analysis determined that social support and life stress scores predicted subsequent hospitalizations, but age, sex, previous hospitalizations and severity of illness did not. For severely ill patients in this study (FEV_1 60), social support scores were the major factor discriminating between those who required hospitalization during the six month period and those who did not. The distributions of social support scores were not described for the COPD patients participating in this study, and compliance was not a variable which was measured.

Social support of COPD patients was also measured by King (1982). With a possible score of 100 on 25 items measuring both tangible and intangible support of COPD patients, subjects responses ranged from 49 to 99. The mean score for social support in these 31 COPD patients was 74. Correlational analyses in this study showed social support to be related ($r = -.44$, $p < .01$) to patient perceptions of impact of COPD upon their daily life, indicating that those patients who perceived greater social support also perceived that their disease was less disruptive of their daily life. Relationships between

social support and compliance were sought in this study, but were not found to be significant.

Although both the specific conceptual definitions and corresponding operationalization of social support have shown considerable variance in the literature, the concept has, nevertheless, been associated with decreased need for medication, decreased emergency room visits, increased life satisfaction and increased compliance behavior. Social support has previously been conceptualized and measured in terms of both structure and function. One form of conceptualization, that of the provisions of social support to an individual, incorporates both the functional and structural dimensions of the concept.

The Concept of Health Self-Determinism

Conceptual definition of Health Self-Determinism. The concept of health self-determinism attempts to capture the motivational components of health behavior. The concept of health self-determinism has been derived from Deci's (1975, 1980) cognitive evaluation theory of intrinsic motivation. This theory postulates that people need to experience themselves as competent and self-determining in their interactions with and adaptation to their environment. According to this theory the experience of feeling competent and self-determining provides an intrinsic reward for the individual which serves to reinforce the behavior (Cox, 1985).

Deci, Nezlek and Sheinman (1981) maintain that a sense of competency and self-determinism of any individual is associated

with a motivational subsystem. The intrinsic motivational subsystem is characterized by "active, independent decision-making, managing motives effectively, responsiveness to internal cues, feelings of self-determinism and a high degree of perceived competence. The extrinsic motivational subsystem involves a greater response to external cues and little active decision-making; thus the individual primarily engages in those behaviors for which the rewards for performing the behavior are more meaningful than the feelings that the behavior engenders" (Cox, 1985).

Operationalization of Health Self-Determinism. Motivation relative to health behaviors has been regarded as a multidimensional concept and the manner in which the concept has been operationalized reflects several related constructs which have previously been theorized. The specific dimensions of the concept of health self-determinism which have been previously operationalized and studied include internal/external cue responsiveness, which is related to the concept of locus of control (Rotter, Lefcourt), and perceived competency in health matters which is related to Bandura's conceptualization of self-efficacy.

Locus of control, which was initially conceptualized by Rotter (1966) as a social learning theory construct, refers to a continuum of personal beliefs ranging from the expectation that one's own actions determine outcomes (internal) to the belief that either fate or external others are causal forces in

personal outcomes (external). In the area of health behaviors the construct of locus of control has been adapted by Wallston et al (1976) and operationalized with the Health Locus of Control (HLC) scale. The HLC scale has been used to examine weight loss programs, health information seeking behaviors (Wallston et al, 1978), patient participation in clinic visits (Rotter, 1979), compliance of hypertensive patients (Lewis, Marisky and Flynn, 1978) and cardiovascular health status (Brousseau and Mallinger, 1981).

The concept of self-efficacy, central to another approach to social learning theory espoused by Bandura, is closely allied to the concept of perceived competency which is included in the Health Self-Determinism construct. According to Bandura (1977), efficacy and outcome expectations need to be differentiated because "individuals can come to believe that a particular course of action will result in certain outcomes but question whether they can perform those actions". Self-efficacy is a concept which has been determined to be of particular relevance to the field of health education (Strecher, DeVellis, Becker & Rosenstock, 1986).

Studies of the Relationship of Health Self-Determinism to Compliance. The concept of Health Self-Determinism has not been studied relative to it's association with compliance behaviors. However, both the related concepts of locus of control and self-efficacy have been the subject of compliance related research.

Findings on the relationship between health related locus of control and compliance to therapeutic regimens have been mixed. In a review of research studying the linkage of locus of control, Wallston and Wallston (1981) report on studies where locus of control was positively related to compliance as measured by drug assays, sodium intake and weight gain. They also describe some studies finding no relationship and some reporting negative relationships between locus of control and compliance. The overall conclusion in this review of the literature was that positive compliance behavior was more often related to external locus of control than to internal.

Chavez and Michaels (1980) examined the relationship between locus of control and weight loss in a behavior modification weight loss program. Internal subjects, who initially weighed significantly more than external subjects, lost more weight than those subjects with an external locus of control.

In another study, Jordan-Marsh and Neutra (1985) examined the relationship between locus of control and physical changes over a 6-month period in 339 subjects who participated in lifestyle change programs at a California wellness center. Subjects in this study who had external locus of control scores were significantly more likely to exhibit weight loss after six months, as well as significant decreases in serum triglyceride levers and cholesterol high density lipoprotein ratios. No positive health changes were found to be related to internal locus of control in this six month program.

The utility of the self-efficacy concept was evaluated relative to smoking cessation programs which were studied by Candiotte and Lichtenstein (1981). In this study the smoking behaviors and self-efficacy assessments of 78 smokers from two smoking cessation programs were measured pretreatment, post treatment and three months following treatment. A microanalysis revealed an extremely high correspondence between the cluster of smoking situations in which relapsing subjects experienced a low degree of self-efficacy and the situation in which relapse first occurred. Regression analysis revealed that the higher the level of perceived self-efficacy at the completion of the smoking cessation program, the greater the probability that subjects would remain abstinent throughout the entire experimental period ($r = .62$, $F(6, 71) = 6.4$, $p < .0001$).

Studies of Health Self-Determinism in COPD Patients. The concept of Health Self-Determinism has not previously been tested in a group of patients with COPD. One study of COPD patients which utilized the related concepts of locus of control and self-efficacy was located. Kaplan, Atkins and Reinsch (1984) report on a study of 60 COPD patients for whom measures of both locus of control and self-efficacy were related to responses to an experimental group designed to enhance exercise compliance and a control group. After three months subjects in the experimental group did exhibit significantly greater increases in activity level than did subjects in the control group.

A conclusion of this study was that a generalized health locus of control expectancy was less clearly associated with behavior change than was an expectancy of self-efficacy. Of particular interest in this study, however, was the finding that correlations between self-efficacy judgments and criterion variables tended to be significant for subjects with an internal locus of control and to be nonsignificant for those with an external locus of control. This suggests that the relationship between self-efficacy judgments and behavior may be stronger for those who hold the generalized belief that there is a relationship between their behavior and their health.

Although the specific concept of Health Self-Determinism has not been studied relative to compliance behavior or to patients afflicted with COPD it does incorporate related concepts which have been studied in these areas. The findings of Kaplan et al (1984) which indicate an interrelationship between locus of control and self-efficacy judgments lend credence to the possibility that these may be dimensions of a concept which is of value in understanding the compliance behavior of patients with chronic disease.

The Concept of Perceived Impact of Disease

Conceptual Definition of Perceived Impact of Disease. The individual perceptions of an illness experience have been the focus of theoretical discussion in the recent literature. The perceived severity of illness and the number of alterations in daily life style have been found to be factors related to the

degree of compliance in some early research studies of compliance behavior (Charney, 1967; Becker, 1972; Francis, 1969). The perceptions of an individual with respect to the severity of his illness may differ from the clinical measures of the amount of physical dysfunction which is actually present. According to Leventhal and his colleagues (1980), "regardless of their 'accuracy', illness representations can interact with disease processes in ways that are subtle". The concept of perceived impact of disease is similar to the concept which has motivated the development of the Sickness Impact Profile. Motivation for the development of this measure is characterized by Gilson and colleagues (1975) as including the belief that the behavior of an individual is the manifestation of the overall impact of illness at a given time, reflecting the effects of both the clinical and subjective dimensions, as well as their interactive effects on daily life activities.

Operationalization of Perceived Impact of Disease. Patient behaviors will most accurately reflect their perceptions regarding the severity of their physical disability. German (1981), in a review of measures of functional disability, cites three specific areas that have been addressed in the existing measures of functional disability. First, measurement of the ability to perform activities of daily living such as Katz's Index of Activities of Daily Living (Katz & Akpom, 1979) which measures capabilities in bathing, dressing, toileting, transfer, continence and feeding. Secondly is the measurement of the

degree of mobility of an individual (Densen & Jones, 1976) which assesses five levels of mobility ranging from the ability to go outside without help to confinement to bed. The third area involves assessment of the mental state of individuals, such as the Mini-Mental State measure developed at Johns Hopkins by Folstein and his colleagues (1975) which rates orientation to time and place.

LaRue et al (1979) conducted research to study the relationships of physicians ratings of health with self ratings in a sample of 69 aged individuals (mean age 84.25). Self-reports of health of the participants were significantly correlated with the ratings of the physicians which were based on physical examinations of the study participants ($x^2(1) = 10.69$, $p < .01$). The authors conclude that the results of the research suggest that self-reports can provide a valid means of health status assessment.

Bergner et al (1981) report on a Sickness Impact Profile which has been the subject of their research for a period of six years. The Sickness Impact Profile was designed to be a measure of perceived health status which would be broadly applicable across types and severities of illnesses and across demographic and cultural subgroups. The final revision of the Sickness Impact Profile resulted in 136 questions designed to measure three separate dimensions of the patients perceptions about their illness. (1) Dimension I: including physical categories such as ambulating, mobility, body care and movement. (2)

Dimension II: including psychosocial categories such as social interactions, alertness behavior and communication. (3) Dimension III: including independent categories such as sleep and rest, eating, work, home management and recreation. An adaptation of the Sickness Impact Profile was used in this study to measure perceived impact of disease because it was assumed that patient behaviors would most accurately reflect their perceptions regarding the severity of their physical disability.

Studies of the Relationship of Perceived Impact of Disease to Compliance. The concept of perceived impact of disease, specifically as defined in this study, has not been used previously in studies of patient compliance. A brief review of studies which have incorporated variables similar to perceived impact of disease in relation to compliance behavior will be presented.

Barofsky et al (1979) studied compliance in relation to quality of life assessment in 103 soft tissue sarcoma patients. Quality of life was defined in this study as consisting of (1) impact statements, including level of independence, measures of mobility and frequency of interpersonal conflict, and (2) statements of well-being, including subjective assessment of happiness, feelings of achievement and degree of identification with other persons or groups of persons. Using chi square statistics Barofsky found a significant relationship between compliance (those patients remaining in treatment) and an

increased number of changes in activities of daily living since onset of the disease ($p < .025$).

Becker et al (1972) studied motivations as predictors of compliance behavior in a group of 125 mothers whose children had been treated for otitis media and given prescriptions for a ten day course or oral penicillin. Included in measures of motivation were the mothers' perception of the problems that the illness may have created for the mother and the child. Mothers who perceived high levels of interference caused by the childs illness were significantly more likely to administer medication as prescribed ($r = .30$, $p < .05$) and to keep future clinic appointments for their child ($r = .32$, $p < .05$).

Studies of Perceived Impact of Disease in Patients with COPD. Milazzo reported on a study of compliance and perceived illness in a group of 18 COPD patients at the May 1981 meeting of the American Lung Association. Unpublished data from Milazzo's study revealed a compliance rate to non-medication treatments including exercise, postural drainage and utilization of diaphragmatic breathing techniques averaging 63 percent. Perceived illness was measured by use of a structured interview modified from Radius et al (1978). Although statistics were not reported, the patients perceptions of their illness was classified by the investigator as "very high".

A study of the life quality of patients with COPD (McSweeny, Grant, Heaton, Adams & Timms, in press) which matched 203 COPD patients and 73 health comparisons on age, sex, race and

neighborhood of residence, utilized the Sickness Impact Profile as a measure of life quality. Significant differences between the Sickness Impact Profile scores of COPD patients and the health comparison group were observed. Life quality of COPD patients, as indicated by Sickness Impact Profile scores, also showed a significant relationship with a pulmonary function severity index.

Although perceived impact of disease as defined in this study has not been the subject of a great deal of research regarding compliance related variables, several studies have been located which contains aspects of perceived impact of disease. Becker et al (1972) and Barofsky et al (1979) have published compliance study results which have included variables similar to perceived impact of disease. Milazzo's unpublished research on COPD patients (1981) included a measure of perceived illness and McSweeny et al (in press) have utilized the Sickness Impact Profile as an indicator of life quality in patients with COPD.

One other unpublished study (King, 1982) measured both compliance and perceived impact of disease in a group of COPD patients ($n = 31$). In this study a significant negative correlation was reported ($r = -.44$, $p < .01$) between perceived impact of disease and social support. Patient's reported levels of compliance in this study were not found to be significantly related to measures of perceived impact of disease.

The Concept of Clinical Severity of Disease

Conceptual Definition of Clinical Severity of Disease.

Clinical severity of disease connotes an objective physical measure of dysfunction or loss which is indicative of the physical damage incurred to an individual by the disease process which they are experiencing. In any specific disease this measure will reflect the manifestations of the disease process. For example, in patients with arthritis limitations in joint mobility will reflect severity of disease and for patients with cancer specific grading criteria have been established to reflect severity of the disease. Clinical measures of pulmonary function have been used in the determination of the clinical severity of the disease process in patients with COPD.

Operationalization of Clinical Severity of Disease. In COPD the clinical severity of disease may be measured in several ways. One common test which has routinely been used to diagnose and measure severity of the disease is pulmonary function testing. Pulmonary function testing is used to evaluate the purely mechanical abilities of the patient with regard to ventilation. The forced expiratory volume in one second (FEV_1) is a measure of the volume of air which the patient is able to forcefully expire in one second. Pulmonary function tests in the COPD patient reveal a decreased forced expiratory volume per second. As a diagnostic tool, forced expiratory volume per second is compared to norms which have been derived for persons of a similar age, sex and body size.

The results of forced expiratory volume tests are expressed by two numerical terms. First is an absolute volume of air which an individual expires in one second, expressed in liters. The second expression is the percent of predicted that the measured volume indicates for the individual when compared to norms which have been established on the basis of sex, age and body size.

Studies of the Relationship of Clinical Severity of Disease to Compliance.

As reviewed earlier in this chapter (p. 26-27), some researchers (Haynes, 1976) are unwilling to make generalizations about patient compliance on the basis of characteristics of the illness, while others (Sackett, 1976; Becker, 1979) indicate that the presence of physical symptoms is associated with increased levels of compliance behaviors. Matthews and Hingson (1981) state that "numerous studies have shown that, in general, the severity of a disorder as measured by evaluation by a physician, prior hospitalizations, or prior diagnoses is unrelated to compliance. Just the fact that a person's illness is serious, painful or life threatening does not ensure a high level of compliance."

Studies of Clinical Severity of Disease in COPD Patients.

Perry (1981) included measures of clinical severity in a report on a group of COPD patients. Measures of clinical severity in this report were based on pulmonary function tests and were presented within the format of the American Lung

Association guidelines for classification of respiratory impairment. Within this classification system patients with FEV_1 measures indicating 85% of predicted or greater are considered to be in Class 1, 70 - 85% of predicted indicates Class 2, 55 - 70% of predicted indicates Class 3 and those patients with FEV_1 measures of less than 55% of predicted are classified as Class 4. Seventy percent of Perry's sample were individuals with Class 4 respiratory impairment, 15% with Class 3 impairment and 10% with Class 2 impairment.

The same classification system was used by King (1982) in the study of 31 patients with COPD. A similar distribution of clinical severity was noted in the subjects of this study. Three percent of the subjects were classified as Class 2, 16% in Class 3 and 71% in Class 4. American Lung Association classification criteria were also used to describe 146 COPD patients who took part in an inhospital rehabilitation program (Kimbel, Kaplan, Alkalay & Lester, 1971). Of these subjects six were Class 1, 32 were Class 2, 60 were Class 3 and 25 were Class 4 in their level of respiratory impairment.

Measures of clinical severity in a group of 60 COPD patients taking part in an experimental exercise program (Kaplan, Atkins & Reinsch, 1984) were reported in terms of percent of predicted FEV_1 measures for subjects. In this study the mean percent predicted FEV_1 was reported to be 36.09, with a standard deviation of 27.02. Kass, O'Brien, Zamel and Dyksterhuis (1973) report on an additional 140 COPD patients in whom the mean

percent of predicted FEV_1 was measured to be 45 with a standard deviation of 17. Another 40 COPD patients were studied longitudinally in an effort to investigate long term adjustment and prognosis (Dudley, Verhey, Masuda, Martin & Holmes, 1969). On these 40 individuals, nine were rated as Class 3 and 31 as Class 4 in terms of respiratory impairment.

A large majority of reports of research involving COPD patients do not contain any measure of clinical severity of the disease. In those studies where such measures are reported, however, the clinical severity of the patients tends to indicate uniformly high levels of respiratory impairment.

The Concept of Congruence Between Clinical Severity and Perceived Impact of Disease

Conceptual Definition of Congruence Between Clinical Severity and Perceived Impact of Disease. The perceptions of an individual regarding the severity of their disease may differ from the actual severity of physical dysfunction caused by the disease process. Some people perceive that they are much more ill than clinical measures indicate, while others perceive their disease to be far less severe than actually exists. The concept of congruence between perceived impact and clinical severity of disease indicates a state where the perceptions of the individual regarding influence of the disease upon their daily life are consistent with the limitations placed on their function as a result of the physical disability imposed by their

disease. Brillhart (1986) defines a related concept, perceived physical reality, as "an accurate concept of the condition or state of the body that has been determined by reality testing, observation, and the opinions of reliable authorities".

Operationalization of Congruence Between Clinical Severity and Perceived Impact of Disease. Congruence between clinical severity and perceived impact of disease is a concept which is difficult to operationalize. The measures of clinical severity in most diseases are not able to be calibrated in terms of percentages of functional loss. When operationalizing the related concept of perceived physical reality, Brillhart (1986) relied on comparisons between the evaluations of individuals and health care providers regarding the level of dysfunction which was present.

Studies of the Relationship of Congruence Between Clinical Severity and Perceived Impact of Disease to Compliance. No other studies were located which investigated the relationship of congruence between perceived impact and clinical severity of disease to compliance. Those studies which have dealt individually with either perceived impact or clinical severity in relation to compliance have been addressed earlier in this review.

Studies of Congruence Between Clinical Severity and Perceived Impact of Disease in COPD Patients. No other studies were located which reported on the levels of congruence between physical impact and clinical severity of disease in COPD

patients. Other studies which have measured either perceived impact or clinical severity individually have been addressed earlier in this review.

The Concept of Depression

Conceptual Definition of Depression. Patients with COPD have been documented as frequently experiencing states of depression (Post and Collins, 1980). These patients have been characterized as individuals who "complain vociferously, refuse to follow the prescribed treatment regimen and alienate their families and the treatment staff" (Dudley et al, 1973). One common manifestation of depressive states is a lack of motivation. Depression frequently occurs in patients with COPD (Rowlett and Dudley, 1978), accompanied by both low levels of motivation and poor compliance to the prescribed treatment regimen.

The Diagnostic and Statistical Manual of Mental Disorders (DSM-III) of the American Psychiatric Association is the major psychiatric classification guide for medical practitioners. The DSM-III lists several diagnostic categories of depression characterized by an unhappy mood and loss of interest or pleasure in almost all usual activities or pastimes. This condition is relatively persistent and associated with "appetite disturbance, change in weight, psychomotor agitation or retardation, feelings of worthlessness or guilt, difficulty concentrating or thinking, and thoughts of death or suicide" (p. 210).

Operationalization of Depression. Operationalization of depression has been directly based on the DSM-III definition. According to this definition depressive episodes are indicated when there is the presence of persistent dysphoric mood or loss of interest in almost all usual activities, and at least four of the following associated symptoms; appetite or weight loss, psychomotor retardation or agitation, loss of interest or pleasure in activities, feelings of worthlessness, guilt or self-reproach, cognitive complaints, suicidal ideation or behavior.

A large number of rating scales have been developed and tested to aid in the diagnosis of depressive states. Some of these include the Hamilton Depression Scale, (HAM-D), Inventory of Psychic and Somatic Complaints of the Elderly (IPSCE), Zung Self-Rating Depression Scale (SDS), Center for Epidemiologic Studies Depression Scale (CES-D) and the Beck Depression Inventory (BDI). Additionally, the MMPI contains a depression scale as a part of a larger personality inventory. Many of these rating scales contain identical items and all have been subjected to considerable testing.

Studies of the Relationship of Depression to Compliance. Depression is not a concept which has been studied in relation to compliance behavior. Depression has been inversely linked in correlational studies, however, to both social support and locus of control.

Studies of Depression in COPD Patients. Depression is cited as a classic psychological concomitant of COPD (Dudley, Glaser, Jorgenson & Logan, 1980). McSweeny and colleagues (In Press) also state that depression is the predominant emotional disturbance reported by COPD patients and confirmed by the relatives of COPD patients. A number of studies have demonstrated significant depression in COPD patients related to limitations of the disease, role changes, social isolation and fear of the future.

In a study of life quality in COPD patients (McSweeny, Grant, Heaton, Adams & Timms, In Press) the most common psychological symptomology noted among subjects was that of reactive depression. Forty-two percent of the 203 COPD patients participating in this study exhibited symptoms of depression as measured by the MMPI, compared to 9% of the healthy matched control group. Relatives of the COPD patient subjects were also questioned in this study and the result of the inquiry indicated that relatives also viewed depression and social withdrawal as the major emotional disturbances occurring in conjunction with COPD.

Anxiety and depression accompanying physical symptoms of COPD have frequently been documented by practicing clinicians and have also been verified by psychological testing in research studies. One such study was a retrospective analysis of data from a long-term rehabilitation project at the University of Nebraska reported by Kass, Dyksterhuvis, Rubin and Patil

(1975). One hundred and forty-seven patients with COPD and in varying degrees of respiratory and psychological disability were admitted to the 24 day rehabilitation program. Testing with the MMPI revealed above average levels of depression in the subjects who took part in this study.

Another study in a rehabilitation unit was conducted at Case Western Reserve (Agle, Baum, Chester, and Wendt, 1973). In this study (n = 23) the MMPI and several psychiatric interviews were used to assess mental and emotional functioning. MMPI scores and psychiatric interviews documented various degrees of depression for 17 of the 23 subjects. Subjects complained of sadness, tearfulness, lack of motivation, a sense of worthlessness, anorexia, and insomnia, and a few expressed suicidal ideation.

Depression, when it has been measured in COPD patients, has been found to occur at rates which are considerably higher than the approximate 15% of community dwelling individuals in comparable age categories (Blazer, 1986). Although the relationship of depression and compliance have not been specifically tested, there is reason to believe that the levels of motivation essential for consistent compliance behavior may be associated with emotional states of patients.

CHAPTER III

METHODOLOGY

The purpose of this study was to investigate compliance behaviors in patients with chronic obstructive pulmonary disease (COPD). In the study the variables of social support, health self-determinism, perceived impact of disease, clinical severity of disease, congruence between clinical severity and perceived impact of disease and depression were linked in theoretical models. Described in Chapter III are (a) the sample, (b) measures, (c) procedures, (d) research hypotheses and (e) analysis.

The Sample

The sample was comprised of 80 individuals who met the following study criteria;

(1) Medical diagnosis and currently under medical treatment for COPD,

(2) Able to read and write in the English language,

(3) Access to a telephone for explanation of the study, and

(4) Not currently diagnosed and/or under medical treatment for alcoholism or psychiatric illness.

A total of 100 individuals who met the criteria of the study were contacted and received study questionnaires. Of that number, three subjects expired before returning the questionnaire, three subjects became too ill to complete the questionnaire, ten subjects returned questionnaires which were blank or incomplete and four subjects did not respond after receiving the questionnaire. Sociodemographic and clinical characteristics of the sample of 80 respondents are summarized in the following section.

Sociodemographic Characteristics. Subjects ranged in age from 41 years to 87 years with a mean of just over 66 years of age. A summary of the age distribution of subjects is presented in Table 2.

Table 2. Age distribution of study participants (n = 80).

Age Range	Number of Subjects	Percent of Sample
40-49	4	5.0
50-59	13	16.2
60-69	33	41.3
70-79	27	33.7
80-89	3	3.8
Total	80	100.0

The sex of subjects was evenly distributed, with 39 males and 41 females participating in the study. Relative to race, one subject listed their race as black and all other participants classified themselves as white. Nine subjects (11.2%) were employed, while one reported that they were

unemployed and 47 (58.7%) were retired. An additional nine subjects (11.2%) were disabled and 14 (17.5%) listed their work status as "housewife". Income levels were reported by 73 of the subjects and are summarized in Table 3.

Table 3. Income levels reported by subjects (n = 73).

Annual Income	Number of Subjects	Percent of Reported
Less than 10,000	11	15.1
10,000-19,999	20	27.4
20,000-29,999	18	24.6
30,000-39,999	14	17.8
40,000 and above	10	16.1
Total	73	100.0

Twenty-two percent (n = 18) of the subjects reported an education of less than high school completion and 43 (54%) reported some level of education past high school. The educational level of subjects is summarized in Table 4.

Table 4. Educational level of subjects (n = 80).

Educational Level	Number of Subjects	Percent of Sample
> High School	18	22.5
Graduated H. S.	19	23.7
Technical Training	15	18.8
Some College	16	20.0
Graduated College	12	14.9
Total	80	100.0

Clinical Characteristics. All subjects reported that they did have a chronic obstructive pulmonary disease. Subjects reported being diagnosed with COPD for a median of from

three to five years. Forty six (57.5%) of the subjects also reported having at least one other chronic disease. Other diseases reported by subjects included arthritis (n = 17, 21.2%), hypertension (n = 13, 16.2%), heart disease (n = 5, 6.3%), cancer (n = 4, 5%), diabetes (n = 2, 2.5%), and ulcer (n = 1, 1.2%).

All of the subjects reported that they did experience some difficulty in breathing. Subjects were asked to respond to specific examples of activities which caused them shortness of breath. Examples were created using the behavioral criteria for classification of respiratory impairment published by the American Lung Association (1977). The classes of respiratory impairment and associated behavioral criteria presented for response by study participants are;

Class 1 (no impairment): Dyspnea occurring only when doing very strenuous activity.

Class 2 (20-30% impairment): Dyspnea occurring when climbing hills or stairs but not during normal daily activities.

Class 3 (40-50% impairment): Dyspnea occurring sometimes during normal activities but not while at rest.

Class 4 (60-90% impairment): Dyspnea occurring sometimes at rest and frequently during normal daily activities.

Distribution of responses to the question of activities which resulted in respiratory distress expressed by class of respiratory impairment are presented in Table 5.

Table 5. Class of Respiratory Impairment as Determined by Reported Activities Causing Dyspnea (n = 79).

Class of Impairment	Number of Subjects	Percent of Sample
Class 1	9	11.4
Class 2	6	7.6
Class 3	31	39.2
Class 4	33	41.8
Total	79	100.00

Pulmonary function test (FEV_1) results were recorded for all subjects. These results were then classified in accordance with the classes of respiratory impairment utilized by the American Lung Association (1977) as follows:

Class 1 (no impairment): FEV_1 not less than 85 percent of predicted.

Class 2 (20-30% impairment): FEV_1 of 70 to 85 percent of predicted.

Class 3 (40-50% impairment): FEV_1 of 55 to 70 percent of predicted.

Class 4 (60-90% impairment): FEV_1 less that 55 percent of predicted.

Distribution of pulmonary function test results for subjects expressed by classification of respiratory impairment are summarized in Table 6.

Table 6. Classification of Respiratory Impairment of Subjects According to Pulmonary Function Test (n = 80).

Class of Impairment	Number of Subjects	Percent of Sample
Class 1	2	2.5
Class 2	8	10.0
Class 3	15	18.7
Class 4	55	68.8
Total	80	100.0

Forty seven (58.7%) of the subjects reported that they had not been hospitalized for treatment of a COPD related problem during the past 12 months, 22 (27.4%) had been hospitalized one or two times, and 11 had been hospitalized more than twice (from three to eight hospitalizations) during the past year.

Measures

The following discussion of measures will describe (1) the definition used for the concept to be measured, (2) a description of the scale and scoring used to operationalize the concept, (3) a review of the psychometric qualities exhibited by the measure in prior research and (4) a description of psychometric qualities of the measure in this study. Measures will be described for each of the study variables; compliance, social support, health self-determinism, perceptions of the impact of the disease on daily life, clinical severity of the disease, congruence between clinical severity and perceived impact of disease and depression.

Compliance. Compliance was defined as the extent to which the patient reports that he/she carries out the therapeutic recommendations of health care providers concerning prescribed

medications, behavioral modification (stress management, cigarette smoking, relaxation techniques), exercise, postural drainage, methods of preventing infection and follow-up care.

Compliance was measured by the use of 23 questions (Appendix C) which measured the subjects stated frequency of compliance with the recommendations of health care providers in areas as stated in the study definition of compliance. The format of the questions was a statement of action followed by a five point Likert type scale on which the subject was able to indicate whether they carried out that action all of the time, more than one-half of the time, one-half of the time, less than one-half of the time or never.

The degree of compliance was ascertained by assigning a numerical score to each of the possible responses such that a high score was indicative of a high degree of compliance. For example:

"I practice relaxed breathing when short of breath"

Always	More than one-half the time	One-half the time	Less than one-half the time	Never
(4)	(3)	(2)	(1)	(0)

Scoring was reversed for questions which were negatively phrased. For example:

"I forget to schedule check-ups with my doctor"

Always	More than one-half the time	One-half the time	Less than one-half the time	Never
(0)	(1)	(2)	(3)	(4)

The questions utilized to measure compliance were based on a review of patient education materials (Chronic Lung Disease, flip-chart teaching manual, 1974; Brecher, 1975) used at the sites where data collection took place. A panel of physicians, nurses and respiratory therapists reviewed the questions for content validity. Previous use of this instrument with a group of 31 COPD patients (King, 1982) resulted in a reliability of .76 as determined by coefficient alpha. An alpha coefficient of .75 was found to exist in the present study of COPD patients.

Social Support. Social support was defined as the degree to which the subject reports a pattern of (a) attachment, (b) social integration, (c) reliable alliance, (d) guidance, (e) reassurance of worth, and (f) opportunity for nuturance. These structural dimensions of social support were measured by use of the Social Provisions Scale (SPS) (Russell and Cutrona, 1984) which is based on Weiss's (1974) theoretical breakdown of six basic functions of social support.

The Social Provisions Scale operationalizes each provision with two positive and two negative statements concerning the degree to which each facet of support is available from family, friends and others in the social network (Appendix C). Respondents answer on a four-point scale ranging from "strongly agree" to "strongly disagree". Scores for each provision subscale thus range from four, indicating unavailability of the provision in the social network, to 16, indicating its availability (Cutrona, 1984; Russell & Cutrona, 1984).

The Social Provisions Scale was tested on a random sample of 494 community living older adults (Blieszner & Mancini, 1985) to establish the psychometric properties of the instrument. Alpha coefficients for the subscales ranged from .75 to .86, showing satisfactory internal consistency for each subscale. Convergent validity for the Social Provisions Scale was demonstrated by a significant and positive correlation with morale (as measured by the Philadelphia Geriatric Center Morale Scale), with reported closeness to adult children, and with frequency of contact with friends. Discriminent validity was established by the absence of significant correlation between the Social Provisions Scale and reported levels of conflict with adult children.

Further evidence of the validity of the Social Provisions Scale was provided by Cutrona's (1982) findings in a study of college age subjects that scores on the six social provisions explained 66% of the variance in scores on the UCLA Loneliness Scale. In another study of 300 teachers (Russell & Cutrona, 1984), confirmatory factor analysis indicated that the factor structure provided a good fit to the data. Social Provisions Scale scores in this sample were also found to be predictive of loneliness and depression. An additional test of the Social Provisions Scale conducted by Cutrona, Russell & Rose (1984) using a sample of 100 older adults resulted in alpha coefficients ranging from .76 to .84 for the subscales, with an alpha coefficient of .92 for the scale as a whole.

In this study internal consistency for the subscales, as measured by alpha coefficient ranged from .79 to .90, with an alpha coefficient of .96 for the scale as a whole. Specific indices of internal consistency for each subscale in this study are presented in Table 7.

Table 7. Alpha Coefficients for Social Provisions Scale.

Subscale	Alpha Coefficient
Attachment	.82
Opportunity for Nuturance	.83
Guidance	.90
Social Interaction	.85
Reassurance of Worth	.79
Reliable Alliance	.89
Total Scale	.96

Evidence of concurrent validity for the Social Provisions Scale is provided in this sample by a positive and significant correlation of $r = .28$ ($p < .01$) with the number and frequency of contacts with family and friends indicated by subjects. The Social Provisions Scale was also found to correlate significantly ($r = -.39$, $p < .001$) with depression levels reported by the subjects in this study, indicating further evidence for the validity of the instrument. Interscale correlations for the Social Provisions Scale in this sample are summarized in Table 8. It may be noted from Table 8 that most interscale correlations are below .60, indicating that the subscales are measuring relatively unique dimensions of the

concept of social support. The most notable exceptions are the subscales of attachment and reliable alliance which logically would correlate more strongly with one another.

Table 8. Interscale Correlations for the Social Provisions Scale.

	Nurtur	Attach	Guidance	Interact	Worth	Alliance
Nur	1.00					
Att	.34	1.00				
Gui	.17	.63	1.00			
Int	.46	.63	.51	1.00		
Wor	.36	.41	.47	.48	1.00	
All	.32	.70	.63	.53	.37	1.00

* $p < .0001$ for all correlations

Health Self-Determinism. Health self-determinism is defined in this study as the type and strength of the COPD patients motivational status relative to (a) perceived competency in health matters, (b) internal/external cue responsiveness, (c) self-determinism in health judgment and (d) self-determinism in health behavior. The Health Self-Determinism Index (HSDI) was used as a measure of this concept. The Health Self-Determinism Index is composed of 20 Likert format items divided evenly over the following four subscales; (1) self-determined health judgments, (2) self-determined health behavior, (3) perceived sense of competency in health matters, and (4) responsiveness to internal-external cues. The subscales correspond to the theoretical description of the components of an intrinsically

motivated person; self-determined in judgment and behavior, feelings of competency and responsiveness to internal cues.

Half of the 20 items are worded in such a way that a "strongly agree" response indicates a strong sense of self-determinism and competency regarding health behavior. The other half of the items are worded more extrinsically so that respondents who are in strong agreement with these items reflect little or no self-determinism in health judgments and behavior, decreased feelings of competency about their own health, and a greater responsiveness to external cues. In terms of item order, no two consecutive items are from the same subscale, and no more than two consecutive items are keyed in the same direction.

Each intrinsically worded item is scored on a scale of one to five; a score of five indicating the maximum intrinsic response and a score of one indicating the maximum extrinsic response. Similiarly, each extrinsically worded item is on a five-point scale where five indicates the maximum extrinsic response and one indicates the maximum intrinsic response. For analysis, all extrinsically worded items are subsequently reverse scored so that all items can be scored in the same direction (e.g., 5 = intrinsic, 1 = extrinsic).

The Health Self-Determinism Index was administered via mail survey to a group of 202 randomly selected adults for the purpose of psychometric testing (Cox, 1985). An overall alpha coefficient of .84 was reported and the presence of four unique

subscales was supported through factor analysis. The intercorrelations between subscales were uniformly low, indicating that each subscale did measure a unique dimension of the construct of health self-determinism.

The alpha coefficients computed for the Health Self-Determinism Index in this study were much weaker than those reported in the literature. The alpha coefficient for the total scale was .62 after deleting two items (item 18 and item 20) which correlated negatively with both their respective subscales and with the scale as a whole. Table 9 summarizes the alpha coefficients computed for the Health Self-Determinism Index in this study.

Table 9. Alpha coefficients for Health Self-Determinism Index.

Subscale	Alpha Coefficient
Self-Determinism in Health Beliefs	.30
Internal/External Locus of Control	.47
Self-Determinism in Health Judgments	.29
Perceived Competency in Health Matters	.63
Total Scale	.62

Interscale correlations for all subscales were uniformly low, indicating that the subscales were indeed measuring unique dimensions of the concept of health self-determinism. The interscale correlations for each of the subscales of the Health Self-Determinism Index and correlations of each subscale with the total index are summarized in Table 10.

Table 10. Interscale Correlations for Health Self-Determinism Index.

	Scale 1	Scale 2	Scale 3	Scale 4
Scale 1	1.00			
Scale 2	.04	1.00		
Scale 3	.15	.21	1.00	
Scale 4	.01	.17	.07	1.00
Total Scale	.39	.63	.58	.56

Scale 1 = Self-Determinism in Health Beliefs
Scale 2 = Internal/External Locus of Control
Scale 3 = Self-Determinism in Health Judgments
Scale 4 = Perceived Competency in Health Matters

Perceived impact of disease. Perceived impact of disease was defined by the number of changes necessitated by symptoms of COPD which were reported by the patient in relation to social activities and functional ability to perform customary activities of daily living. Perceived impact of disease was measured using items adapted from the Sickness Impact Profile developed by Bergner and colleagues (1976, 1981). The Sickness Impact Profile is a behaviorally based measure of health status. This measure was utilized because it was assumed that patient behaviors will most accurately reflect their perceptions regarding the severity of their physical disability. The Sickness Impact Profile was developed to provide a measure of perceived health status which is sensitive enough to detect changes in health status that occur over time or between groups. The Sickness Impact Profile contains statements about health related dysfunction in several areas of normal daily

activity. The subject is asked to respond to each statement in either agreement or disagreement that the statement is descriptive of their own behavior and is related to their health.

Bergner et al (1981) reported on the psychometric properties of the Sickness Impact Profile following six years of development and testing of the instrument. The final revision of the Sickness Impact Profile resulted in 136 questions designed to measure three seperate dimensions of the patients perceptions about their illness. (1) Dimension I: including physical categories such as ambulation, mobility, body care and movement. (2) Dimension II: including psychosocial categories such as social interaction, alertness behavior, and communication. (3) Dimension III: including independent categories such as sleep and rest, eating, work, home management and recreation.

In a field test of the final revision of the Sickness Impact Profile utilizing a stratified random sample of 696 individuals, Bergner et at (1981) report two reliability measures. Test-retest reliability yielded an $r = .97$ and internal consistency analysis resulted in an $r = .94$. Validity measures included correlating self-assessment by patients with the result of the Sickness Impact Profile ($r = .56$) and correlating results of the National Health Interview with the Sickness Impact Profile ($r = .52$).

The perceived impact of disease questionnaire used in this study was adapted from the Sickness Impact Profile and was pilot tested with a group of 31 COPD patients with physical and demographic characteristics similar to the subjects in this study (King, 1982). Coefficient alpha for the scale in that pilot test was computed to be .90. In this study an alpha coefficient of .79 was computed for the perceived impact of disease scale.

Clinical severity of disease. Clinical severity was defined as the patient's level of lung capacity as measured by pulmonary function tests (FEV_1) relative to norms established relative to age, body size and gender of the individual. A discussion of clinical severity and the results of FEV_1 tests for the subjects of this study have been presented earlier in this chapter (see pages 66-68). The FEV_1 value which has been used to operationalize clinical severity of disease in this study is the percent of predicted forced expiratory volume in one second. That value is presented in the form of a percentage.

Congruence between clinical severity of disease and perceived impact of disease. Congruence between clinical severity and perceived impact of disease has been defined as an index indicating the degree to which the patients reported perceptions of the impact of disease are consistent with the level of lung capacity as measured by clinical pulmonary function tests. The index used to indicate congruence between clinical severity of disease and perceived impact of disease was

composed of two percentage measures; (1) the percent of lung disability which was indicated by FEV_1 testing and (2) the percent of total possible impact of disease reported by the subject. Percent of lung disability was calculated by subtracting percent of predicted FEV_1 from 100. Percent of total possible impact of disease reported by the subject was computed as a percentage measure directly obtained from responses to the Perceived Impact of Disease questionnaire. High values for each component of the ratio, respectively, indicate high levels of clinical severity of lung disease and high levels of perceived impact of disease.

Congruence between clinical severity and perceived impact of disease was approached in two ways. First, in order to determine an indicator of the magnitude of the difference between clinical severity and perceived impact the percent of possible perceived impact score is subtracted from the pulmonary function test results and squared in order to obtain a positive interger in the following manner;

$$(\%\ \text{Clinical Severity} - \%\ \text{Perceived Impact})^2$$

The results range from one, indicating perfect agreement between clinical severity and perceived impact, to 2116. Higher scores indicate greater discrepency between percent of clinical severity and percent of perceived impact but do not give an indication of the direction of discrepency.

Lack of congruence between the percent of clinical severity and percent of perceived impact of disease may take two forms.

Patients may perceive that they are being affected by COPD to a greater or lesser magnitude than their measured level of pulmonary dysfunction. Therefore a ratio to indicate the direction of discrepency was constructed in the following manner;

(% Clinical Severity / % Perceived Impact)

Use of this ratio results in an index where 1 indicates perfect agreement between the percent of clinical severity and the percent of perceived impact of disease, and values above and below one indicate the direction of difference between the two scores.

For example, an individual who has FEV_1 test results indicating that they have 50% of their predicted pulmonary function, and who has responded to questions on the Perceived Impact of Disease questionnaire so as to obtain 50% of the total possible will have a Congruence Index score of 1. If that same individual, with FEV_1 of 50%, responded to only 30% of the possible total on the Perceived Impact of Disease questionnaire their congruence ratio would be 50:30 with an index score of 1.66. Conversely, if the individual with an FEV_1 of 50% responded to 70% of the total on the Perceived Impact of Disease questionnaire their congruence ratio would be 50:70 with an index score of .71.

Depression. Depression was defined as the degree to which the COPD patient reported symptoms of depression as measured by

the Beck Depression Inventory. This scale is contained in Appendix C. The Beck Depression Inventory (BDI) is a 21-item, multiple choice self-report depressive symptom scale. For each item, respondents must choose among four statements representing increasingly severe instances of the depressive symptom (e.g., ranging from the absence of the symptom, which is scored 0, to extreme severity, which is scored 3 in this measure).

The Beck Depression Inventory was developed through systematic observations of depressed clients (n = 409) to measure the behavioral manifestations of depression. The instrument has exhibited a high degree of reliability between clinical judgments and self-reported scores of patients. In the initial testing of the instrument complete agreement was observed in 56% of the cases and more than one degree of disparity was found in only 3%. The instrument has been found to be capable of discriminating effectively between patients with varying degrees of depression.

Acceptable psychometric properties for the Beck Depression Inventory have been established in many studies. Both adequate reliability and concurrent validity with the Schedule for Affective Disorders and Schizophrenia and the Research Diagnostic Criteria have been documented in independent samples of adults over the age of 60. In this study a reliability of .72 was computed for the Beck Depression Inventory using coefficient alpha.

Summary of Study Measures. A summary of the measures of study variables used in this study, along with their reliability indicators in terms of alpha coefficients, is shown in Table 11.

Table 11. Summary of Study Variables and Measures.

Variable	Measure	Coefficient Alpha
Compliance	Compliance Behavior Scale	.75
Social Support	Social Provisions Scale	.96
Perceived Impact of Disease	Scale adapted from Sickness Impact Profile	.79
Health Self-Determinism	Health Self-Determinism Index	.62
Depression	Beck Depression Inventory	.72
Clinical Severity of Disease	FEV_1	NA
Congruence between Clinical Severity and Perceived Impact of Disease	Ratio between FEV_1 and Perceived Impact of Disease	NA

Procedures

Data collection sites were contacted with the assistance of the American Lung Association of Michigan (see Appendix B for American Lung Association letter of support). The program director of the American Lung Association of Michigan provided letters to selected pulmonary physicians and pulmonary rehabilitation program directors describing the proposed study and soliciting their cooperation in contacting potential subjects. Sites were located in Kalamazoo, Flint, Detroit and Lansing, Michigan.

The purpose and protocol of the study was described to appropriate personnel within each collection site agreeing to assist in the study. A written list of criteria for inclusion in the study, overview of the methodology, copies of the study questionnaires (Appendix C) and a copy of UCRIHS approval were given to staff at participating collection sites. Approval for conducting research was obtained through organizational channels at sites which had formal structures in place (Appendix B).

Caseloads from each collection site were screened by or with the assistance of staff from the site. Those patients meeting criteria of the study were mailed a letter of introduction and post card for return to the researcher. Each letter was reproduced on the letterhead of the data collection site and contained the signature of the director or physician of the site.

The letter of introduction from the data collection site contained a description of the study, it's purpose, and expectations of subjects agreeing to participate. Assurances of anonymity and confidentiality, as well as the offer to answer any possible questions was included in each letter. Additionally, potential subjects were assured that their decision to participate or reject participation in the study did not affect their customary care and that if, after agreeing to participate, they should decide to withdraw from the study they would not be penalized.

Each letter included a stamped post card, addressed to the researcher, on which the individual was able to check that they "would like to know more about the study", "would like to participate in the study", or were "not interested in participating in the study". Potential subjects were asked to check one response, fill in their name and telephone number if they would like to have information or participate and mail the post card.

Upon receipt of completed post cards from interested individuals, the researcher telephoned the potential subject. The study was explained, assurances of human rights reiterated, questions answered and the individual was asked if they would like to take part in the study. Those persons responding affirmatively were entered into the study, assigned an identification number and asked for their mailing address.

Study questionnaires (Appendix C), along with a letter of explanation, consent form (Appendix D) and stamped, self-addressed envelope for return of the consent form and questionnaire, were mailed to each subject entered into the study. Upon receipt of completed questionnaires and consent forms, the consent for release of pulmonary function test results and letter for reporting these results was forwarded to the collection site from which the subject was obtained. Pulmonary function test results were then obtained from each individual collection site for the subjects from that site.

Each subject completing and returning a questionnaire was mailed a letter thanking them for their participation and offering them a summary of study results upon completion of the research. Post cards were included for return by those desiring a summary of results. Subjects whose questionnaires were not received after ten days were telephoned to ascertain if the questionnaire was received, if the subject had difficulty in understanding the dirrections, and if they still wished to take part in the study. Those subjects wishing to withdraw from the study were asked to return their blank questionnaire, thanked for their time and consideration and reassured of confidentiality. A complete review of all human rights assurances may be found in the UCRIHS application (Appendix D).

The procedure of pre-screening, written communication requesting a response from potential subjects and telephone explanation of study purposes and procedures has been used in

prior research (King, 1982). Using this set of procedures, along with a written protocol for telephone explanations (Appendix E), has resulted in high return rates (90-97%) in studies with from 31 to 115 subjects as well as assuring consistency in explanations provided to potential subjects.

Research Hypotheses

This study was designed to test the following research hypotheses;

I. The individual who perceives higher levels of social support will perceive lower levels of impact of the disease on their daily life.

II. The individual who exhibits higher levels of depression will perceive higher levels of impact of the disease upon their daily life.

III. High levels of clinical severity of disease will be associated with high levels of depression in the patient with COPD.

IV. High levels of health self-determinism will be associated with high levels of compliance to the therapeutic regimen.

V. High levels of congruence between the clinical severity of disease and the perceptions of impact of the disease will be associated with high levels of compliance to the therapeutic regimen.

Plan for Analysis

The specified purposes of the study and specific research hypotheses have guided the plan for analysis of the study findings. Purposes of the study included; (a) a description of subjects relative to the study variables, (b) examination of the relationships between study variables in this sample of COPD patients, (c) development and description of a variable to describe the relationship between clinical severity and perrceived impact of disease, and (d) examination of models incorporating study variables as they relate to reported compliance behavior.

Frequency distributions, range, mean and standard deviation will be computed for each variable in order to provide a description of subjects relative to study variables. Relationships between study variables will be investigated by computation of Pearson Product Moment Correlations for pairs of variables, and a correlation matrix will be constructed to display interrelationships between study variables.

When interpreting correlations it is essential to remember that the existence of a high correlation does not necessarily indicate that a causal relationship exists between the two variables. Multiple regression analysis is a method used for understanding the effects of two or more independent variables on a dependent measure. In order to test properties of the proposed models, prediction equations will be computed for each predictor variable by use of multiple regression techniques.

Structural equation models have been useful in attacking many of the substantive problems in the social and behavioral sciences. Path analysis is a way of referring to a structural equation model designed to determine the tenability of a theoretical model formulated by the researcher. The researcher designs the study on the basis of a theoretical formulation or causal model and then determines whether the resulting data are consistent or inconsistent with the model. It the data are consistent with the model it is not considered to be proof of the model, but rather to support the model. Path analysis was used to test the hypotheses of the study relative to their presentation in reference to the theoretical models depicted in Figure 1.

Beta weights were computed for each predictor variable. The path coefficients obtained are considered as indicating the direct effect of any of the independent variables on dependent variables. If the assumptions outlined in the theoretical models are tenable, path coefficients take the form of beta weights such as are used in multiple regression analysis. There is an important difference between regular regression analysis and path analysis. In regular regression analysis, a dependent variable is regressed in a single analysis on all of the independent variables under consideration.

In path analysis more than one regression analysis may be necessary. At each stage a dependent variable is regressed on the variables upon which it is assumed to depend. The resulting

betas are the path coefficients for the paths leading from the particular set of independent variables to the dependent variable under consideration.

Among the assumptions in conducting tests of structural models are (1) a normal distribution of variables and (2) a linear relationship between specifically designated variables. Bar graphs were constructed to observe for the degree to which distributions of each study variable approach normality and scatterplots were constructed between pairs of variables to check for obvious departures from linearity.

Tests of path models represented by study hypotheses, descriptive analysis of study variables and tests of association between variables will be presented in Chapter IV.

CHAPTER IV

ANALYSIS

Analysis of study findings will be presented so as to address the specified purposes of the study, the research hypotheses and supplemental findings. Purposes of the study included (a) a description of subjects relative to study variables, (b) examination of the relationships between study variables, (c) development and description of a variable which is an index of congruence between clinical severity of disease and perceived impact of disease and (d) examination of theoretical models incorporating study variables as they relate to compliance to the therapeutic regimen of a COPD patient. Study hypotheses are addressed in relation to the proposed theoretical models.

Description of Subjects Relative to Study Variables

Each study variable was addressed using descriptive statistics to determine the frequency distribution, range, mean and standard deviation.

Compliance

The range of compliance scores for the subjects in this study was from 18 to 71, out of a maximum possible score of 72.

The mean compliance score was 50.6 (S.D. = 10), 70% of the maximum possible score, where a high score indicates a high level of compliant behavior. Distribution of compliance scores is summarized in Table 12 and a graphical representation of the distribution is presented in Figure 2.

Table 12. Distribution of Compliance Scores.

Score	Number	Percent of Sample
35	4	5.0%
35-44	18	22.5%
45-54	29	36.2%
55-64	23	28.8%
65 +	6	7.5%
Total	80	100.0

Examination of responses to specific items within the compliance scale was undertaken to determine areas of behavior which were most frequently reported as being inconsistent with therapeutic recommendations. Related to medication usage, 65 of the subjects (81%) reported taking extra doses of bronchodilators when experiencing shortness of breath, but only 35% (n = 28) stated that they would report side-effects of medications to their physician immediately. The side-effects of bronchodilators may be life threatening to the patient and a systematic aspect of their regimen is instruction in recognition of the side-effects and the importance of rapid communication of such symptoms to the physician.

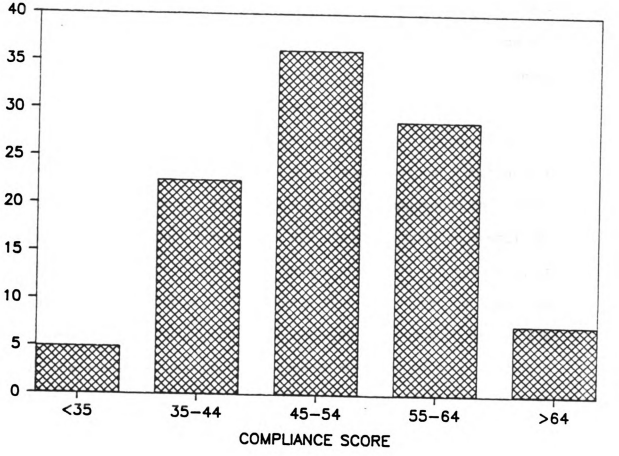

Figure 2. Distribution of Compliance Scores (n = 80).

Avoidance of respiratory irritants is another area of behavior which is consistently addressed as part of the therapeutic regimen of COPD patients. Although only five (6%) of the subjects in this study reported that they continued to smoke cigarettes, over half of the subjects (58%, n = 46) stated that they did regularly spend time in rooms where other people are smoking. Additionally, less than half of the subjects (n = 38, 47%) reported avoidance of the use of spray products and 44% (n = 35) reported that they did not make a practice of covering their face when going outside into cold weather.

Exercise is a vital part of the treatment regimen for COPD patients which serves to maintain maximum levels of function for the patient. Only 30 (38%) of the subjects in this study reported that they routinely did their recommended exercises, although 51% (n = 41) did report that they got some kind of exercise every day. The most frequent form of exercise recommended to COPD patients is walking and, distressingly, 23% of the subjects reported that they do not walk if they can avoid it.

Respiratory infections are a serious occurance for patients with COPD and health care providers consistently counsel these patients about both recognition and avoidance of infection. Ninty percent of the subjects reported that they did avoid crowds during the flu season, but only 34 (42%) reported staying away from friends or family members with colds or flu symptoms. Additionally, subjects reported that they did not make a

practice of regularly contacting their physician in the event of fever (55%), change in the color or consistency of respiratory secretions (44%) or increased shortness of breath.

Relaxation and specific breathing techniques are also important to the control of respiratory distress in patients with COPD. Only 42% (n = 34) of the subjects in this study report regularly planning activities for themselves to reduce stress and 21% (n = 17) state that they make a consious effort not to let others know when they are experiencing stressful situations. Thirty five percent of the subjects report that they do not consistently use the special breathing techniques which they have been taught when experiencing shortness of breath.

Social Support

The range of social support scores for subjects in this study was from 64 to 120 out of a possible of 125. The mean social support score was 94 (S. D. = 10.2), 75% of the maximum possible score. A summary of reported social support scores is presented in Table 13 and a graphical representation of distribution is presented in Figure 3.

Table 13. Distribution of Social Support Scores.

Score	Number	Percent of Sample
60-69	2	2.5%
70-79	4	5.1%
80-89	17	21.5%
90-99	36	45.6%
100-109	13	16.4%
110-120	7	8.9%
Total	79	100.0

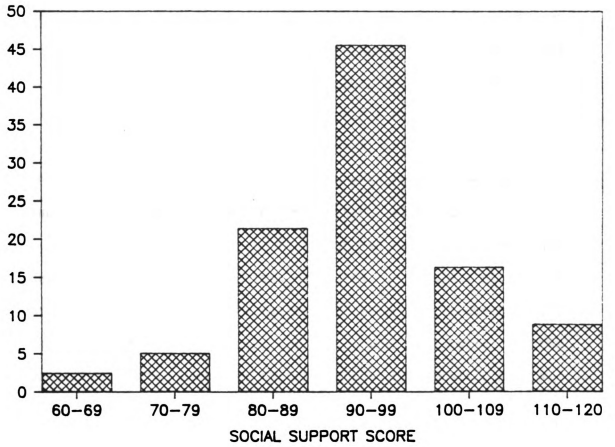

Figure 3. Distribution of Social Support Scores in Study Sample

Subjects in this study reported a wide range of total scores relative to their perceptions of social support. In order to give a more detailed representation of the social support reported by this group of COPD patients specific subscales on the social support questionnaire were examined.

The subscale measuring reassurance of worth, defined as relationships where the individual's skills and abilities are recognized by others, was tapped by items #6, #9, #13 and #20 on the social provisions scale. In this sample the majority of the subjects (80%, n = 64) reported that they did have relationships with others which resulted in feelings that their skills and competence were recognized. Twelve (15%) of these subjects were uncertain that these relationships existed for them and three subjects did not feel the presence of such relationships.

Attachment, as a subscale of social provisions, was determined by use of questions regarding the presence or absence of close personal relationships with other people which result in the sense of emotional security and well-being for the subject. This area was operationalized by items #2, #11, #17 and #21 on the social provisions scale. Only 13 (16%) of the subjects reported a lack of such relationships and an additional five subjects (6%) were uncertain about the presence of these relationships. Seventy seven percent of the subjects (n = 61) felt certain that such relationships existed in their lives.

Guidance, defined as relationships with trustworthy and authoriative others who provide advice, makes up another

subscale of the social provisions instrument. This subscale was comprised of items #3, #12, and #19. Very few of the subjects (n = 3) felt with certainty that there was no one with whom they could talk during times of stress.

The subscale of nurturance which questioned the degree to which individuals felt that there were others who depended on them and upon whom they could depend was examined by items #1, #4, #7, #15 and #24 on the social provisions scale. Almost all (97%) of the subjects felt that there were others upon whom they could depend, but only 75% (n = 59) felt that there were other people who were dependent upon them.

The subscale of social interaction, defined as a network of relationships where individuals share interests and concerns, was made up of items #5, #8, #14 and #22 Sixty six percent of the subjects reported that they did feel a part of such a group and, when questioned relative to the presence of others who share their concerns, no subject reported a lack of such others in their life.

Reliable alliance made up the last subscale of the social provisions scale. Reliable alliance, defined as relationships where the individual can count on assistance under any circumstances, was measured by items #10, #16, #18 and #23. Few (n = 4) the subjects felt that there were not other people upon whom they could count in an emergency and 97% felt that there was a trustworthy person to whom they could turn if they were having problems.

Health Self-Determinism

The range of scores on the Health Self-Determinism Index for the subjects in this study was from 36 to 65 out of a maximum possible score of 80. The mean score was 49, 61% of the maximum possible, and the standard deviation was 5.9. Higher scores on the Health Self-Determinism Index indicate a more intrinsic orientation while lower scores are indicative of a more extrinsic orientation. Distribution of scores on the Health Self-Determinism Index is summarized in Table 14 and a graphical representation of distribution is presented in Table 4.

Table 14. Distribution of Health Self-Determinism Scores.

Score	Number	Percent of Sample
> 40	4	5.0%
40-44	10	11.5%
45-49	28	35.0%
50-54	23	28.8%
55-59	11	13.7%
60 +	4	5.0%
Total	80	100.0

Four subscales made up the Health Self-Determinism Index; (a) internal/external cue responsiveness, (b) self-determinism in health beliefs, (c) self-determinism in health judgments and (d) perceived competency in health matters. Responses to these subscales indicated the degree to which the subject operated under a motivational subsystem on a continuum from extrinsic to intrinsic.

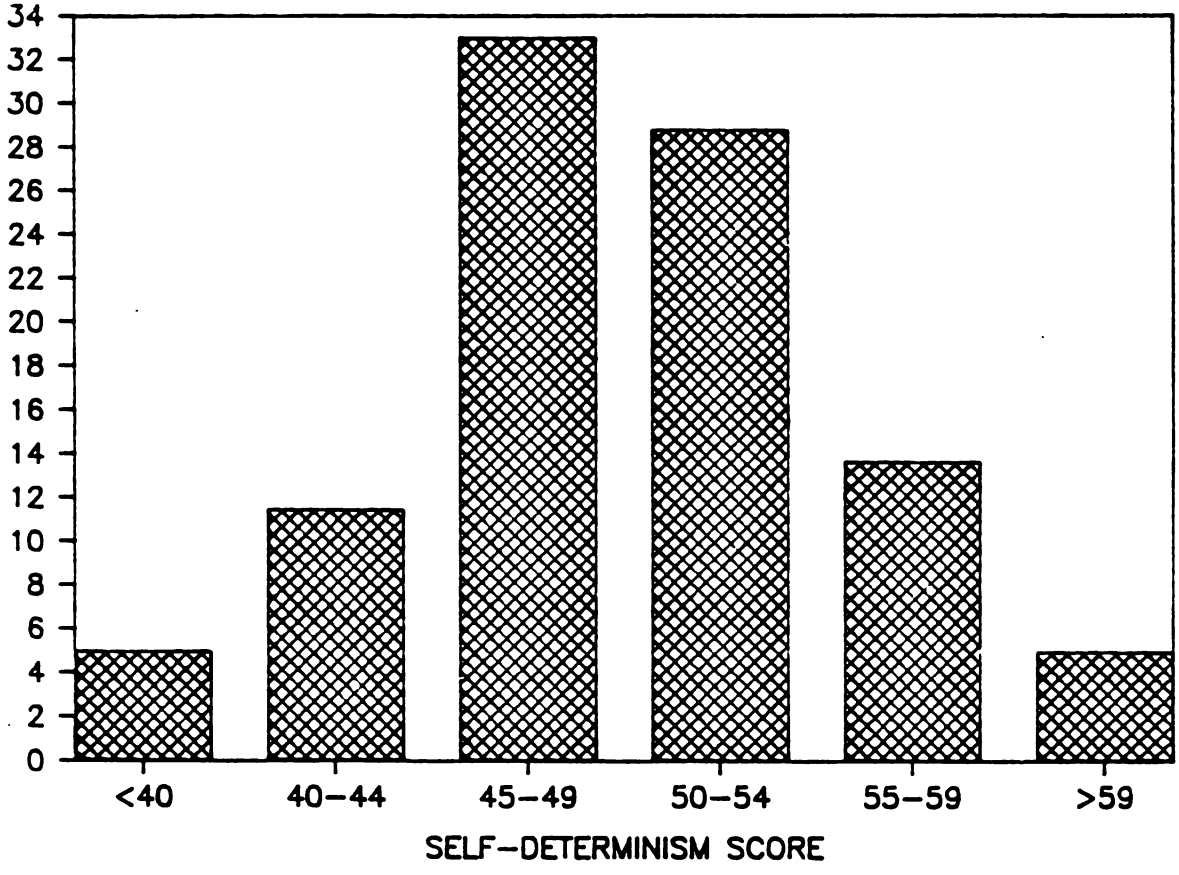

Figure 4. Distribution of Self-Determinism Scores.

Relative to internal/external cue responsiveness (measured by items #3, #4 and #10), 28% of the subjects felt that they, rather than their physicians, should ultimately make decisions about their health (internal orientation) and 49% prefered that physicians make such decisions (external orientation). A predominance of external orientations were observed with the exception of one item, "I'm never really sure I'm doing the right things for my health unless I check it out with my doctor". Sixty percent of the subjects displayed an internal orientation regarding that item.

Self-determinism in health beliefs was tapped by items #1, #6, #14 and #16. With the exception of one item (#14, "I know without being told that I'm doing the right things for my health"), over sixty percent of the subjects exhibited intrinsic orientations. Sixty-three percent responded in an intrinsic manner to the statement "I know what I'm doing when it comes to taking care of my health" and 65% responded in a similar fashion to the statement that they know without being told when they are well.

Items #2, #5 and #7 were used to operationalize the subscale of self-determinism in health judgments. These items tapped the subjects feelings of confidence in their own health related judgemnts and were characterized by responses which were somewhat more extrinsically oriented. Between 51% and 65% of the subjects responded to these items in a manner which reflected an extrinsic orientation in health judgments.

Perceived competence in health matters, the fourth subscale of the Health Self-Determinism Index, was measured by items #8, #9 and #12. These items were designed to tap the subjects feelings of doing well at caring for their own health and were responded to in a manner reflecting an intrinsic orientation by the majority of the subjects. Between 63% and 86% of the subjects exhibited feelings of competence in health matters as reflected by their responses on the Health Self-Determinism Index.

Perceived Impact of Disease

The range of scores on the questionnaire to measure perceived impact of disease was from 22 to 74 out of a maximum possible score of 100. The mean score for perceived impact of disease was 49.5% (S.D. = 10.2). Higher scores on the perceived impact of disease scale indicate greater perceptions that chronic lung disease is impacting the daily life of the subject. Distribution of scores for perceived impact of disease is summarized in Table 15 and a graphical representation of distribution is presented in Figure 5.

Table 15. Distribution of Perceived Impact of Disease Scores.

Score	Number	Percent of Sample
22-34	5	5.1%
35-44	21	25.3%
45-54	36	39.7%
55-64	19	23.8%
65-74	5	5.1%
Total	80	100.0

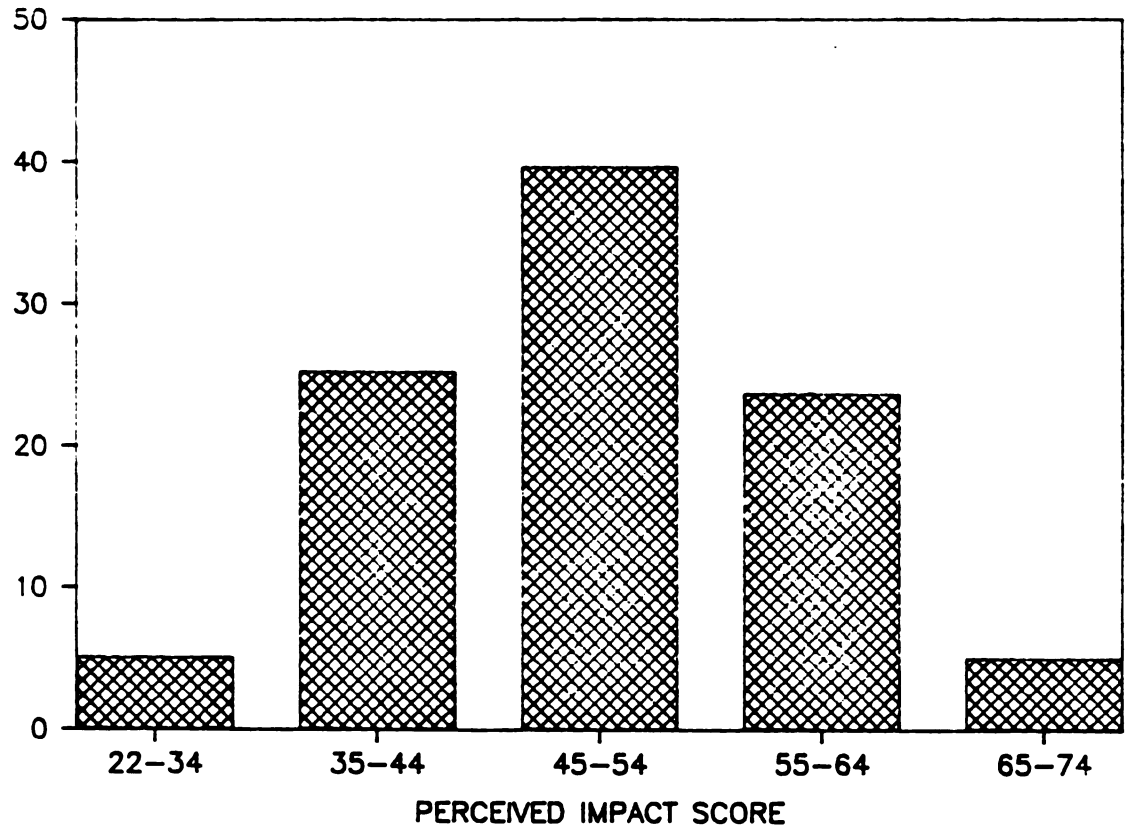

Figure 5. Distribution of Perceived Impact of Disease Scores.

Isolation is an area which is frequently cited in literature as being associated with COPD patients. Indeed, 25 of the subjects (31%) did report that they stayed alone most of the time, 32 subjects (40%) reported staying at home most of the time and half of the subjects reported cutting down on the length of visits with friends. Some of the subjects (n = 14, 18%) gave an indication that their feelings of isolation might be, to some degree, self-imposed when they failed to disagree with the statement "I isolate myself as much as I can from the rest of the family".

Need for rest and restriction of physical activities were also areas where subjects reported that their COPD affected their daily life. Ninty percent (n = 72) of the subjects reported resting often when doing work around the house and 43% reported that they were not doing the regular daily work that they usually do. Twenty three percent reproted that they do not walk if they can avoid it.

Disrupted sleep patterns are an area in which COPD is reported to impact the lives of patients. Indeed, over half (60%) of the subjects reported that they sleep less at night (for example, wake up early, can't fall asleep, awaken frequently during the night) and 51% report that they do sleep or nap during the day.

Alterations in social activities and recreation were attributed to their chronic lung disease by some patients. Social visiting by phone rather than in person was reported

(28%), as was not going out as much as usual to visit people (34%), staying away from home only for brief periods of time (41%) and not doing their usual physical activities and activities (31%).

Clinical Severity of Disease

Distribution of the clinical severity of disease values for the subjects in this study were presented in the section of Chapter III which describes the clinical characteristics of subjects. The mean value for the FEV_1 for subjects in this study was 45.09% of the predicted value for an individual of similar age, sex and body size. This value is within the range of FEV_1 criteria for inclusion in Class 4 (FEV_1 less than 55% of predicted) catagorization of respiratory impairment used by the American Lung Association. The standard deviation was 18.96. The range of values for FEV_1 testing was from 13% of predicted to 91% of predicted.

Congruence Between Clinical Severity and Perceived Impact of Disease

Magnitude in variations from absolute congruence between clinical severity and perceived impact of disease was computed by subtracting the percent of perceived impact score from the percent of clinical severity score and squaring the result ((% clinical severity - % perceived impact)^2). The range in scores, where one was indicative of absolute agreement, was from one to 2116, with a mean of 169. Distrutibion of the scores indicating magnitude of variation is summarized in Table 16.

Table 16. Summary of Congruence Between Clinical Severity and Perceived Impact of Disease (n = 80).

a) Magnitude of indications of disagreement between clinical severity and perceived impact of disease:

Score = (% Clinical Severity - % Perceived Impact)^2

Score	Number	Percent
0-49	22	27.50
50-99	4	5.00
100-149	9	11.25
150-199	8	10.00
200-249	1	1.25
250-299	3	3.75
300-399	4	5.00
400-499	8	10.00
500-599	3	3.75
600-699	2	2.50
700-799	4	5.00
800-899	2	2.50
900-999	2	2.50
1000	8	10.00

b) Direction of lack of congruence between clinical severity and perceived impact of disease:

Score = (% Clinical Severity / % Perceived Impact)
If Score Below 1: % Perceived Impact > % Clinical Severity
If Score Above 1: % Clinical Severity > % Perceived Impact

Score	Number	Percent
.20-.29	2	2.50
.30-.39	2	2.50
.40-.49	1	1.25
.50-.59	3	3.75
.60-.69	6	7.50
.70-.79	5	6.25
.80-.89	5	6.25
.90-.99	8	10.00
1.00	2	2.50
1.01-1.09	8	10.00
1.10-1.19	10	12.50
1.20-1.29	9	11.25
1.30-1.39	2	2.50
1.40-1.49	4	5.00
1.50-1.59	5	6.25
1.60-1.69	0	0.00
1.70-1.79	4	5.00
1.80	4	5.00

The range in scores on the ratio which was computed to indicate the direction of discrepency between clinical severity and perceived impact of disease was from 0.21 to 2.88, with a standard deviation of 0.42. The distribution of dirrectional congruence scores is summarized in Table 16.

Depression

The range of scores on the Beck Depression Inventory was from 2 to 34 out of a maximum possible score of 63. The mean score was 14.5 and the standard deviation was 6.5. Higher scores on the Beck Depression Inventory indicate that the subject perceives and reports more symptoms of depression. Distribution of depression scores is summarized in Table 17 and a graphical representation of the distribution of scores on the Beck Depression Inventory is presented in Figure 6.

Table 17. Distribution of Scores on the Beck Depression Inventory.

Score	Number	Percent of Sample
0 - 5	3	3.7%
6 - 10	19	23.3%
11 - 15	30	37.5%
16 - 20	14	17.5%
21 & above	16	20.0%
Total	80	100.0%

Subjects reported that they acted nervous and restless (59%) and didn't enjoy things like they used to (53%). They also reported cognitive changes which they believed to be the result of their lung disease, such as forgetfulness (36%), difficulty

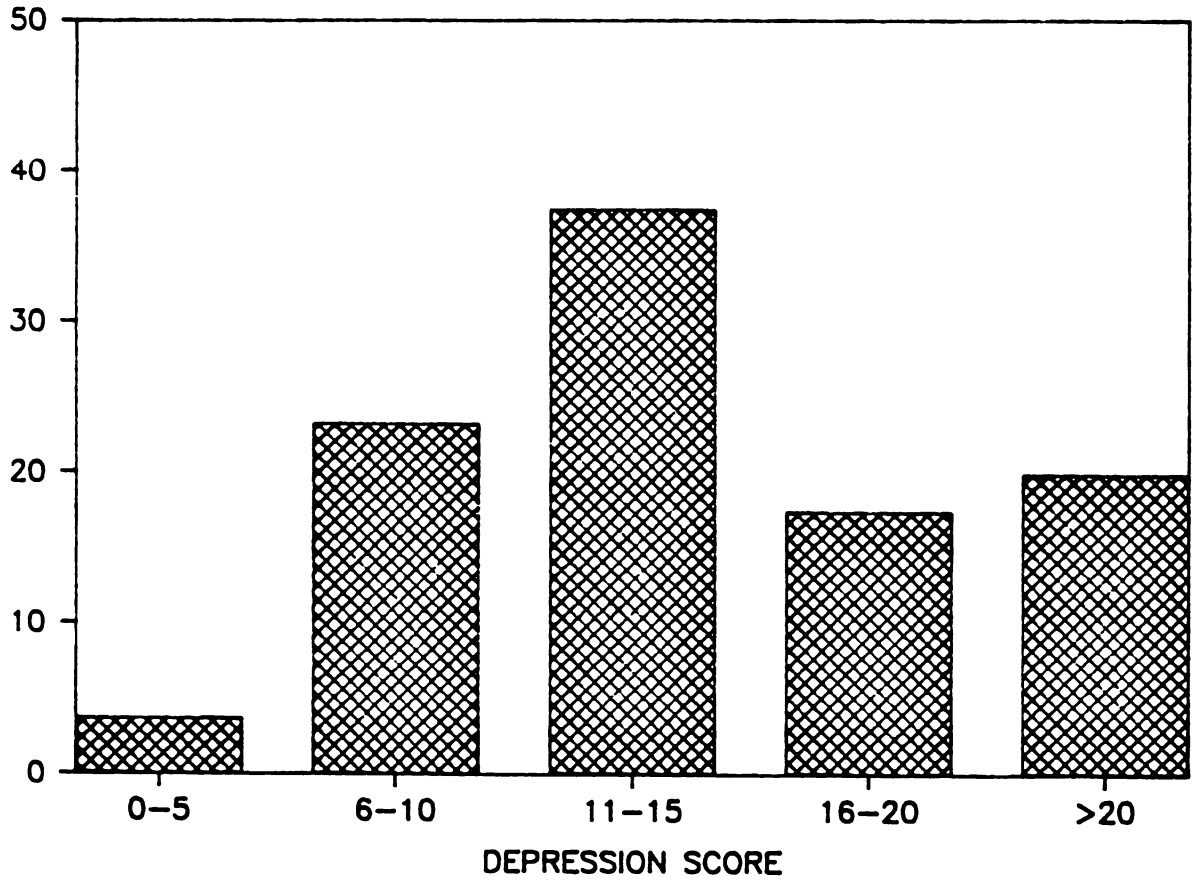

Figure 6. Distribution of Depression Scores.

reasoning (24%) and difficulty doing activities requiring concentration (13%). Self-blame and feelings of being critical of their own weakness and faults were reported by 34% of the subjects and 26% responded that they were disappointed with themself. They also reported being easily annoyed or irritated (56%) and having difficulty making decisions (36%).

Relationship Between Study Variables

Compliance. No single study variable correlated significantly with compliance to the therapeutic regimen in this sample of COPD patients. Although compliance did not exhibit significant relationships with other study variables, statistically significant correlations were observed between compliance and certain subscales of the perceived impact of disease scale and the Health Self Determinism Index. From the Health Self-Determinism measure, internal/external cue responsiveness was found to have a negative relationship with compliance ($r = -.30$, $p < .01$), indicating that those subjects with more intrinsic orientations reported significantly lower compliance rates.

Additionally the perceived competency subscale of the Health Self-Determinism measure was found to be positively associated with compliance ($r = .28$, $p < .01$), indicating that subjects reporting greater perceptions of their own competence in health matters were significantly more likely to have higher reported compliance rates. Compliance was also positively correlated

with the subscales of attachment ($r = .20$, $p < .05$) and guidance ($r = .19$, $p < .05$) on the Social Provisions Scale, indicating that subjects who reported more social resources in these two areas also reported higher rates of compliance to the therapeutic regimen for COPD. Some sociodemographic variables (age, income and education) were also found to relate significantly to rates of compliance and are discussed in the section of this chapter addressing supplemental findings.

Social Support. Social support was found to be significantly related to subjects perceptions of impact of disease on their daily life ($r = -.51$, $p < .0001$) indicating that those subjects who perceived higher levels of social support reported significantly lower perceptions that COPD was impacting their daily life style. Additionally, those subjects who perceived higher levels of social support reported significantly fewer symptoms of depression ($r = -.39$, $p < .001$).

Another significant correlation was observed between social support and the created variable referred to as congruence between clinical severity and perceived impact of disease ($r = .20$, $p < .05$), indicating that those individuals whose congruence index indicated that clinical severity of disease was greater than perceptions of the disease as disrupting daily life style were significantly more likely to be reporting higher levels of social support on the Social Provisions Scale. Additionally, one subscale from the Health Self-Determinism Index was found to correlate significantly with perceptions of

social support. Those subjects who reported higher levels of perceived competency in health matters also reported higher levels of social support ($r = .27$, $p < .01$)

Health Self-Determinism. Health Self-Determinism was found in this sample of COPD patients to be significantly associated only with perceptions impact of disease ($r = -.30$, $p < .01$), indicating that those subjects who exhibited the most intrinsic orientation in health self-determinism perceived lower levels of impact of COPD on their daily life. The Social Provisions subscale addressing social interaction did exhibit a significant relationship with Health Self-Determinism ($r = .21$, $p < .03$), indicating that those subjects with higher reported scores on the social interaction were more likely to be subjects with scores indicating a more intrinsic orientation on the Health Self-Determinism scale.

Perceived Impact of Disease. Perceived impact of disease was significantly related to both clinical severity of disease ($r = .31$, $p < .01$), indicating that those who perceived greater impact of disease also were experiencing greater clinical loss of pulmonary function, and to depression ($r = .66$, $p < .0001$), indicating that those who perceived the greatest impact of disease were also experiencing significantly greater levels of depression.

The significant correlation observed between perceived impact of disease and social support has been addressed in the previous section regarding social support. Additionally,

perceived impact of disease was found to correlate with one sociodemographic variable (income) and that relationship will be addressed in the section on supplemental findings.

Clinical severity of disease. The results of pulmonary function tests which mirror clinical severity of disease indicated that severity was significantly related to both perceived impact of disease ($r = .31$, $p < .01$) and to depression ($r = .19$, $p < .05$). The direction of both of these correlations would indicate that subjects with more severe lung damage respond with more self-reported symptoms of depression and greater perceptions that their disease is affecting their daily living activities.

Congruence Between Clinical Severity and Perceived Impact of Disease. The computation for magnitude of lack of congruence, or discrepency, between percent of clinical severity and percent of perceived impact was analyzed for relationships with other study variables. It was found that this computation was negatively correlated with depression ($r = -.40$, $p < .0001$), such that greater differences between percent of clinical severity and percent of perceived impact were associated with fewer symptoms of depression. A positive relationship was found between the computed value of magnitude of lack of congruence and social support ($r = .20$, $p < .05$), indicating that greater support was associated with greater discrepency.

Depression. Depression was found to be related to a number of study variables. A negative association between depression

and social support ($r = -.39$, $p < .0001$) reflects responses which indicate a relationship between higher levels of social support and lower reports of symptoms of depression. Subjects with higher levels of lung dysfunction on pulmonary function tests, clinical severity, were significantly more likely to report symptoms of depression ($r = .19$, $p < .05$).

Depression was also significantly correlated with perceived impact of disease ($r = .66$, $p < .001$), indicating a greater number of reported symptoms of depression being associated with the report of a greater number of alterations required in daily living activities. Two additional correlations were observed between depression and sociodemographic variables (number of hospitalizations during the past year and income) which will be addressed in the section regarding supplemental findings.

A summary of the relationships between study variables in presented in Table 18. Scatterplots between variables which exhibited significant relationships may be found in Appendix F.

Table 18. Relationships Between Study Variables

	Soc Support	Self-Deter	Perc Impact	Clin. Sev.	Depression	Congruence
Compliance	.11	.08	.10	-.15	.07	.02
Soc Support		.17	-.51[d]	-.03	-.39[c]	.20[a]
Self-Deter			-.31[c]	.15	-.09	.00
Perc. Impact				.31[b]	.66[d]	-.42[d]
Clin. Sev.					.19[a]	.12
Depression						-.40[d]

[a]= $\underline{p}$ .05
[b]= $\underline{p}$ .01
[c]= $\underline{p}$ .001
[d]= $\underline{p}$ .0001

Testing of Study Hypotheses

It was one major assumption of this study that the subjective perceptions of individuals with COPD regarding the impact of the disease on their daily activities are influenced by factors including, but not limited to, the clinical severity of their disease. Further, it was assumed that clinical severity of disease effects the perceived impact of disease indirectly. Accordingly, predictions regarding the perceived impact of disease are expressed in the following set of hypotheses.

HYPOTHESIS I. The individual who perceives higher levels of social support will perceive lower levels of impact of disease on their daily activities.

HYPOTHESIS II. The individual who exhibits higher levels of depression will report higher levels of perceptions of impact of disease on their daily activities.

HYPOTHESIS III. High levels of clinical severity of disease will be associated with high levels of depression in patients with COPD.

The above hypotheses may be expressed in a path model and are shown in that form in Figure 7. Theorized pathways representing Hypotheses I, II and III are indicated by p(13), p(12) and p(24) respectively. Hypotheses IV and V will be addressed following discussion of the testing of Hypotheses I, II and III.

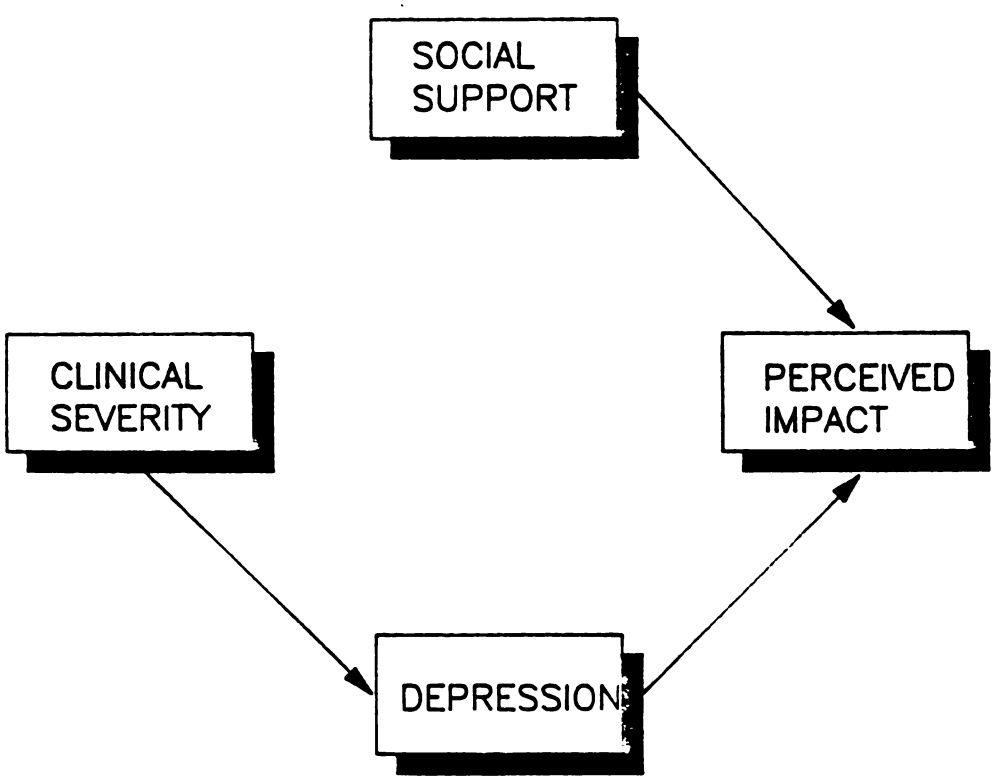

Figure 7. Path Model for Hypothesis I, Hypothesis II and Hypothesis III.

The path model depicted in Figure 7, proposed to test Hypothesis I, Hypothesis II and Hypotheiss III, shows social support (V3) and clinical severity of disease (V4) to be exogenous variables whose variability can be explained from outside of the model. Some investigators include a term for the unmeasured residuals in their structural equations, but Asher (1983) argues that we are not interested in the causes of the variability of exogenous variables and does not include a residual term. The logic of Asher's arguement is that whatever the effect of the residuals may be, it is channeled through the identified exogenous variables into the system represented by the model.

Endogenous variables in this model, or those whose variability is theorized to arise from other variables within the model, are perceived impact of disease (V1) and depression (V2). Within the model each of these variables is theorized as having causal pathways from other variables. The two paths from social support and depression to perceived impact of disease indicate that the variability in perceived impact is dependent on social support and depression.

The path coefficients between social support and depression indicate the direct effects on perceived impact of disease. It is possible within a nonrecursive model for a variable to be treated as dependent in one set of variables and also to be viewed as independent to another set of variables. In this model, for example, depression is a dependent variable in

Table 19. Prediction of Perceived Impact of Disease: Path Model

a) VARIABLES

		Mean	St. Dev.
V1:	Perceived Impact of Disease	49.45	10.24
V2:	Depression	14.46	6.46
V3:	Social Support	94.40	10.29
V4:	Clinical Severity of Disease	54.91	18.96

b) ZERO-ORDER CORRELATIONS (Pearson's r)

	V2	V3	V4
V1	.66	-.51	.31
V2		-.39	.19
V3			.02

c) PATH MODEL

Equation 1: V1 = p(12)V2 + p(13)V3
Equation 2: V2 = p(24)V4

d) REGRESSION RESULTS

1) Equation 1 (Dependent Variable: V1 = Perceived Impact)
p(12) = .54, p(13) = -.29; R(squared) .508

2) Equation 2 (Dependent Variable: V2 = Depression)
p(24) = .19; R(squared) .199

e) ZERO-ORDER CORRELATION BETWEEN V1 AND V4 BASED ON PATH MODEL

r(14) = p(12)p(24) = .09

f) REGRESSION MODEL FOR FULL MODEL

Equation 4: V1 = p(12)V2 + p(13)V3 + p(14)V4

g) REGRESSION RESULTS

Equation 4 (Dependent Variable: V1 = Perceived Impact)

p(12) = .48, p(13) = -.33, p(14) = .23; R(squared) .559

relation to clinical severity of disease and is independent relative to perceived impact of disease.

The results of the analysis related to prediction of perceived impact of disease are presented in Table 19. It can be seen from the correlation matrix (Table 19b) that increased perceived impact (V1) is associated with increased depression (V2), higher clinical severity (V4) and decreased social support (V3). According to Hypothesis III the positive correlation matrix between perceived impact of disease (V1) and clinical severity of disease (V4) should be explained in terms of the observed levels of social support (V3) and depression (V2).

If most or all of the effect of clinical severity (V4) on perceived impact of disease (V1) indeed is due to depression (V2) and social support (V3) as theorized, the path coefficient p(14) should be close to zero and the zero-order correlation between clinical severity (V1) and perceived impact (V4) based on the path model would equal $r(14) = p(12)p(24)$. As such, the proposed nonrecursive model (Table 19c) omits the direct path p(14) from clinical severity (V4) to perceived impact (V1). Support for this reduced model would be demonstrated by the reproduction, on the basis of the path model, of values which are close to those of the original correlation matrix. Significance for the tests of these hypotheses will be inferred relative to the degree to which correlations derived from the reduced model deviate more than .05 from the corresponding coefficients of the full model.

The reduced model is evaluated using ordinary least squares regression between all interdependent variables in the model. Throughout this evaluation path coefficients are represented by the standardized regression coefficients. The obtained path coefficients (Table 19d) show the same general patterns as observed in the correlation matrix. Depression does effect perceived impact of disease (equation 1: $p(12) = .54$), and is effected by clinical severity of disease (equation 2: $p(24) = .19$). Social support also effects perceived impact (equation 1: $p(13) = -.29$).

It also is evident, however, that the original correlation matrix cannot be reproduced within the acceptable limits of a .05 deviation. On the basis of this test, the path model derived from Hypothesis I, Hypothesis II and Hypothesis III must be rejected.

Although the major hypotheses must be rejected, the direct association between clinical severity and perceived impact evidenced by the full regression model (Table 19f and g) suggest a possibility for reformulating the causal linkages within the model. In this vein, it may be noted that the equation for the full regression model does account for 55.9% of the variance associated with perceived impact of disease.

An additional set of hypotheses referred to the direct effects of health self-determinism and congruence between clinical severity and perceived impact of disease upon the reported compliance behavior. Predictions regarding compliance are expressed in the following set of hypotheses.

HYPOTHESIS IV. High levels of health self-determinism will be associated with high levels of compliance to the therapeutic regimen.

HYPOTHESIS V. High levels of congruence between the clinical severity of disease and the perceptions of impact of the disease will be associated with high levels of compliance to the therapeutic regimen.

The above hypotheses may be expressed in a second path model as shown in Figure 8. Theorized pathways representing Hypothesis IV and V are indicated by p(12) and p(13) respectively.

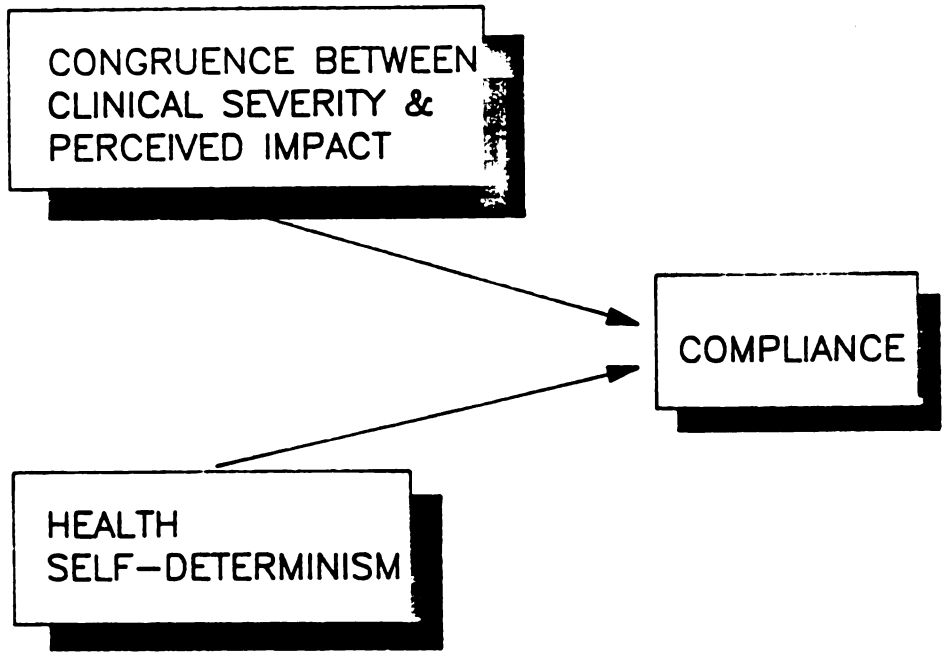

Figure 8. Path Model for Hypothesis IV and Hypothesis V.

Table 20. Prediction of Compliance: Path Model

a) VARIABLES

		Mean	St.Dev.
V1:	Compliance	50.60	10.07
V2:	Health Self-Determinism	49.22	5.92
V3:	Congruence between Clinical Severity and Perceived Impact	369.33	101.43

b) ZERO-ORDER CORRELATIONS (Pearson's r)

	V2	V3
V1	-.10	.02
V2		.00

c) PATH MODEL

Equation 1: V1 = p(12)V2 + p(13)V3

d) REGRESSION RESULTS

1) Equation 1 (Dependent Variable: V1 = Compliance)
p(12) = -.09, p(13) = .02; R(squared): .01

e) ZERO-ORDER CORRELATION BASED ON PATH MODEL

r(13) = p(12)p(13) = 00

f) REGRESSION MODEL FOR FULL MODEL

Equation 3: V1 = p(12)V2 + p(13)V3

g) REGRESSION RESULTS

Equation 3 (Dependent Variable: V1 = Compliance)

p(12) = -.09, p(13) = .02; R(squared): .01

Table 20 presents the results of the analysis related to prediction of compliance behavior. As is evident from this analysis, there was no significant association observed between any of the three variables incorporated into the second path model to predict compliance. On this basis Hypothesis IV regarding the effects of Health Self-Determinism and Hypothesis V relative to the effects of congruence between clinical severity and perceived impact on compliance both must be rejected.

Supplemental Findings

Supplemental findings will be addressed in terms of the relationships observed between study variables and sociodemographic measures. Three of the sociodemographic variables displayed significant relationships with various study variables. Those include (1) educational level, (2) age and (3) income .

Education was observed to be related to self-determinism in such a manner ($r = .19$, $p < .05$) that those subjects reporting a more intrinsic orientation on the health self-determinism scale were found to report significantly higher levels of education. A negative correlation was noted between education and compliance ($r = -.22$, $p < .05$), indicating an association between higher levels of education and lower levels of reported compliance.

Although education was not significantly related to either social support of health self-determinism, associations were observed with specific subscales of those two variables. The reassurance of worth subscale from the Social Provisions Scale was found to be positively related to level of education, with higher levels of education being associated with greater perceptions of reassurance of worth.

Two subscales from the Health Self-Determinism Index, internal/external cue responsiveness and self-determinism in health judgments, were positively correlated with levels of education. Higher levels of education were associated with a more intrinsic orientation in health related judgments ($r = .31$, $p < .01$) and a more internal cue responsiveness in health matters ($r = .19$, $p < .05$).

Age of the subjects was found to be significantly correlated with two of the subscales of the Health Self-Determinism Index. Older subjects were significantly more likely to respond with an extrinsic orientation relative to their own self-determinism in health judgments ($r = -.23$, $p < .05$) and an internal orientation relative to self-determinism in health beliefs ($r = .18$, p .05). Additionally, age of the subjects was found to be positively related to the length of time they reported having been diagnosed with COPD ($r = .29$, $p < .01$) and with their sex ($r = .26$, $p < .01$). Older subjects were more likely to have been diagnosed with COPD for a greater length of time and were significantly more likely to be female.

Level of income correlated with several variables and with several other sociodemographic characteristics. Negative correlations which were found to be significant indicated that those subjects with lower incomes tended to be older ($r = -.35$, $p < .001$), female ($r = -.19$, $p < .05$) and unmarried ($r = -.45$, $p < .0001$). Higher levels of education were related to higher levels of income ($r = .38$, $p < .001$). Additionally, higher levels of income were found to be associated with higher perceived impact of disease ($r = .24$, $p < .05$) and with lower levels of compliance to the therapeutic regimen ($r = -.39$, p .0001).

An analysis of variance was conducted in order to investigate for possible differences between subjects who reported perceptions of impact of disease to be greater than clinical severity and those who reported perceptions of impact of disease to be less than clinical severity. The results of this analysis, which are summarized in Table 21, indicate that there is a significant difference between those two groups only relative to their reported levels of social support and clinical severity of disease. Subjects who were actually more ill than reflected by their perceived impact of disease scores reported significantly higher social support scores and, logically, had pulmonary function test scores which indicated greater physical disability than those subjects whose perceived impact was in excess of their clinical severity.

Table 21. Mean Scores on Study Variables for Subjects Differing in Direction of Lack of Congruence.

	Clinical Severity greater than Perceived Impact	Perceived Impact greater than Clinical Severity	Total Group
Social Support	96.96	90.66	94.41
F-Sig. = .006			
Depression	14.39	15.55	14.88
F-Sig. = .422			
Compliance	50.93	50.12	50.58
F-Sig. = .730			
Self-Determinism	48.66	49.48	49.01
F-Sig. = .530			
Perceived Impact	49.43	51.61	50.36
F-Sig. = .307			
Clinical Severity	66.20	39.15	54.61
F-Sig. = .0001			

In Chapter V the study findings will be discussed in relation to the limitations inherent in this study. Study conclusions will be summarized and the implications of study findings for practice and further research will be addressed.

CHAPTER V

DISCUSSION

The focus of this study has been upon factors which were hypothesized to influence the compliance behavior of patients with COPD. This discussion of study findings is structured so as to address; (1) limitations of the study, (2) conclusions based on study findings (3) implications for practice and (4) implications for further research.

Limitations of the Study

When interpreting the findings of this study it is important to be aware of the following limitations:

(1) Subjects were a convenience sample and random selection was not employed. It is acknowledged that a sample of volunteers may, in some unknown ways, be systematically different from those individuals who chose not to volunteer. In order to examine those differences, the post card which was included with the letter soliciting participation in the study included the response option "I would prefer not to take part in the study because _____". Of the 300 letters

which were distributed to potential subjects, 103 cards were returned indicating an interest in study participation. After telephone contact with those individuals, three persons made the decision that participation would not be convenient based either on their own current health status or that of a close family member.

Unfortunately, only an additional three potential subjects returned post cards with an indication of the reason for their lack of interest in participation. Two of those were because the timing of the study coincided with the time they planned to be traveling out of state and one indicated "not enough time" as the reason that they preferred not to participate in the study. One hundred ninty four of the letters which were distributed to potential subjects were not responded to by post card.

An attempt to compare sample characteristics to aggregate sociodemographic descriptions of all patients at participating clinical sites was unsuccessful due to lack of availability of that data at any of the sites. Therefore, there is no way to compare those individuals who took part in the study with other COPD patients who met study criteria but did not volunteer to participate.

(2) Stated compliance is based on the subjects' report of behaviors relative to a therapeutic regimen which is consistently reported to the care of COPD patients in literature and in consultation with pulmonary physicians. That regimen specifically prescribed for any individual subject was not measured. Thus, the possibility exists that individual recommendations may differ from the standards of care upon which compliance related questionnaire items were developed.

(3) Social support was reported only from the perspective of the subject and no attempt was made to verify those perceptions with significant others.

(4) A restriction in range existed in those scores computed to indicate congruence between clinical severity and perceived impact of disease, serving to limit the potential of that variable to relate significantly with other study variables.

(5) Measures of pulmonary function indicated that the severity level in the sample was skewed toward high levels of pulmonary dysfunction.

(6) The psychometric weakness exhibited by some of the scales in the form of low alpha coefficients, particularly the measures for Health Self-Determinism and the scales measuring compliance and depression, served to limit the potential for obtaining meaningful relationships involving those variables.

Conclusions of the Study

Given the stated limitations of this study, the following conclusions are in order;

(1) Those individuals who met the study criteria of being diagnosed with COPD and volunteered to take part in the study tended to be very ill. The majority of the subjects (68.8%) fit into the Class 4 level of respiratory impairment used by the American Lung Association. These are individuals who experience dyspnea always on exertion and sometimes at rest. Their level of respiratory function is less than 55% of what would be predicted for a person of their age, sex and body size.

(2) Compliance rates were reported to be far less than optimal for the COPD patients who took part in this study. The mean reported compliance rate of 50.6 was representative of only 70% of the maximum possible score for the compliance scale, which included items on medication taking, breathing techniques, exercise and methods for avoiding infection. This indicates that therapeutic recommendations are being adhered to, on average, 70% of the time.

(3) The symptoms of depression reported by the COPD subjects who were subjects in this study were alarmingly high. After removing those somatic items on the Beck Depression Index which were reflective of

symptoms of COPD and replacing those items with an equal number of items reflecting cognitive and emotional behavior, a mean score of 14.46 was obtained in this group of subjects. An equivalent score on the Beck Depression Index would indicate significant levels of depression.

(4) A significant negative association between social support and depression ($r = -.39$, p .0001) was noted in this group of COPD patients. This correlation, indicating lower levels of depression in the presence of higher levels of social support is worthy of note, particularly for a group of subjects in whom the symptoms of depression are so prevelant.

(5) Subjects experiencing more respiratory impairment as measured by pulmonary function tests report significantly more symptoms of depression ($r = .19$, p .05).

(6) Those variables hypothesized to directly predict compliance behavior, Health Self-Determinism and congruence between clinical severity and perceived impact, were found not to have either a relationship to or predictive value for compliance.

(7) Those variables hypothesized to predict perceived impact of disease either directly (social support and depression) or indirectly (clinical severity of disease) were not found to be predictive in the form

that was hypothesized. When an additional direct path between clinical severity and perceived impact was added to the model, however, the three variables of clinical severity, depression and social support were able to account for 56% of the variance observed in perceived impact of disease. While doubt is cast on the model to predict perceived impact as it was formulated, the presence of associations between variables was substantiated through correlational analysis.

(8) The variable constructed to reflect the congruence between clinical severity and perceived impact of disease, while not exhibiting predictive value relative to compliance, was found to be related to both social support ($r = .20$, $p < .05$) and depression ($r = -.40$, $p < .0001$). These associations would indicate that discrepencies between perceptions and clinical reality are related to lower levels of depression and higher levels of support. Analysis of variance resulted in the further observation that significantly greater support was reported by individuals who were actually more ill than reflected by their perceptions of the impact of the disease on their daily life.

Implications for Practice

Findings of this study, in combination with empirical findings documented in the literature, point toward the following implications for practice;

(1) The observation was made that severity levels in the study, as indicated by pulmonary function test results, were skewed toward high levels of pulmonary dysfunction. At each clinical site staff were made aware of the importance of distributing information about the study to all clients who met study criteria. It is therefore assumed that the severity level of subjects is reflective of the population under treatment. If this assumption is accurate it would indicate the need for attention to screening and early diagnosis and treatment in patients at risk for or in the early stages of chronic obstructive pulmonary disease. It is consistently reported in the literature that groups of COPD patients who are studied scientifically tend to have extremely high levels of respiratory impairment. The risk factors of long-term exposure to respiratory irritants, history of smoking and alpha-1 antitrypsen deficiency are well documented.

The potential for positive results from intervention is much greater in earlier stages of COPD than when the disease has progressed to the stage where permenant lung damage is substantial. It would seem

that it would be most efficient and effective on the part of both the health care provider and the patient to become aware of and treat COPD patients in the early, rather than the later, stages of the disease process.

(2) The assessment of patient compliance behavior is a vital function of health care providers. This study, as well as a number of others, would indicate that patients will report deficiencies in the area of their own compliance related behaviors if they are questioned in that regard. Most frequently, however, in real world practice patients are not asked directly if they are doing the specific things which have been recommended to them by health care providers. Implications (3) through (6) deal with specific areas of compliance behavior.

(3) COPD patients should be given frequent reinforcement in regard to both the recommended doses of the bronchodilators which are prescribed for them and the importance of reporting side-effects of these medications. In this study the percentage of subjects reporting that they take extra doses of bronchodilators (81%) was far in excess of the percentage (35%) who indicated an awareness of the necessity to report the symptoms of side-effects of those medications.

(4) It is particularly important to emphasize to COPD patients the long-term value of regular exercise. It is increasingly uncomfortable for COPD patients to engage in exercise as their disease progresses and that discomfort is reflected in the low numbers of subjects in this study (38%) who reported regularly doing exercise. It has been documented, however, that a regular exercise program is effective in aiding the COPD patient to maintain (although possibly not regain) function.

(5) It is important to consider the value of incorporation of relaxation and stress reduction techniques into rehabilitation programs for COPD patients. The few subjects in this study (42%) making conscious use of relaxation techniques, combined with the high levels of reported depression, would serve to emphasize the importance of patient education programs including techniques for stress management and relaxation.

(6) The consistent assessment by health care providers of the sleep patterns of COPD patients would appear to be an important part of the management of those patients. Based on the 66% of the subjects in this study who reported disruptions in their normal sleep patterns and past documentation in the literature of the prevalence of disruption of normal sleep patterns

in these patients, that portion of the regular assessment of COPD patients should take on added importance. The disruption of sleep patterns has been related in the literature to depression and there are many non-medicinal techniques for enhancing normal sleep patterns which may be shared with patients.

(7) Rates of reported depression, even though not related to compliance behavior, are alarmingly high and point to the need for consideration of COPD patients as being at high risk for depression. Depression, in this study correlated negatively and significantly with social support and all of the support subscales. It is particularly worthy of note that the relationship between depression and the social support subscale measuring guidance ($r = -.26$, $p < .01$) relates depression to a group of items which are reflective of the kind of support which is frequently provided by health care providers.

Several years ago Lin and colleagues (1985) published an article regarding the referent power of health care providers in their interactions with patients. The above observation would seem to substantiate the notion that a significant part of what is being perceived by patients as support can be provided by the health care providers with whom they

interact and that this interaction is indeed associated with lower levels of depression in those patients.

(8) It should be noted with interest by health care providers that the Health Self-Determinism Index subscale measuring internal/external cue responsiveness correlated negatively with self-reproted compliance behavior. In medically related studies of locus of control, a strongly related concept, the overriding assumption has been than an internal locus of control is preferable to an external orientation. The findings from this study would not necessarily contradict that point of view but might indicate the need for approaching those individuals with an internal orientation in a diffiernt manner. For example, the mere presentation of facts regarding the regimen, etc., may be insufficient to result in adherence to that regimen in patients with an internal orientation. The patient with a more internal locus of control may need to be presented with all of the possible alternatives and make their own decision on the basis of those alternatives rather than only being told what they should do in the case of a situation like the one which they are experiencing.

(9) In spite of the degree to which the subjects in this study report that their social activities are restricted by the symptoms of their disease, they do

report that they on the whole receive support from the social relationships which are retained.

Implications for Further Research

The following implications for further research may be drawn from the conduct and findings of this study;

(1) The negative correlation noted in this study between depression and the magnitude of lack of congruence between clinical severity and perceived impact of disease ($r = -.40$, $p < .0001$) would suggest the possibility that denial might be serving as a protective mechanism against depression in patients with COPD. Given that possibility, it would be worthy of inclusion of a measure of the "realistic view" held by patients of their illness when studying their psychological reactions to the illness.

(2) The high levels of clinical severity observed in this study sample would point to the value of both demographic studies of those patients under treatment for COPD and those at risk for COPD in the general population with specific attention paid to the prevalance of diagnostic testing being done in the at risk population.

(3) Replication of this study in a group of chronic disease patients where compliance to the therapeutic recommendations of health care providers makes a perceivable physical improvement. It may be that there

is not one single way of understanding the factors which result in positive self-care behavior by patients. As in the case of the varying prescriptive formulations for ways of achieving different kinds of learning in educational psychology, there may also be a variety of ways for achieving positive compliance behavior which vary in the presence of different factors of the disease.

(4) A replication of this study should give consideration to the incorporation of measures of enduring personality traits, with the view that those traits of subjects might confound measures of perceptions.

(5) Refinement and further investigation of congruence between clinical status and perceptions as a variable which aides in the explanation of depression of chronic disease patients, if not compliance.

(6) A longitudinal study which would follow patients over time on the study variables as they relate to compliance would add valuable information about the manner in which study variables change over time and with increasing severity of disease. At the current time these measures have been incorporated as part of the on-going patient assessment in the pulmonary rehabilitation unit at Henry Ford Hospital in Detroit. They are being measured before and following

participation in a pulmonary rehabilitation program and at one year intervals thereafter. Observation of changes in the variables over time may serve to increase the understanding of the relationships between variables and their potential effect on compliance behavior.

(7) Depression is an important variable to measure in patients with chronic disease. Care must be taken, however, to assure that physical disease symptoms are not being interpreted as manifestations of depression. In this study, for example, fatigue was one item included on the Beck Depression Inventory which is a documented result of decreased lung capacity and blood oxygen levens secondary to the disease process of COPD.

(8) Refinement of the theoretical models should preceed any future research based on causal modeling of the variables addressed in this study. Theoretical formulation of the models proposed in this study, while based on empirical research and practical experience with COPD patients, was insufficient to result in models which could be statistically supported. It has been noted by Asher (1983) that "if one's causal analysis goes astray, it will more likely be due to the carrying out of earlier steps in the research process poorly rather than to any misuse of techniques that are relatively straightforward". The earlier steps to

which Asher refers include (a) the use of reliable and valid indicators of concepts, (b) appropriate data collection and data reduction strategies, and most importantly, (c) construction of a theoretical model which is substantively and theoretically plausible.

Two further areas merit discussion in relation to this study and the associated findings. These areas have to do with (1) the analysis and interpretation of research findings, and (2) the determination of appropriate client outcomes by health care providers. Statistical support for the research hypotheses in this study was not found partially because of the form of analysis which was chosen. Had the same hypotheses regarding associations between variables been tested using only correlational analysis, three of the five hypotheses would have been supported.

The important point to be made in relation to this observation has to do with the interpretation of research findings in the literature. Very frequently those empirical studies upon which theory is based report significant findings but stop short of the most robust analysis appropriate to their research question. Descriptive correlational studies add to our understanding of the relationships between complex sets of variables but may not be sufficient as a basis for theory building.

Compliance was the focus of this study and, as such, was viewed as a positive client outcome for the patient with COPD.

Reflection regarding the observed values for each of the variables and the relations between variables has resulted in the awareness that compliance alone may not be the most appropriate client outcome for health care providers to emphasize.

In actual practice health care providers function with a number of client outcome goals for each individual with whom they work. Compliance is frequently among those goals but it is included as a client outcome goal toward the end of achieving optimal physical and emotional health of the client. The clients physical and emotional status, and the relationship of physical and emotional states to compliance behavior, need to be considered in both the study of compliance and the applications of findings of compliance research to clinical practice.

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APPENDIX A

Sample Treatment Plan for COPD

COPD: Sample Treatment Plan

In order for the patient to control the symptoms of COPD they must take the specified actions in the following areas:

MEDICATIONS:
(1) Antibiotics
(2) Bronchodilators
(3) Expectorants

OXYGEN:
(1) Learn appropriate dosage (too much is hazardous)
(2) Learn safety precautions (avoid open flame, smoking, post sign "Oxygen in Use")
(3) Learn techniques for cleaning and checking equipment
(4) Arrange for portable O_2 to maintain mobility

NEBULIZERS AND IPPB MACHINES:
(1) Learn appropriate technique for use
(2) Learn techniques for cleaning
(3) Learn how to check function of machine
(4) Learn appropriate dosage (overuse is hazardous)

PERCUSSION AND POSTURAL DRAINAGE:
(1) Locate willing assistant to perform percussion
(2) Learn technique for percussion and teach to assistant
(3) Learn techniques to drain individual lung segments
(4) Practice daily as prescribed (perhaps multiple times/day)

BREATHING RETRAINING:
(1) Learn pursed lip breathing
(2) Learn abdominal/diaphragmatic breathing
(3) Practice both until able to do during shortness of breath

WEIGHT CONTROL:
(1) Adjust eating patterns (e.g. multiple small meals)
(2) Avoid milk and dairy products if mucus is thick

FLUID CONSUMPTION:
(1) Drink 6-8 glasses fluid daily unless restricted
(2) Avoid caffinated beverages
(3) Drink hot beverage in morning to loosen accumulated mucus

GRADED EXERCISE PROGRAM:
(1) Daily graded exercise (e.g. walking, rebounding)
(2) Learn appropriate response to exercise-induced dyspnea
(3) Attend rehabilitation program if prescribed and/or available

OCCUPATIONAL RESTRUCTURING:
(1) Negotiate with employer for work requiring less expenditure of physical energy
(2) Arrange for irritant-free work environment

ENVIRONMENTAL IRRITANTS:
(1) Avoid smoking or areas where others are smoking
(2) Avoid use of spray products and powders
(3) Avoid temperature extremes
(4) Avoid dry air; use humidifier
(5) Avoid all known environmental pollution

AVOID RESPIRATORY INFECTIONS:
(1) Avoid crowds and contact with individuals with infections
(2) Obtain flu and pneumonia shots
(3) Learn symptoms of infection which should be reported
  (a) change in color or consistancy of mucus
  (b) frequent or painful cough
  (c) increased shortness of breath
  (d) fever

RELAXATION AND STRESS MANAGEMENT:
(1) Learn relaxation and stress reduction techniques
(2) Plan for activities to aid in relaxation and stress reduction
(3) Learn to control feelings of panic resulting from SOB

ADJUST PATTERNS OF SEXUAL ACTIVITY:
(1) Learn alternative methods of expression of intimate feelings
(2) Plan for intimacy (e.g. preceed with postural drainage, period of rest)

SLEEP:
(1) Use several pillows which are clean and non-allergenic
(2) Medications and postural drainage before sleep
(3) Check O_2 setting and supply if used during sleep

TRAVEL:
(1) Check accomodations for availability of O_2, non-smoking areas
(2) Check for availability of wheelchairs in airports

PATTERN OF LIVING:
(1) Negotiate with family for someone else to take over high energy activities...change in family roles
(2) Substitute activities requiring high energy expenditure for satisfying activities requiring less energy
(3) Maintain communication patterns which serve to minimize emotional stress

FINANCIAL:

(1) Adjust to decreased available income secondary to medical expenses and possible decrease or elimination of work

(2) Learn to negotiate for medical insurance/medicare coverage and/or disability coverage

HEALTH CARE SERVICES:

(1) Locate available services to fit needs

(2) Coordinate tests, prescriptions and recommendations of multiple providers

APPENDIX B

Letters from Agencies to COPD Patients Meeting Study Criteria

INGHAM MEDICAL CENTER

401 W. Greenlawn Ave.
Lansing, Michigan 48910-2819

June 1, 1987

Sharon King, R.N., M.S.N.
A230 Life Sciences
E. Lansing, MI 48824

Dear Ms. King:

This is to advise you that the Research Review Committee, the Executive Committee and the Board of Trustees of Ingham Medical Center have approved your recently submitted research protocol entitled, "A Model to Predict Compliance in Patients with Chronic Obstructive Pulmonary Disease", and its informed consent effective May 28, 1987.

Sincerely yours,

Ron Cline

Ron Cline
Research Committee

INGHAM MEDICAL CENTER

401 W. Greenlawn Ave.
Lansing, Michigan 48910-2819

This letter is to let you know about a statewide research study about chronic lung disease which is being conducted by Sharon King, RN, who is a graduate student at Michigan State University. Sharon is a nurse who has worked with people who have chronic lung disease and is concerned with learning more about the experiences of chronic lung disease patients. The goal of the research is to help health care providers understand what kind of changes chronic lung disease causes in the lives of their patients so that they may help people adjust to those changes.

I would like to invite you to consider finding out more about this study and to consider taking part in it. Taking part in the study would involve filling out a questionnaire which would be mailed to you and giving permission for us to share the results of your latest pulmonary function test with the researcher. The questions which you would be asked on the questionnaire are about the changes in your life which have been caused by chronic lung disease, your present health practices, your views about the support you have received from others and some questions about yourself.

Taking part in the study will not interfer with or change the care you are now receiving, and there will be no physical risk or expense to you. You will be encouraged to ask questions about the study and will be assured that your identity will be kept confidential and that no information which could identify you will be used in any reports of the study. The responses that you would make on the questionnaire are completely confidential.

If you feel that you might consider taking part in the study and would be interested in learning more about it, please fill out the enclosed post card and put it in the mail. The post card will go to Sharon King and after she receives it she will telephone you to explain more about the study and answer any of your questions. At that time you may decide whether or not you would like to be a part of the study.

We feel that this is a valuable study and would like to encourage you to consider learning more about it.

Sincerely,

Robert B. Klimek MD

AMERICAN LUNG ASSOCIATION *of Michigan*
The Christmas Seal People·

403 Seymour Avenue • Lansing, MI 48914 • 517/484-4541

Rex Archer, M.D.
President
Robert G. Smith
Executive Director

Sharon King
1817 Ann Street
East Lansing, MI 48823

January 8, 1986

Dear Sharon:

Thank-you for letting me review your Master's Thesis. I am very interested in your work with the elderly, and with chronic lung patients in particular.

I understand that your doctoral dissertation will require the use of subjects who are chronic lung patients. You asked for assistance, from the American Lung Association of Michigan (ALAM), in identifying potential subjects.

I would be most happy to assist you by providing you with the names and addresses of physicians and allied health care professionals who work with pulmonary rehabilitation programs throughout the state. ALAM maintains a mailing list of approximately 400 individuals who work in this area. I could also identify a select group of individuals who would be most likely willing to assist you in recruiting patient subjects.

Furthermore, I could put you in touch with the coordinators of support groups and self-care classes for chronic lung patients. The coordinators could also recommend potential patient subjects.

The American Lung Association of Michigan is supportive of the research you propose, and I will do what I can to assist you. Good luck with your doctoral program.

Sincerely,

Karen D. Krzanowski

Karen D. Krzanowski,
Program Director

MGH
McLAREN GENERAL HOSPITAL, INC.

Gary R. Peterson
President

Dear

I am writing to you to let you know about a statewide research study about chronic lung disease which is being conducted by Sharon King, RN, who is a graduate student at Michigan State University. Sharon is a nurse who has worked with people who have chronic lung disease and is concerned with learning more about the experiences of chronic lung disease patients. The goal of the research is to help health care providers understand what kind of changes chronic lung disease causes in the lives of their patients so that they may help people adjust to those changes.

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If you feel that you might consider taking part in the study and would be interested in learning more about it, please fill out the enclosed post card and put it in the mail. The post card will go to Sharon King and after she receives it she will telephone you to explain more about the study and answer any of your questions. At that time you may decide whether or not you would like to be a part of the study. We feel that this is a valuable study and would like to encourage you to consider learning more about it.

Sincerely,

Valerie McLeod

401 South Ballenger Highway, Flint, Michigan 48502 (313) 762-2000

Associated Pulmonary Specialists P.C.

Department of
Pulmonary Medicine
Bronson Methodist Hospital

Bronson Medical Center
252 E. Lovell Street
Kalamazoo, Michigan 49007

616-388-5864
616-388-(LUNG)

This letter is to let you know about a statewide research study about chronic lung disease which is being conducted by Sharon King, RN, who is a graduate student at Michigan State University. Sharon is a nurse who has worked with people who have chronic lung diseae and is concerned with learning more about the experiences of chronic lung disease patients. The goal of the research is to help health care providers understand what kind of changes chronic lung disease causes in the lives of their patients so that they may help people adjust to those changes.

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We feel that this is a valuable study and would like to encourage you to consider learning more about it.

Sincerely,

John W. Dircks, M.D., FCCP.
Geoffrey R. Grambau, M.D., FCCP.
John E. Schoell, M.D., FCCP.
Thomas A. Abraham, M.D., FCCP.

Lansing General
Hospital

I am writing to you to let you know about a statewide research study about chronic lung disease which is being conducted by Sharon King, RN, who is a graduate student at Michigan State University. Sharon is a nurse who has worked with people who have chronic lung disease and is concerned with learning more about the experiences of chronic lung disease patients. The goal of the research is to help health care providers understand what kind of changes chronic lung disease causes in the lives of their patients so that they may help people adjust to those changes.

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Sincerely,

Lansing General
Hospital, Osteopathic
2727 S. Pennsylvania
Lansing, MI. 48910-3490
(517)372-8220

APPENDIX C

Study Questionnaires

1817 Ann Street
East Lansing, MI 48823
(517) 351-7918

Dear ,

Enclosed is the questionnaire for the COPD study that we talked about on the telephone. You will also find a consent form and a stamped envelope for the return of the consent form and the questionnaire. Before you start to fill out the questionnaire, please do the following things:

(1) Wait until you have about an hour of time that is fairly quiet and not likely to be interrupted. It will be more pleasant for you if you choose a time when you are well rested.

(2) Find a comfortable place to sit and just read through the things that I have sent you. If you have any questions please feel free to call me about them. If you decide after reading through the questionnaire that you would rather not take part in the study, just put the blank questionnaire and consent form in the enclosed envelope and send them back to me.

(3) Fill out the questionnaire during a time that you can be alone. The responses that you make should be just your opinions, there are no right or wrong answers. All of your responses are confidential.

Thank you very much for your time and consideration.

Sincerely,

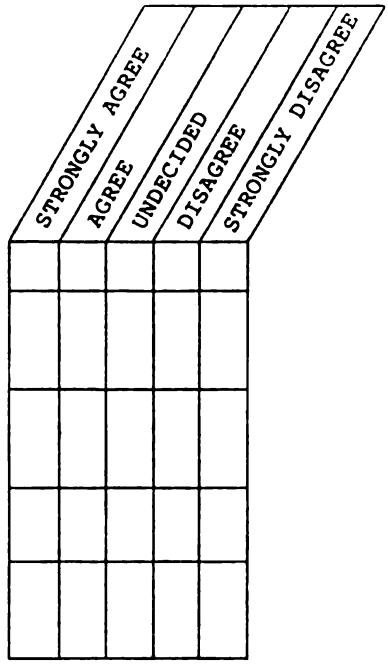
Sharon King, RN

ID _____
Date _____

COPD
Study Questionnaire

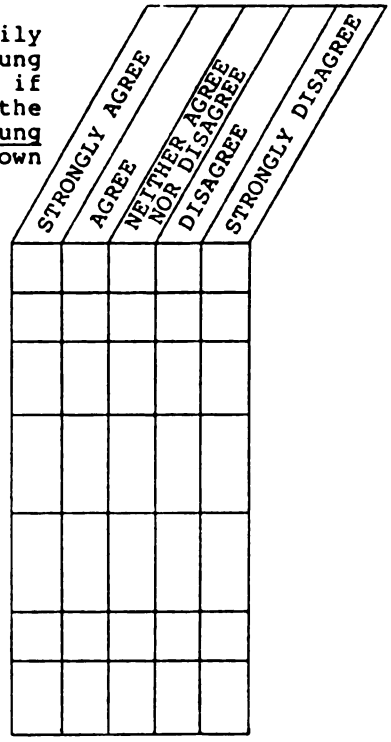
The following are questions about the way you feel about health care and taking care of your own health. Please mark the response which most closely describes how you feel about each question. Remember, your answers are confidential and there are no right or wrong answers.

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
1. Most of the time I know what to do for my health without needing to contact the doctor.					
2. Only the doctor really knows whether or not I am in good health.					
3. Some people think that the doctor should decide about their health, but I think that I should decide.					
4. I worry about my health.					
5. Whatever the doctor suggests about my health is OK for me to do.					
6. I know, without someone else telling me, when I'm in good health.					
7. I more often agree what doctors and nurses thinkinstead of my own opinion.					
8. I feel good about how I take care of my health.					
9. I do things to help my health even though a doctor or nurse has not suggested these things to me.					
10. I am really never sure I'm doing the right things for my health unless I check with the doctor.					
11. My own ideas about taking care of my health are often better than the ideas which doctors and nurses have.					
12. I don't do as well as well at taking care of my health as other people I know.					
13. I would prefer that the doctors and nurses help me plan my health practices.					
14. I know, without the doctor telling me, that I'm doing the right things for my health.					
15. What the doctor thinks about my health is more important than what I think.					



16. I know what I'm doing when it comes to taking care of my health.
17. For me, it takes more willpower than I have to do the things that I know are good for my health.
18. For me, it is very interesting to discover new and different things about my body and how it works.
19. I only want to know enough about my health to get by.
20. Doing things that will help me to be healthy, even though they may be hard, is an enjoyable challenge.

The following questions are about you and your daily activities as they relate to your chronic lung disease. Read each statement carefully and decide if you agree or disagree that the statement describes the way you are doing things now <u>because of your lung disease</u>. Please mark the response <u>most</u> <u>like</u> your own opinion.



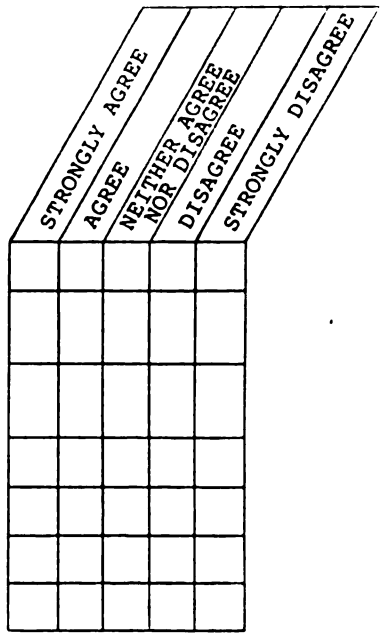
1. I rest often when doing work around the house.
2. I am considerate of family members.
3. I often act irritable toward family members (for example, snap at them, criticize them).
4. I have no difficulty reasoning and solving problems (for example, making plans, making decisions, learning new things).
5. I do not make many demands of family members (for example, insist that they do things for me, tell them how to do things).
6. I act nervous or restless.
7. I sleep less at night (for example, I wake up early, can't fall asleep, awaken frequently).

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
8. I am doing my usual physical recreation or activities.					
9. I isolate myself as much as I can from the rest of the family.					
10. I do social visiting by phone rather than in person.					
11. I have no difficulty doing activities involving concentration and thinking.					
12. I don't walk if I can avoid it.					
13. I am cutting down the length of visits with friends.					
14. I am doing the regular daily work around the house that I usually do (for example, yard work, repairs, cooking, cleaning).					
15. I stay away from home only for brief periods of time.					
16. I act irritable and impatient with myself (for example, talk badly about myself, swear at myself, blame myself for things that happen).					
17. I talk with people about my health.					
18. I stay at home most of the time.					
19. I forget a lot (for example, things that happened recently, where I put things, appointments).					
20. I sleep or nap during the day.					
21. I have given up taking care of personal or household business affairs (for example, paying bills, banking, working on budget).					
22. I go out as much as usual to visit people.					
23. I talk about the future in a positive way.					
24. I am doing less of the regular daily work around the house than I usually do.					
25. I stay alone most of the time.					

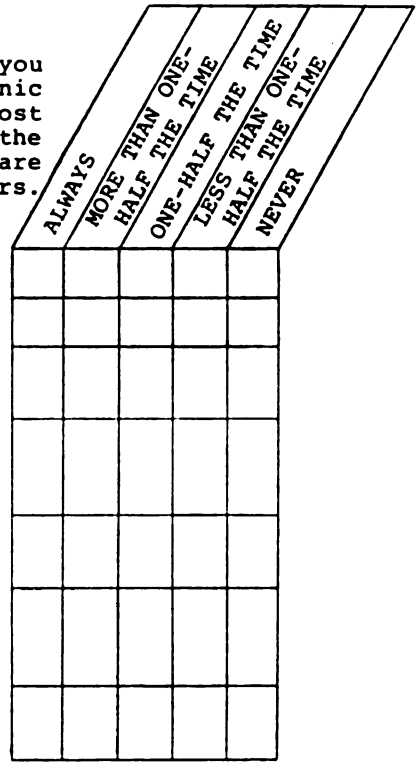
-4-

The following are questions about the kind of support you receive from other people. Please mark the response which most closely describes how you feel about each question. Remember, your answers are confidential and there are no right or wrong answers.

	STRONGLY AGREE	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE
1. There are people I can depend on to help me if I really need it.					
2. I feel that I do not have close personal relationships with other people.					
3. There is no one I can turn to for guidance in times of stress.					
4. There are people who depend on me for help.					
5. There are people who enjoy the same social activities as I do.					
6. Other people do not view me as competent.					
7. I feel personally responsible for the personal well-being of another person.					
8. I feel part of a group of people who share my attitudes and beliefs.					
9. I do not think other people respect my skills and abilities.					
10. If something went wrong, no one would come to my assistance.					
11. I have close relationships that provide me with a sense of emotional security and well-being.					
12. There is someone I could talk to about important decisions in my life.					
13. I have relationships where my competence and skills are recognized.					
14. There is no one who shares my interests and concerns.					
15. There is no one who really relies on me for their well-being.					
16. There is a trustworthy person I could turn to for advice if I were having problems.					
17. I feel a strong emotional bond with at least one other person.					



18. There is no one I can depend on for aid if I really need it.
19. There is no one I can feel comfortable talking about problems with.
20. There are people who admire my talents and abilities.
21. I feel a lack of intimacy with another person.
22. There is no one who likes to do the things I do.
23. There are people I can count on in an emergency.
24. No one needs me to care for them.



The following questions are about you and the way you take care of yourself in relation to your chronic lung disease. Please mark the response which most closely describes <u>how</u> <u>often</u> you do each of the following activities. Remember, your answers are confidential and there are no right or wrong answers.

1. I take care to avoid very dry air.
2. I smoke cigarettes.
3. I contact my doctor if my phlegm (sputum) is a different color or is thicker than usual.
4. I wait a few days before calling my doctor if I think I am having side effects from my medicine.
5. I practice relaxed breathing (diaphragmatic breathing) when I am short of breath.
6. I take extra doses of a broncho-dilator such a Theolair or Bricanyl) when I have touble breathing.
7. I plan for activities which reduce stress for me.

	ALWAYS	MORE THAN ONE-HALF THE TIME	ONE-HALF THE TIME	LESS THAN ONE-HALF THE TIME	NEVER
8. I avoid using spray products such as hair spray or deodorant.					
9. I forget to schedule checkups with my doctor.					
10. I avoid extremes of heat and cold.					
11. I spend time with family and friends even when they have a cold or the flu.					
12. I call my doctor whenever I have more shortness of breath than usual.					
13. I try not to let others know if something is making me feel tense or stressed.					
14. I plan my activities carefully to make the best use of the energy that I have.					
15. I don't use relaxation techniques and diaphragmatic breathing to help myself relax when I get short of breath.					
16. I wait a few days before calling my doctor when I get a fever.					
17. I do not take the medicine prescribed by my doctor.					
18. I stay in rooms where other people are smoking.					
19. During the flu season I avoid places that are crowded.					
20. I don't make any special time to do things that are relaxing for me.					
21. I walk or get some kind of exercise every day.					
22. I am careful to cover my face and nose before going outside during cold weather.					
23. I do the exercises that I have been shown to increase my stamina.					

On this questionnaire are groups of statements. Please read each group of statements carefully. Then pick out the one statement in each group which best describes the way you have been feeling during the PAST WEEK, INCLUDING TODAY. Make a check beside the statement you have chosen. Be sure to read all the statements in each group before making your choice. Be sure to read all the statements in each group before making your choice.

1. ___ I do not feel sad.
   ___ I feel sad.
   ___ I am sad all the time and I can't snap-out of it.
   ___ I am so sad or unhappy that I can't stand it.

2. ___ I am not particularly discouraged about the future.
   ___ I feel discouraged about the future.
   ___ I feel I have nothing to look forward to.
   ___ I feel the future is hopeless and that things cannot improve.

3. ___ I do not feel like a failure.
   ___ I feel I have failed more than the average person.
   ___ As I look back on my life, all I can see is a lot of failures.
   ___ I feel I am a complete failure as a person.

4. ___ I get as much satisfaction out of things as I used to.
   ___ I don't enjoy things the way I used to.
   ___ I don't get real satisfaction out of anything anymore.
   ___ I am dissatisfied or bored with everything.

5. ___ I don't feel particularly guilty.
   ___ I feel guilty a good part of the time.
   ___ I feel quite guilty most of the time.
   ___ I feel guilty all of the time.

6. ___ I don't feel I am being punished.
   ___ I feel I may be punished.
   ___ I expect to be punished.
   ___ I feel I am being punished.

7. ___ I don't feel disappointed in myself.
___ I am disappointed in myself.
___ I am disgusted with myself.
___ I hate myself.

8. ___ I don't feel I am any worse than anybody else.
___ I am critical of myself for my weaknesses or mistakes.
___ I blame myself all the time for my faults.
___ I blame myself for everything bad that happens.

9. ___ I don't have any thoughts of killing myself.
___ I have thoughts of killing myself, but I would not carry them out.
___ I would like to kill myself.
___ I would kill myself if I had the chance.

10. ___ I don't cry any more than usual.
___ I cry more now than I used to.
___ I cry all the time now.
___ I used to be able to cry, but now I can't cry even though I want to.

11. ___ I am not more irritated now than I ever am.
___ I get annoyed or irritated more easily than I used to.
___ I feel irritated all the time now.
___ I don't get irritated at all by the things that used to irritate me.

12. ___ I have not lost interest in other people.
___ I am less interested in other people than I used to be.
___ I have lost most of my interest in other people.

13. ___ I make decisions about as well as I ever could.
___ I put off making decisions more than I used to.
___ I have greater difficulty in making decisions than before.
___ I can't make decisions at all anymore.

14. ___ I don't feel I look any worse than I used to.
___ I am worried that I am looking old or unattractive.
___ I feel that there are permanent changes in my appearance that make me look unattractive.
___ I believe that I look ugly.

15. ___ I can work about as well as before.
___ It takes an extra effort to get started at doing something.
___ I have to push myself very hard to do anything.
___ I can't do any work at all.

16. ___ I can sleep as well as usual.
___ I don't sleep as well as I used to.
___ I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
___ I wake up several hours earlier than I used to and cannot get back to sleep.

17. ___ I don't get more tired than usual.
___ I get tired more easily that I used to.
___ I get tired from doing almost anything.
___ I am too tired to do anything.

18. ___ My appetite is no worse than usual.
___ My appetite is not as good as it used to be.
___ My appetite is much worse now.
___ I have no appetite at all anymore.

19. ___ I haven't lost much weight, if any lately.
___ I have lost more than 5 pounds.
___ I have lost more than 10 pounds.
___ I have lost more than 15 pounds.

I am purposely trying to lose weight by eating less.
___ YES ___ NO

20. ___ I am no more worried about my health than usual.
___ I am worried about physical problems such as aches and pains; or upset stomach; or constipation.
___ I am very worried about physical problems and it's hard to think of much else.
___ I am so worried about my physical problems, that I cannot think about anything else.

21. ___ I have not noticed any recent change in my interest in sex.
___ I am less interested in sex than I used to be.
___ I am much less interested in sex now.
___ I have lost interest in sex completely.

22. Right now, for me, life is:

___ of great value
___ of moderate value
___ of little value
___ of no value

Background Information

The following questions describe general things about you. Please answer all of the questions to the best of your ability.

1. When were your born? _____
(month) (day) (year)

2. What is your sex? ___ Male ___ Female

3. What is your racial or ethnic background? (optional)

___ White
___ Black
___ Mexican-American
___ American Indian
___ Oriental
___ Other (please specify _____)

4. What is your marital status? (please check one)

___ Married
___ Single, never married
___ Separated
___ Divorced
___ Widowed

5. How many living children do you have, include adopted and step children?
_____

6. Taking all sources of money into consideration, what was your family's total income before taxes and other deductions for the past 12 months? (please check one)

___ Less than $ 5,000
___ $ 5,000 - $ 9,999
___ $10,000 - $14,999
___ $15,000 - $19,999
___ $20,000 - $24,999
___ $25,000 - $29,999
___ $30,000 - $34,999
___ $35,000 - $39,999
___ $40,000 - $49,999
___ $50,000 or over

7. Are you working now at a regular job outside the home for money?

___ YES, I am working
___ NO, I am
___ Unemployed
___ Retired
___ Disabled
___ Housewife
___ Other (write in)
_____

8. What is (or was) your main occupation? (write in what type of work you do or did).
_____
_____

9. What is the highest grade that you completed in school? (please check one)

___ None or some grammar school (less than 7 grades completed)
___ Junior high school (9 grades completed)
___ Some high school (10 or 11 grades completed)
___ Graduated high school
___ Technical, business or trade school
___ Some college (less than 4 years completed)
___ Graduated college
___ Postgraduate college or professional degree

10. Who lives in your household, besides yourself? (please check as many as apply)

___ No one else
___ Husband/wife
___ Children, write in number of children living at home _____
___ Other relatives
___ Non-related persons

11. How many close friends do you have? (People that you feel at ease with, can talk to about private matters, and call call on for help.)

___ none
___ 1 or 2
___ 3 - 5
___ 6 - 9
___ 10 or more

12. How many relatives do you have that you feel close to?

___ none
___ 1 - 2
___ 3 - 5
___ 6 - 9
___ 10 or more

13. How many of these friends or relatives do you see at least once a month?

___ none
___ 1 - 2
___ 3 - 5
___ 6 - 9
___ 10 or more

14. Do you belong to any of these kinds of groups?

    a. A social or recreational group? ___ YES ___ NO

    b. A labor union, commercial group or professional organization? ___ YES ___ NO

    c. A church or religious group? ___ YES ___ NO

    d. A group concerned with community betterment, charity or service? ___ YES ___ NO

    e. A support group. ___ YES ___ NO

    f. Any other group? ___ YES ___ NO

15. Do you have a chronic lung disease such as emphysema, chronic bronchitis or COPD?

    ___ YES ___ NO

16. How long have you had a chronic lung disease (please check one)

    ___ Less than one year
    ___ One to five years
    ___ Five to ten years
    ___ Ten to fifteen years
    ___ Fifteen years or more

17. How many times have you been in the hospital due to a chronic lung disease problem during the past 12 months? (please write in)

    _____

18. Do you have any other chronic health problems?

    ___ NO ___ YES, I have:

    ___ High blood pressure
    ___ Diabetes
    ___ Arthritis
    ___ Cancer
    ___ Ulcer
    ___ Heart disease
    ___ Other (write in)
    _____

19. Do you ever have difficulty breathing?

___ NO ___ YES, I have trouble breathing:

___ only when doing very strenuous activity
___ only when climbing but not during normal activities
___ sometimes during normal activities but not while at rest
___ sometimes at rest

20. The treatment plan for patients with chronic lung disease frequently includes a large number of different recommendations. The following list includes some of the kind of things that are recommended for patient with chronic lung disease. Please check, for each item, whether this has been recommended <u>for</u> <u>you</u> as part of your plan of treatment.

Stop smoking	___ YES	___ NO
Avoid places where others are smoking	___ YES	___ NO
Use of medications	___ YES	___ NO
Exercise	___ YES	___ NO
Symptoms of infection	___ YES	___ NO
Use of oxygen	___ YES	___ NO
Postural drainage and/or percussion	___ YES	___ NO
Special breathing techniques such as pursed lip breathing or diaphragmatic breathing	___ YES	___ NO
Diet changes	___ YES	___ NO
Methods of relaxation or stress reduction	___ YES	___ NO
Methods for preventing infections	___ YES	___ NO
Use of nebulizers	___ YES	___ NO
Amounts of fluids to consume each day	___ YES	___ NO
Adjustments in sexual activities	___ YES	___ NO
Methods to promote restful sleep	___ YES	___ NO
Involvement in a breathing club or support group	___ YES	___ NO

APPENDIX D

UCRIHS Application

HUMAN SUBJECTS PROTECTION

COMPLIANCE BEHAVIOR IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

I. Abstract

Chronic obstructive pulmonary disease (COPD) affects over fourteen million Americans, altering both the length and the quality of their lives. Compliance to a prescribed regimen is a patient responsibility which influences the patient's prognosis and functional capacity. Reported levels of compliance for patients with COPD are extremely low. The literature describes a number of variables which have been studied relative to compliance levels in patients with both simple acute and chronic diseases as well as the preventative health behaviors of well individuals.

This research tests a hypothesis of selected factors which are thought to influence compliance in patients with COPD, a common chronic disease, and seeks causal pathways to positive compliance behavior. Concepts drawn from motivation theory are used to develop a framework for understanding patient compliance behaviors. Those concepts include social support, self- perception, locus of control and self-efficacy beliefs.

One hundred volunteer COPD patients from the lower peninsula of Michigan will be sampled relative to levels of perceived social support, self-determinism in health care (a measure of self-efficacy beliefs and locus of control orientation relative to health care), perceived and clinical severity of disease, depression and levels of reported compliance.

Correlational analysis of relationships, as well as path analysis of the hypothesized model, will be conducted to establish causal pathways. The resultant model should be important in considering the compliance levels of patients with other chronic diseases as well as providing implications for both patient and professional education.

II. Subject Criteria with Rationale

A sample of 100 volunteer COPD patients from the lower peninsula of Michigan will be recruited to complete study questionnaires. Each of the subjects must fulfill the following criteria to be considered for inclusion in the study:

(1) Have a medical diagnosis and currently be under medical treatment for COPD.
(2) Be able to read and write in the English language.

(3) Have access to a telephone for explanation of the study.
(4) Not be currently diagnosed and/or under medical treatment for alcoholism or psychiatric illness.

The following protocol will be followed for the recruitment of subjects. Subjects will be screened by staff at pulmonary physician offices and rehabilitation programs which have agreed to cooperate in the study. Those subjects meeting criteria as listed above will be contacted by letter by the staff from the site. The study will be briefly explained in the letter and a post card will be enclosed on which the potential subject may indicate their interest or willingness to participate in the study. Those individuals who wish to know more about the research, or take part in the study, may mail the pre-stamped post card to the researcher. The researcher will then telephone individuals who have indicated interest for the purpose of (1) explaining the study in detail, (2) answering any questions of the potential subject, (3) giving assurances of anonymity and confidentiality and (4) soliciting participation in the study.

Those individuals indicating willingness to participate in the study by filling out a questionnaire and consenting to release of results of their latest pulmonary function test will be mailed a packet including: (1) a letter of explanation, (2) consent form for both questionnaire and release of pulmonary function test results, (3) questionnaire, and (4) a stamped envelope addressed to the researcher for return of the consent form and questionnaire.

III. Risk/benefit ratio

A. Potential risks

No potential physical risks to any subject can be identified. All subjects selecting to participate in the study will continue to receive their customary medical care, and all individuals who are contacted by the researcher will be assured that either choosing not to participate in the study or withdrawal from the study will not affect the medical care which they receive in any way. There will be no financial risk to subjects who participate in the study. No legal, psychological or social risk can be identified

B. Procedures to safeguard

The following procedures will be used to protect the confidentiality which will be assured to each potential subject. Only the researcher will have access to the study questionnaires which are filled out by subjects. Each questionnaire will be number coded and will not contain the name, address or telephone number of the subject. All

responses will be transformed to number codes for the purpose of computer analysis. Information from the study will be treated in aggregate and it will not be possible to identify any individual taking part in the study or the responses that they have made. The names of individual subjects or collection sites will not be used in any reports of the results of this research.

C. Potential benefits

Although subjects may experience an increased self-awareness as the result of completing study questionnaires, it is assumed that no individual benefits are likely to occur as a result of participating in the study. In both the consent form and explanation of the study potential subjects will be appraised of the fact that participating in the study may not benefit them personally.

The results of this research may benefit patients with COPD, health care providers working with those patients and the educators of health care professionals in the future. COPD patients who are guidedin such a way as to achieve maximum compliance will also receive maximum benefit from the treatment regimen which has been prescribed for them. Health care professionals will be able to gauge the efficacy of prescribed recommendations without the confounding produced by noncompliant patient behaviors. Educators will be able to guide learners toward greater understanding of practice strategies which will influence patients to follow healthful self-care behaviors.

IV. Consent procedures

Michigan State University

The experience of living with chronic lung disease affects people's lives in many ways. This research study is being conducted to help health care providers better understand the changes caused by chronic lung disease and things which may help people better tolerate those changes. Participation in this study will require approximately one hour of your time. I understand that I will be asked to complete a questionnaire about chronic lung disease and the changes it has caused in my life, my present health practices and the support that others have given me. I also understand that the results of my latest pulmonary function test will be shared with the researcher in order to give an understanding of the severity of my disease.

I understand that this study may not benefit me personally but could help persons with chronic lung disease in the future.

I understand that I am free to ask questions at any time during the study.

I understand that this study will not affect the care that I am now receiving.

I understand that my anonymity will be maintained and that all of my responses will be kept confidential.

I understand that my participation in this study is voluntary and that I may withdraw at any time.

_____

Signature of Participant (Date)

TO: (Agency from which subject receives care)

I give permission for you to release the results of my latest pulmonary function test to Sharon King, RN for the use in a research study which she is conducting.

_____

Signature (Date)

APPENDIX E

Protocol for Telephone Explanation

Telephone Protocol

* If potential subject has indicated a time to call which is most convenient for them, call at that time of day.

* Introduce self, indicate that call is about the COPD study that post card was returned for. On post card you indicated that you (a) wanted more information about the study, so this call is to tell you about the study and answer your questions; or (b) wanted to take part in the study, so this call is to explain the study to you and what is involved in taking part.

* Give basic explanation of study...awareness that COPD causes a number of changes in all aspects of a persons life, that some things make it easier for the person to take good care of themselves and some make it more difficult...purpose of study is to help health care providers know the best ways to help their patients who have COPD.

* Explain what would be involved in taking part in study...filling out a questionnaire which would come in the mail...one time only...signing a release so that their health care providers will be able to give out the results of their latest pulmonary function test so that the researcher will understand the severity of their illness...questionnaire would take about one hour to fill out...questions about the kind of help you receive from others, the way you take care of yourself, your feelings about COPD, and some questions about yourself...stamped envelope will be enclosed for return of questionnaire and consent form.

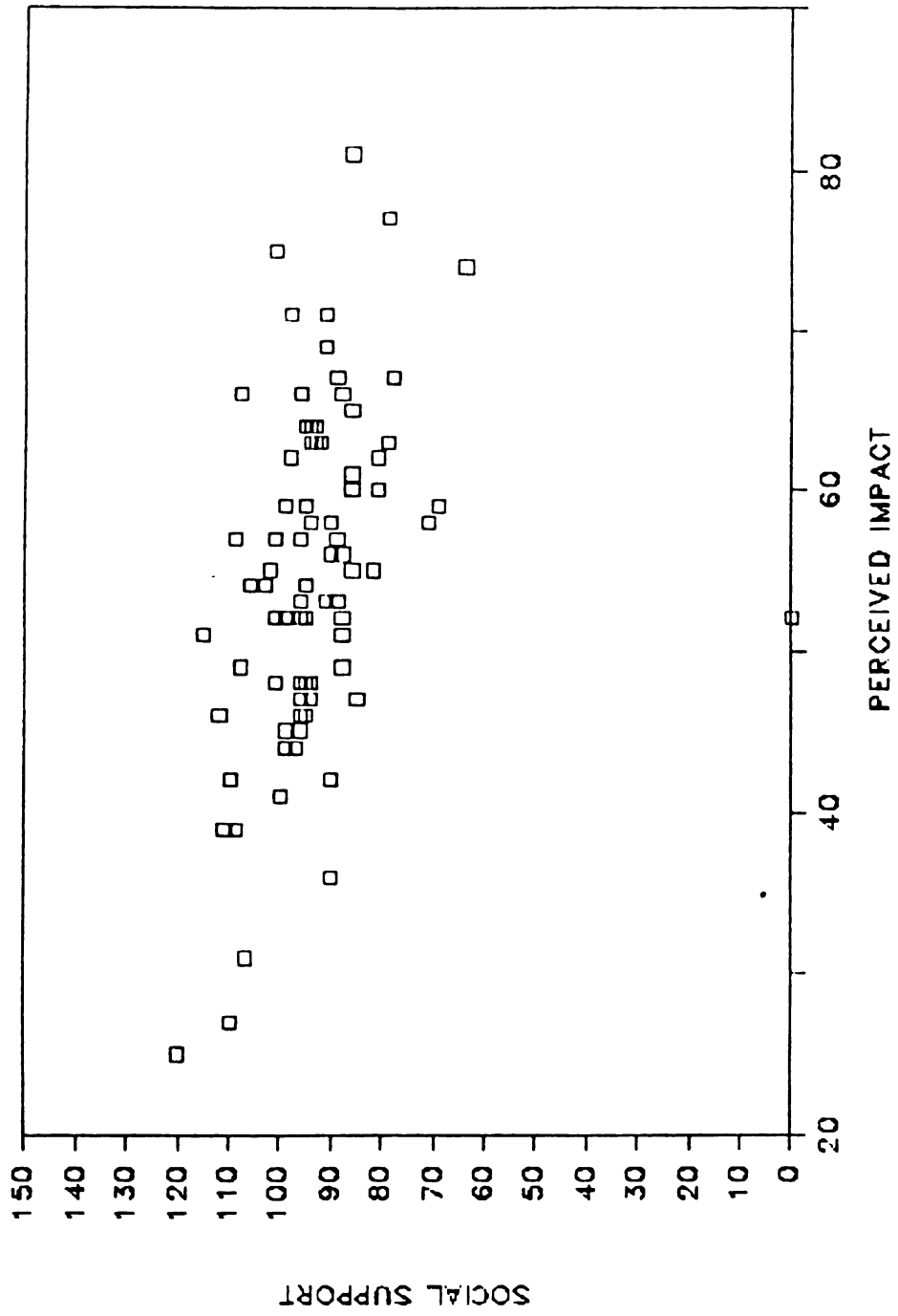
* Explain anonymity and confidentiality...no name, address or telephone number will be asked for on questionnaire...consent form will be separated from questionnaire on receipt of both...the questionnaire will be marked with code number so that the results of pulmonary function test can be coupled with correct questionnaire...no other person will see responses...your name or responses will not be used in any reports...provider will not know what responses you have made on questionnaire.

* Explain consent form...should be signed before completing the questionnaire and returned with the questionnaire...indicates that the study has been explained to you...that you are filling out the questionnaire voluntarily...that you are aware that you will not experience any change in your medical care because of filling out the questionnaire...that you understand that you can withdraw from the study at any time...that you may ask questions at any time.

* If potential subject is willing to take part in study, ask for mailing address and tell them to expect the questionnaire to arrive in the mail within a week...thank all potential subjects for their time and interest.

APPENDIX F

SCATTERPLOTS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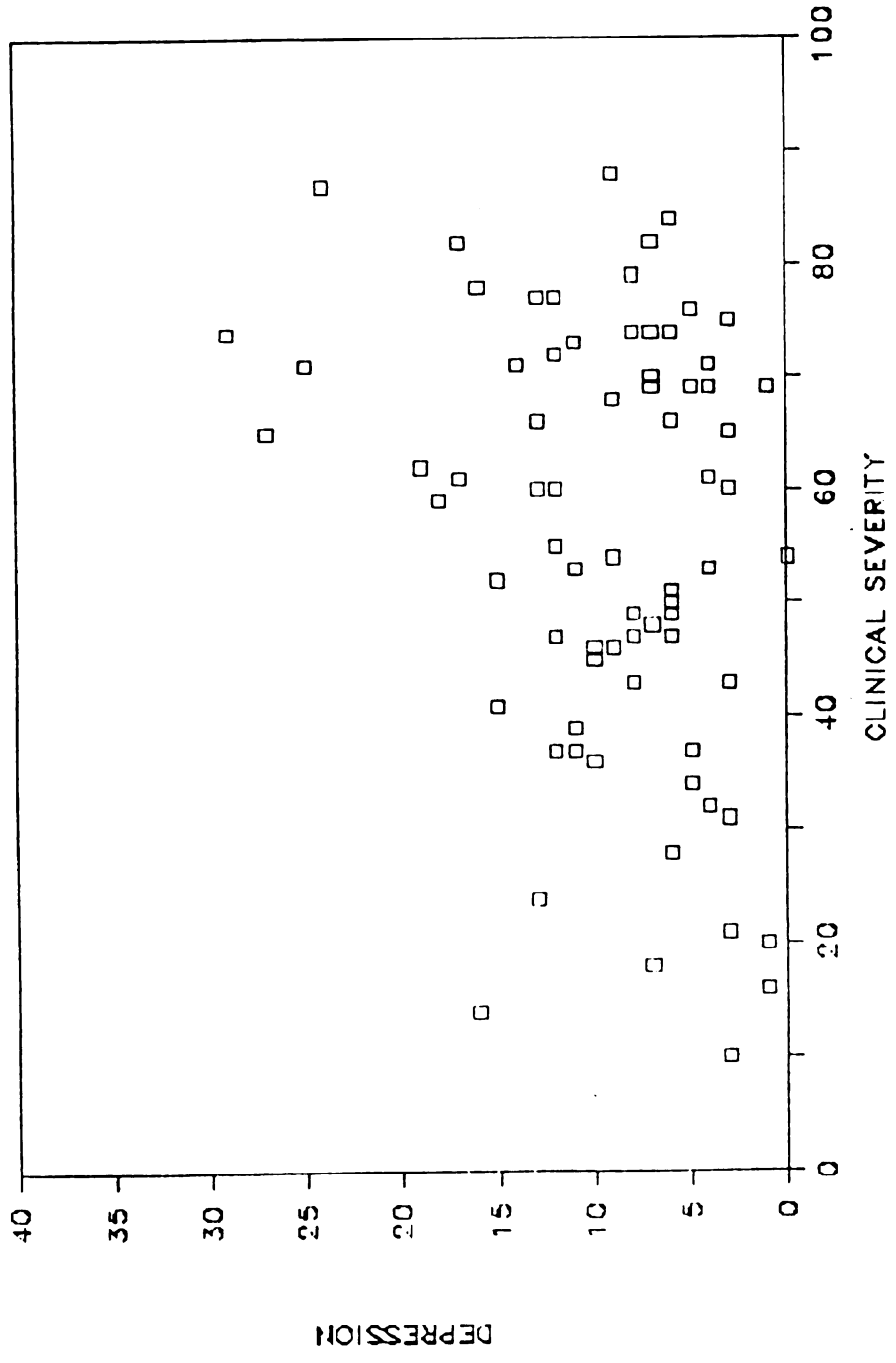
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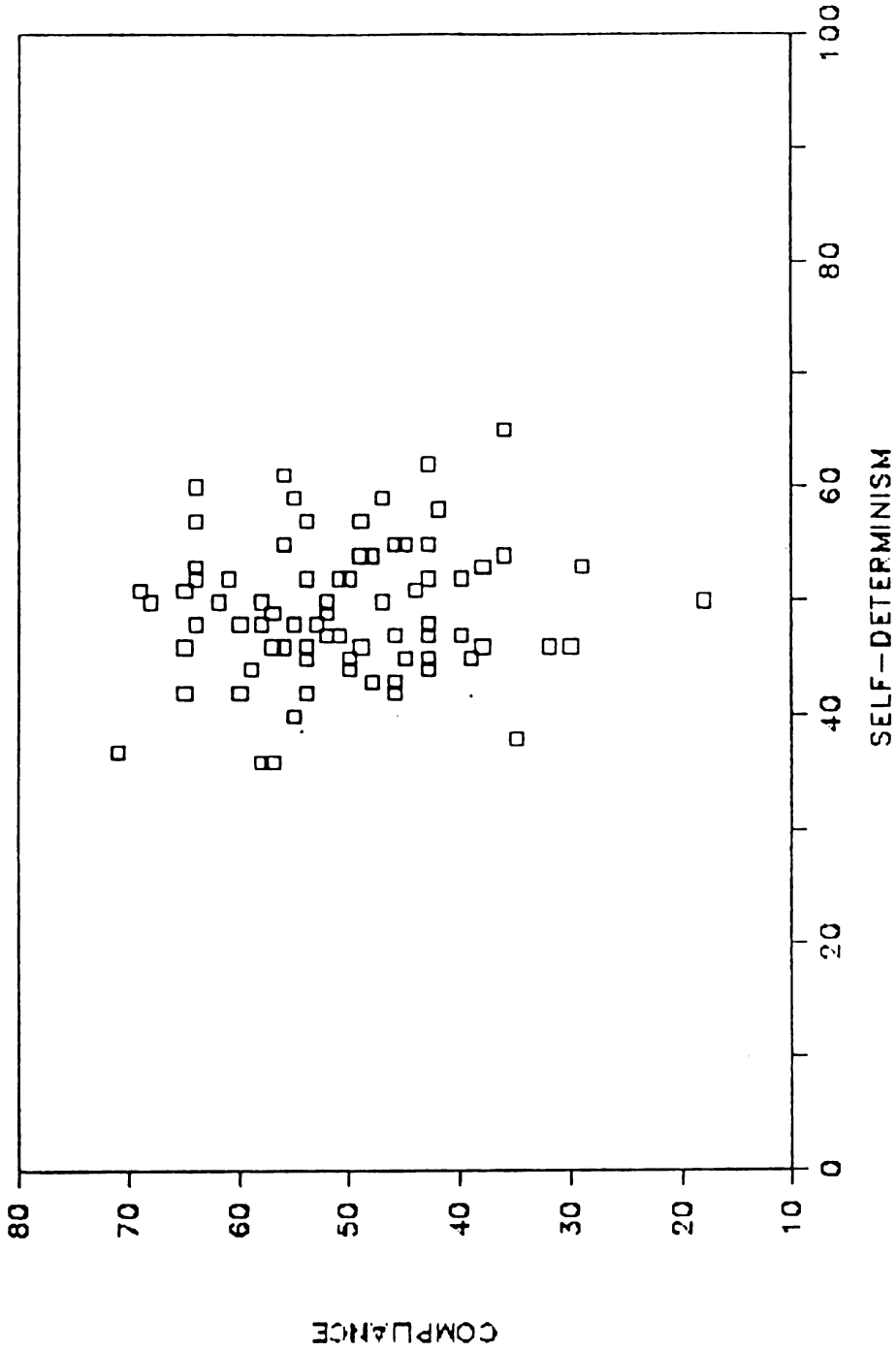
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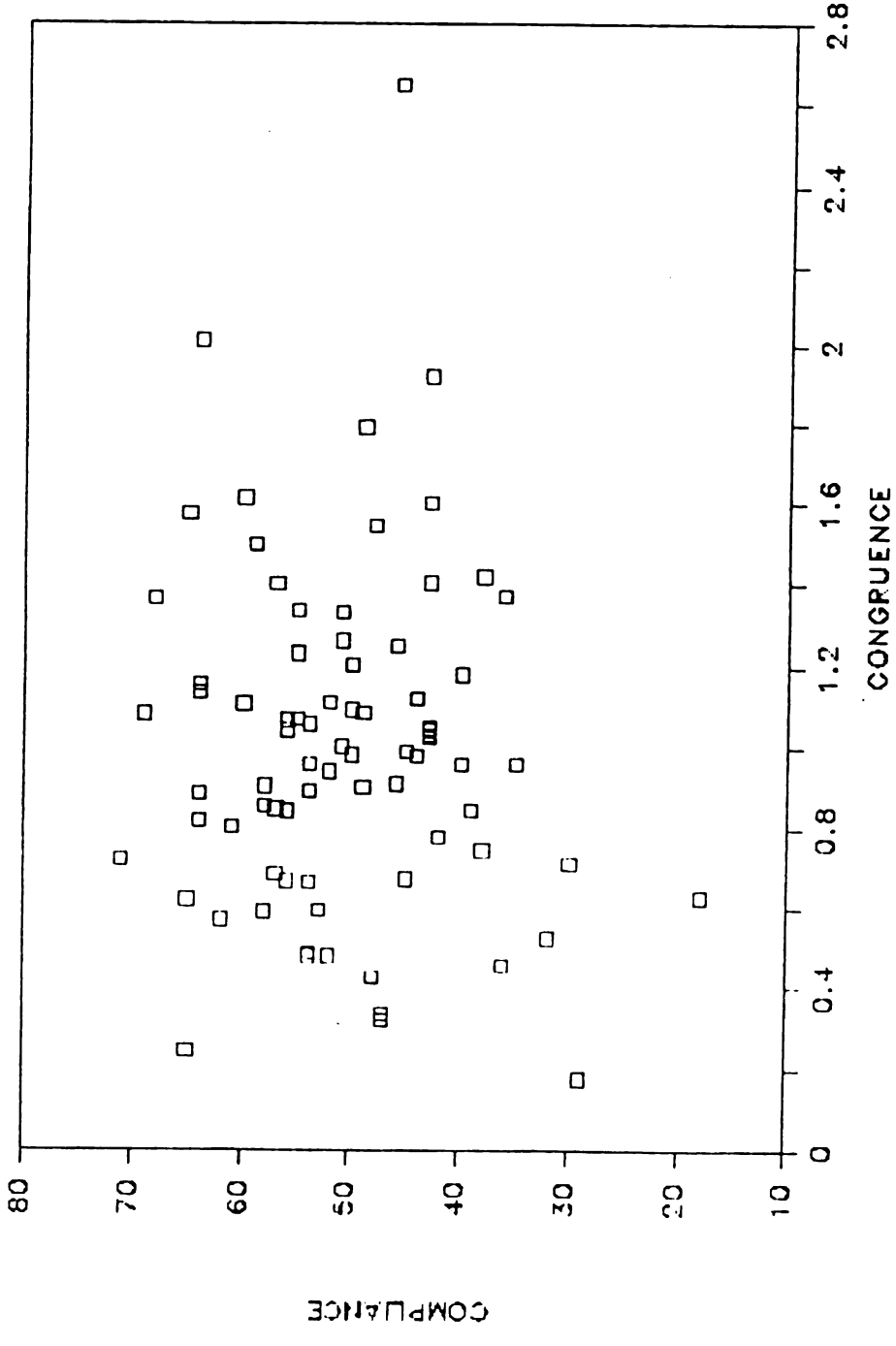
SELF-DETERMINISM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2
2.4
2.8
CONGRUENCE