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Impact of Stress and Coping on Adherence and Health Status
in Patients With Hypertension

by

Diane Darby Goldberger, MN, RN

A dissertation submitted in partial fulfillment
of the requirements of the degree of

Doctor of Nursing Science

University of San Diego

1990

Dissertation Committee

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Abstract

Impact of Stress and Coping on Adherence and Health Status in Patients With Hypertension

The purpose of this study was to describe and explain the impact of demographic variables (age, educational level, time since diagnosis) and subsequent psychosocial variables (perceived stress, ways of coping, professional support, and social support) on adherence and, ultimately, on health status (blood pressure, psychological symptoms, and subjective health) in patients with essential hypertension whose health care was managed by a nurse. Because nurses manage the therapeutic regimens of these patients, it is necessary to identify those factors that influence adherence and thus the health of hypertensive individuals.

The transactional framework of stress, appraisal, and coping of Lazarus and Folkman (1984) was used for this study. A literature review supported the hypothesized linkages between the variables. The correlational design chosen for the study resulted in a

temporally ordered causal recursive model.

The recruited sample of 95 adult subjects was solicited from the patients of nurses who manage the therapeutic regimens of hypertensive patients in outpatient settings. Data were collected by chart review and subjects' answers on multiple questionnaires. Descriptive statistics were used to define the sample. Correlational and inferential statistics were used to analyze the data.

Data analysis resulted in the development of four path analytic models. Predictor variables explained 23% of the variance in systolic blood pressure; 14% of the variance in diastolic blood pressure; 23% of the variance in health perceptions; and, 44% of the variance in psychological symptoms. The strongest predictors of systolic blood pressure were age, time since diagnosis, coping, adherence to a low sodium diet, and professional support. The strongest predictors of diastolic blood pressure were age, time since diagnosis, coping, and adherence to medications. The strongest predictors of health perceptions were ways of coping. Perceived stress was the strongest predictor of psychological symptoms. There were no differences when the results in the

outcome variables were compared by sex and education. A comparison of the results by age showed a difference only in systolic blood pressure between pre-retirement and post-retirement groups.

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Chapter I

Scope of the Problem

Essential hypertension (EH) is a major health problem in the United States. It has been estimated that 60 million persons or 25% of the adult population have EH, with blood pressures (BPs) at or exceeding 140/90 mm Hg (Joint National Committee, 1984). Since the landmark studies of the Veterans Administration Cooperative Study Group (1967, 1970), it has been evident that morbidity and mortality from EH can be reduced greatly if patients' BPs are kept within a prescribed range. However, treatment to control BP can involve a complicated, sometimes expensive, regimen requiring many changes in lifestyle. Nonadherence with a therapeutic regimen is a major problem among patients with EH, and factors influencing adherence are not understood clearly (Gerber & Nehemkis, 1986; Hollenberg, 1987; Joint National Committee, 1984; Sackett & Haynes, 1976). Stress has been implicated in the etiology and exacerbation of EH (Buell & Elliot, 1979; Brody, Natelson, Anderson, Folkow, Levy, Obrist, Reis, Rosenman, & Williams, 1987). Low

stress levels and certain coping patterns have been described in patients who have well-controlled hypertension (Powers & Jalowiec, 1987). The influences of perceived stress levels and coping patterns on adherence and health need to be described and explored further.

Preliminary studies have indicated that social support may have a positive effect on adherence and subsequent control of BP (Caplan, Harrison, Wellons, & French, 1980; Caplan, Robinson, French, Caldwell, & Shinn, 1976; Haynes, Mattson, Chobanian, Dunbar, Engebretson, Garrity, Leventhal, Levine, & Levy, 1982). The support that a health care provider conveys to a patient (professional support) has not been fully explored for its effects on adherence and health outcomes (Haynes et al., 1982).

Purpose and Significance

Because nurses with advanced degrees manage the therapeutic and educational regimen of clients with EH, it is imperative that more nursing research be done to identify those factors that influence adherence and thus the health of hypertensive patients. Therefore, the purpose of this study was to describe and explain the impact of demographic variables (age, educational level, time since

diagnosis) and subsequent psychosocial variables (perceived stress, ways of coping, professional support, and social support) on adherence and, ultimately, health status (BP, psychological symptoms, and subjective health) in patients with EH.

The significance of this study is that it provides nurses with a more detailed description and explanation of factors influencing adherence and health in patients with EH. The results will serve as the basis for further nursing research into variables influencing adherence and health in hypertensive patients. The knowledge gained will serve as the basis for the development of specific nursing interventions to enhance adherence, understanding, and health in patients with EH.

Physiological Background

Health care practitioners used to think that an elevation in BP was a normal part of the aging process and that it did not need to be treated. In 1967, a controlled, prospective study of 143 subjects by the Veterans Administration showed that the prevalence of strokes, myocardial infarctions, and congestive heart failure (CHF) could be reduced significantly if patients with diastolic BPs between 115 and 129 mm Hg were treated with diuretics. Later, the

epidemiological Framingham Study, which had followed 5,209 subjects for 14 years, found that high BP was a significant precursor of strokes and CHF (Kannel, Castelli, McNamara, McKee, & Feinleib, 1972; Kannel, Wolf, Verter, & McNamara, 1970). A later controlled, prospective study of 380 subjects by the Veterans Administration Cooperative Study Group (1970) showed that treating patients who had diastolic pressures in the lower ranges (90-114 mm Hg) reduced the complications of stroke and CHF. These landmark studies showed that mortality and morbidity from the complications of CHF, cerebral vascular accidents and myocardial infarction could be reduced greatly if patients with diastolic BPs higher than 90 mm Hg were treated with available antihypertensive medications.

Today it is recognized that the risks associated with EH increase continuously as diastolic pressures increase and that hypertension is an important etiological factor in the development of CHF, cerebral hemorrhage, dissecting aneurysm, renal failure and hypertensive crisis (Joint National Committee, 1984). High BP also accelerates atherogenesis which leads to increased risk of myocardial infarction, cerebral infarction, and peripheral vascular

insufficiency. Untreated hypertension can shorten life spans by 10 to 20 years (Williams, Jagger, Braunwald, & 1980). The goal of treating EH is to achieve and maintain diastolic BPs at lower than 90 mm Hg, thereby reducing premature mortality and morbidity attributable to high blood pressures (Joint National Committee, 1984; World Health Organization & International Society of Hypertension [WHO/ISH], 1986). In this study, the Joint National Committee's (1984) definition for EH was: (a) the average of two or more diastolic BPs on two or more subsequent visits that is 90 mm Hg or higher, or (b) the average of multiple systolic BPs on two or more subsequent visits that is consistently greater than 140 mm Hg, and no cause for the elevations can be identified in a diagnostic workup. When this definition was used, it was estimated that more than 60 million Americans have EH (Joint National Committee, 1984). EH is usually asymptomatic, so patients are not even aware of their problem. The exact cause of EH is unknown, and no cure is available, so management of the disease requires a lifetime of surveillance by the patient and health care workers (Campese, 1987). A wide variety of pharmacological and nonpharmacological therapies are available. The WHO and the ISH (1986) have

recommended that diastolic pressures in the range of 90 to 114 mm Hg first be treated with nondrug approaches, and if this is not effective in lowering the diastolic BP, then drugs should be considered.

Nonpharmacological approaches may include reduction of weight to ideal, restriction of sodium intake to moderate levels, consumption of alcohol in moderation only, cessation of smoking, a regular isometric exercise program, and relaxation and biofeedback techniques (Campese, 1987; Chesney, Agras, Benson, Blumenthal, Engel, Foreyt, Kaufmann, Levenson, Pickering, Randall, & Schwartz, 1987; WHO/ISH, 1986; Zussman, 1986). Recommended drug regimens for EH involve a stepped-care approach in which a thiazide diuretic or a beta-blocker may be tried first, and then other medications are added if these drugs do not control the BP. Most often antihypertensive medications are used in conjunction with nonpharmacological interventions (Joint National Committee, 1984; WHO/ISH, 1986). Many changes in lifestyle may be requested of the patient with EH. Often the antihypertensive medications cause side effects. The treatment may seem complicated, expensive, and time-consuming to someone who was generally asymptomatic

before diagnosis. The patient may be unable or unwilling to adhere to the prescribed plan of treatment. In a hypertension detection and five year follow-up program, treatment drop-out rates ranged from 20 to 40.9%, depending on type of medication prescribed, race, and sex (Curb, Borhani, Blaszkowski, Zimbaldi, Fotiu, & Williams, 1985). In an extensive survey of the literature on nonadherence, Sackett and Haynes (1976) found that adherence depends on many factors but that as many as one half of all patients may not adhere to various parts of a therapeutic regimen. Haynes et al. (1982) estimated that 40-50% of patients with EH drop out of treatment within the first year, and of those remaining under treatment, the rate of adherence with the prescribed regimens is only 20-30%. Nonadherence can pose a danger to the patient, be frustrating for the health care worker, and waste health care resources. More research needs to be done on factors that influence adherence.

Flynn (1974) found that patients cared for by nurse practitioners had greater knowledge of the illness and its complications, showed more adherence when taking medications, and knew more about the special diets prescribed. Finnerty (1975) argued that nurses can best manage the therapeutic regimen of

patients with EH. He thought that because nurses could spend more time with patients, nurses could better motivate them to adhere to prescribed medications. The Joint National Committee (1984) in its report on the detection, evaluation, and treatment of hypertension suggested that nonphysician health care workers could facilitate patients adherence by identifying problems, suggesting solutions, providing education, and monitoring the treatment regimen.

Currently, nurses do supervise the therapeutic regimens of patients who have EH and nurses do much of the health teaching of patients who have EH. Nurses need more knowledge about the factors influencing adherence so that they can incorporate that knowledge into their clinical practice.

In summary, essential hypertension is a major health care problem whose devastating effects could be minimized if patients would adhere to a therapeutic regimen. Because nurses manage the therapeutic regimen of many patients with EH, more research needs to be done on the factors which influence adherence and health in hypertension.

Psychosocial Background

Much research has been done to determine the cause of EH.

Environmental, physiological, psychological, genetic, and sociological factors implicated in the etiology of EH have been studied extensively. One variable that has been implicated in the etiology and exacerbation of EH is stress. A survey of the literature on psychophysiological factors and stress showed that researchers have looked at the relationship between stress and hypertension from two major perspectives.

First, most research has examined how stress can induce and maintain an elevation in BP. Benson, Kotch, and Crassweller (1978), who argued that a major cause of hypertension is stress, cited epidemiological evidence that indicated that aculturation from a primitive to a modern industrialized society resulted in higher BPs. Critics stated that diet, rather than stress, was probably the cause of hypertension in those subjects. More recently, in a major review of the epidemiological literature, James (1987) concluded that rapid sociocultural change is associated with an increased prevalence of EH, regardless of diet. Buell and Eliot (1979) stated that the data available from experiments with animals indisputably linked psychosocial stress to cardiovascular disease although the analogous relationship in humans was not conclusive. In research

with humans, Bahlmann, Brod, and Cachovan (1982) compared normotensive and hypertensive persons under conditions of emotional stress and found that the hypertensive persons had statistically significantly increased cardiac output and decreased venous compliance. Other researchers have noted that BPs in persons with borderline hypertension are extremely reactive to conditions of mental stress (Eliasson & Atterhog, 1982). Light, Koepke and Willis (1983) reported that psychological stress induced retention of renal sodium and fluid in persons with borderline hypertension. At a conference on behavioral medicine and cardiovascular disease, a task force was asked to review the literature on stress and hypertension and to draw conclusions. Members of the conference concluded that both animal and human studies indicate that psychological stress can induce an acute elevation of BP, especially in those subjects with a familial or genetic predisposition to hypertension (Brody et al., 1987). The evidence for a direct link between psychological stress and sustained elevation of BP was most evident in animal studies. Such a direct link in humans has been harder to substantiate, possibly because of the complex cognitive way in which humans respond to

stressful stimuli.

Second, a focus in research and the literature has been on how a person responds psychologically to the impact of chronic illness and adherence to a therapeutic regimen. Burckhardt (1987) described coping with a chronic illness as both a threatening and a challenging process. In one study (Foxall, Ekberg, & Griffith, 1985), the authors suggested that it is not only the patient but also spouses who must adjust to illness. McEntee and Peddicord (1987) wrote about the many changes in life style requested of patients who have hypertension. DeVon and Powers (1984) found that persons with uncontrolled hypertension were less well adjusted to their illness than patients with better controlled hypertension.

Another task force at the conference on behavioral medicine and cardiovascular disease (Shapiro, Alderman, Clarkson, Furberg, Jesse, Julius, Miller, & Pitt, 1987) examined the consequences of antihypertensive therapy and concluded that therapeutic regimens (especially antihypertensive medications) greatly detract from the quality of life for many patients. It is realized now that for many patients, being advised that they have an illness for which there is

no cure and being asked to make many changes in lifestyle to accommodate the illness are sources of stress. Fagin (1987) called this type of stress illness-induced stress and stated that nurses are the health care workers most strategically positioned to study the phenomena of behavioral responses to illness-induced stress. This study explains and describes the impact of selected demographic and psychological variables on adherence and health status in patients who have hypertension.

Theoretical Background

For this study, the theoretical framework of stress, appraisal, and coping by Lazarus and Folkman (1984) supports the development of a causal model. Within Lazarus and Folkman's framework, psychological stress is viewed as a relationship between the person and environment that is appraised by the person as taxing or exceeding his or her resources and threatening his or her well-being. This view of stress emphasizes the transaction between a person and the environment. Earlier researchers, Selye (1976) in particular, had defined stress as stimuli or events that impinged on a person and to which a person automatically responded. This early definition did not allow for explanations of the great variations

among persons in their responses to stressful events.

Lazarus and Folkman's framework is a transactional one in which certain person/environment factors influence how a person cognitively evaluates an event before automatically responding to it. In the model developed for this study, age, level of education, and time since diagnosis are viewed as person/environment factors that influence a person's appraisal of stress.

Lazarus and Folkman's (1984) cognitive appraisal is an evaluation, by the person, of an event as being either (a) irrelevant, (b) benign or positive, or (c) stressful. If an event is appraised as stressful, the person continues to classify the event cognitively as portending harm or loss, threat, or challenge. For the purposes of this study, cognitive appraisal is represented in the model by perceived stress. Perceived stress is defined further and was measured as daily hassles.

In the framework of Lazarus and Folkman, coping is a constantly changing process of cognitive and behavioral efforts to manage the specific demands of psychological stress. Coping can be either problem focused, which serves to manage or alter the problem causing the distress, or emotion focused, which serves to

regulate the person's emotional response to the problem.

Emotion-focused coping includes the strategies of escape/avoidance, distancing, self-control, acceptance of responsibility, and positive reappraisal. With emotion-focused coping, the situation stays the same, but a person's emotional reaction to the event alters. Problem-focused ways of coping include planful problem solving and confrontive coping. Seeking social support is considered a combination of emotion- and problem-focused coping. Ways of coping, whether problem focused or emotion focused, are mediated by coping resources. Coping resources include such things as the person's health and energy, social skills, social support, problem-solving skills, material resources, beliefs, and commitments.

In the model developed for this study, perceived stress is viewed as influencing coping and coping resources. Coping can be problem focused or emotion focused. Coping resources are defined as social support and professional support. Social support is defined as perceived support from friends, relatives, neighbors, and co-workers. Professional support is defined as the patient's assessment of helping behaviors proffered by professionals.

Professionals are defined as nurses with at least a bachelor's degree in nursing who manage the majority of care of the hypertensive patients.

Coping and coping resources influence adaptational outcomes in the Lazarus and Folkman framework. Their framework defines adaptational outcomes as level of functioning at work and in the social area, life satisfaction or morale, and somatic health.

Adaptational outcomes for this study are viewed as adherence to a prescribed therapeutic regimen and health status. Use of coping and coping resources, in the model used for this study, affect adherence, and adherence affects health status. Adherence is defined as self-motivated perseverance with a treatment regimen. Health status is defined as a composite measure of systolic BP, diastolic BP, psychological symptoms and subjective health.

In summary, for this study, the theoretical framework of Lazarus and Folkman serves as the foundation for the development of a causal model in which person/environmental factors (demographic variables) influence cognitive appraisal (perceived stress), the evaluation of coping resources (social support and professional support), and choice of ways of coping (coping). Ways

of coping and evaluation of coping resources in turn influence the adaptational outcomes of adherence to a therapeutic regimen and, ultimately, affect the health status (BP, psychological symptoms, and subjective health) of a person with hypertension.

Definition of Terms

Essential hypertension. Essential hypertension is defined as (a) the average of two or more diastolic BPs on two or more subsequent visits that is 90 mm Hg or higher, or (b) the average of multiple systolic BPs on two or more subsequent visits that is consistently greater than 140 mm Hg, and no cause for the elevations can be identified in a diagnostic workup by a physician. BPs were measured by the nurse according to a study protocol.

Demographic characteristics. Demographic characteristics are person/environment factors that influence a person's cognitive appraisal of stress. They include age, level of education, and time since diagnosis. These variables were measured in years and by the subjects' responses on the demographic information sheet.

Perceived stress. Perceived stress is a relationship between the person and the environment that is appraised cognitively by the person as taxing or exceeding his or her resources and threatening

his or her well-being. For the purposes of this study, perceived stress is defined as daily hassles. It was measured by the Hassles Scale as developed by Kanner, Coyne, Schaefer, and Lazarus (1981).

Social support. Social support is a resource that the person considers when coping with stress. It is defined as perceived support from friends, relatives, neighbors, and co-workers. Social support was measured by the Social Support Scale developed by Schaefer, Coyne, and Lazarus (1981).

Professional support. Professional support is a resource that the person considers when coping with stress. It is defined as the patient's assessment of helping behaviors proffered by professionals. This variable was measured by a specially designed Professional Support Scale as developed by Goldberger (1987).

Professional. For the purposes of this study, professional is defined as nurses with a bachelor's degree in nursing who manage the majority of the health care of hypertensive patients.

Coping. Coping is a constantly changing process of cognitive and behavioral efforts to manage the specific demands of psychological stress. It was measured by the Ways of Coping scale developed by Lazarus and Folkman (1980).

Adherence. Adherence is an adaptational outcome of the coping process. It is defined as self-motivated perseverance with a treatment regimen. An Adherence Self-Report Scale, as adapted from Caplan et al. (1976) was used to measure this variable.

Health status. Health status is an adaptational outcome of the coping process. It is defined as a composite measure of systolic BP, diastolic BP, psychological symptoms and subjective health. Systolic and diastolic BPs were determined at the patient's most recent visit. Psychological symptoms were measured by a score on the Brief Symptom Inventory by Derogatis and Spencer (1982). Perceptions of subjective health were measured by using a questionnaire developed by Davies and Ware (1981).

Chapter II

Review of the Literature

This chapter focuses on three major areas: (a) the relationship of predictor variables (adherence, coping and coping resources, perceived stress, and selected demographic variables) to health status; (b) the relationship of predictor variables (coping and coping resources, perceived stress, and selected demographic variables) to adherence; and (c) the relationship of predictor variables (perceived stress and certain demographic variables) to coping and coping resources. A summary concludes each of the three major areas.

Relationship of Predictor Variables (Adherence, Coping,

Coping Resources, Perceived Stress and Selected

Demographic Variables) to Health Status

Adherence and health status. Since the landmark Veterans Administration (1967; 1970) and Framingham Studies (Kannel et al. , 1972; Kannel et al.,1970), health care workers have assumed that adherence to a properly prescribed therapeutic regimen can result in lower BPs and better physical health. One group (Sackett, Haynes,

Gibson, Taylor, Roberts, Johnson, Hackett, Turford, & Mossey, 1976) used pill counts as measures of adherence and found that patients had to take 80% of their prescribed medications in order to reach the desired therapeutic reductions in BP. Caplan et al. (1976) did find a significant ($r = -.30/-.29$, $p \leq .05$) inverse relationship between self-reported adherence and systolic and diastolic BP. This inverse relationship between adherence and blood pressure also held true in a later study by Caplan et al. (1980).

However, in the 1976 study, Caplan et al. found that high levels of somatic complaints were associated with greater levels of adherence. In discussing this relationship, Caplan et al. suggested that taking more medication might lead to more side effects or that the reverse might be true: more physical complaints might induce a person to adhere better to the prescribed regimen. The first explanation is consistent with the findings of Curb et al. (1985) that the reason many patients drop out of hypertensive therapy is the untoward side effects of the medications they are asked to take. Hollenberg (1987) has questioned the necessity of treating mild hypertension because of the negative impact that antihypertensive therapy can have on the quality of life for patients. The findings on

adherence and health status have been inconsistent. Caplan et al. (1980) later found that increased somatic complaints and depression were related to decreased adherence. Clearly, more research needs to be done on this relationship.

Coping and health status. As previously discussed, ways of coping can be categorized broadly as problem focused or emotion focused. In analyzing more than 1,300 stressful episodes and the ways of coping used by middle-aged persons, Folkman and Lazarus (1980) found that in more than 98% of the episodes, both problem- and emotion-focused coping were used. In this study, looking at the context of a stressful event, they noted that work contexts fostered the use of problem-focused coping and health contexts fostered the use of emotion-focused coping. In a later study (Folkman & Lazarus, 1985), the same researchers examined the ways of coping used by college students before an examination, immediately after an examination, and after grades were posted. They found that on average, in all three situations, students used a combination of problem- and emotion-focused ways of coping. This is consistent with the theoretical conception of coping as a process that changes over time. However, the subjects were healthy persons dealing with

a situation amenable to some control, and these findings may not apply to persons with health problems.

In a more recent study examining coping and outcomes, researchers found that when a person's health was threatened, the person tended to respond by seeking social support (mixed problem- and emotion-focused coping) and by using escape or avoidance, an emotion-focused way of coping (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). A drawback to interpreting these data is that time since threat to health and exact nature of the threats were not discussed. In the same study, the researchers noted that overall, the pattern of coping in situations that persons appraised as amenable to change was quite different from the coping patterns used if the persons thought the situation could not be changed. In changeable situations, subjects used both problem-focused (planful problem solving and confrontation) and emotion-focused (acceptance of responsibility and positive reappraisal) patterns. In contrast, when subjects considered a situation unchangeable, the emotion-focused patterns of distancing and escape or avoidance were used. The subjects for this study were 85 married couples. Folkman and Lazarus (1986) found that certain coping styles

(confrontation, self-control, escape or avoidance, and acceptance of responsibility) were associated with high depressive symptomatology in a group of 75 married couples in a community setting. These subjects, however, were not clinically depressed.

Using a scale developed by Moos and Billings (1984) to measure coping responses, other researchers (Roberts, Browne, Streiner, Byrne, Brown & Love, 1987), studied 260 adult burn patients and noted that the survivors who were better adjusted psychologically used more problem-solving coping responses and fewer avoidance responses. In a study of 136 adolescents, Yarcheski and Mahon (1986) found that those persons who used affective or emotion-oriented coping styles in relation to perceived stress (life events) had more physical complaints and psychological symptomatology. In describing 450 hypertensive patients, Powers and Jalowiec (1987) also found that better adjusted subjects tended to use more problem-oriented coping behaviors rather than affective or emotion-oriented coping behaviors.

In another study of a large community sample, Aldwin and Revenson (1987) examined the impact of stressful events on emotional well-being as mediated by ways of coping. They found

that the greater the number of coping strategies (both problem-focused and emotion-focused) used, the more adverse were the impacts on mental health. Another study of bereavement (Gass, 1987) found that a greater assessment of number of resources, not greater number of coping strategies, was associated with less psychosocial and physical dysfunction. Resources were defined as social supports, belief in control, and adequate finances.

The differences in findings may reflect a difference in domains that the different coping scales are measuring, or they may reflect a difference in sample subjects (well vs. ill). No research was located that specifically studied the effect of ways of coping in hypertensive patients. The relationship between ways of coping and health status needs to be explored in greater depth.

Coping resources and health status. According to Lazarus and Folkman's (1984) model of stress, appraisal, and coping, coping resources are taken into consideration as part of the coping process. Social support can be a coping resource. Early research focused on the negative relationship between social support and physical and/or psychological distress or illness. Holahan and Moos (1981) reported a negative relationship between social support and

psychological maladjustment. Schaefer, Coyne, and Lazarus (1981) also reported a negative relationship between perceived tangible and emotional support and depressive symptoms and negative morale. Neither social support nor stressful life events were associated with physical health. Billings and Moos (1982) found that perceived work and family support were negatively related to depressive and physical symptoms. In yet another study, Lin, Dean, and Ensel (1986) found a significant negative relationship between perceived close ties and depressive symptoms. Strogatz and James (1986) reported that low instrumental support was significantly correlated with higher BPs in blacks in a rural, southern community.

More recently, research has noted a positive relationship between social support and distress or illness. Fiore, Becker, and Coppel (1983) found that as upset or distress in the social network increased, so did depressive symptomatology in caregivers of patients with Alzheimer disease. Pagel, Erdly, and Becker (1987) also found that for caregivers of patients with Alzheimer disease, degree of upset with the caregivers' social network was associated positively with increased depression. The overall positive effects of social support on physical and psychological health are being

called into question.

In a review of the literature on this relationship, Barrera (1986) attributed the discrepancy in findings to the global way in which social support has been viewed and measured. He argued that social support needs to be defined and measured more narrowly in order to get a better idea of the impact of social support on health status. This seems to support the findings of Rook (1987), who separated companionship from the more global concept of social support. He noted that companionship had a main effect on psychological well-being and a buffering effect on minor life stress, whereas social support had a buffering effect on major life stress. Barrera's argument makes sense in light of the findings of Dunkel-Schetter, Folkman, and Lazarus (1987) on the correlates of receipt of social support. In studying correlates of social support in stress and coping, these researchers found that a person's ways of coping were strongly associated with all types of social support received (informational, aid, and emotional). Their explanation for this was that the three types of social support studied represented three different constructs. These researchers also found that highly stressful encounters engendered more support from more people

than did encounters low in stress.

In a study of patients with hypertension, Caplan et al. (1976) hypothesized that social support might have a direct, inverse effect on BP. However, a direct relationship between social support and BP was not shown. Rather, the researchers found that social support had an indirect effect on BP, as mediated by a direct and positive effect on the motivation of the patient to adhere to a therapeutic regimen. Inconsistent findings on the relationship between social support and physical and psychological health status need further exploration and clarification.

In the model proposed for this study, professional support also is viewed as a coping resource. Professional support is a concept that has received little attention; the literature on social support has tended to lump support from all sources together. Support from professional persons was not separated from the support of friends, relatives, or co-workers. On the basis of the conceptualization that professional support is a separate and distinct concept from social support, a scale was developed to measure this concept (Goldberger, 1987).

In an experimental study, Caplan et al. (1980) followed 236

hypertensive patients over the course of one year. Support from the health caregiver, who was a nurse, was the independent variable.

The researchers measured patients' perceived support from the nurse and found positive significant relationships between perceived support, patients' motivation to adhere, and self-reported adherence, but no direct significant relationship to BP was found.

High levels of somatic complaints and depression were associated with decreases in the level of support from the nurse and from the physician. Caplan et al. also found no significant changes in mean systolic or diastolic BP due to the intervention of social support from the nurse. One possible explanation for this finding, according to the researchers, is that social support from the nurse operates mainly via its effect on a patient's motivation to adhere and not directly on adherence or on BP. Powers and Jalowiec (1987) found that high satisfaction with health care and confidence in health care providers were good predictors of well-controlled hypertension. Few studies have examined the concept of professional support; it is an area in need of research.

Perceived stress. Early research on measurement of stress focused on major life events (deaths, marriages and loss of job) as

significant influences on health outcomes (Holmes & Rahe, 1967). More recently, stress researchers (Kanner et al., 1981; Lazarus & Folkman, 1984) have examined the contribution that daily hassles make to the outcome of health. Daily hassles are defined as irritating and frustrating everyday demands that characterize everyday living. In research on daily hassles, Kanner et al. (1981) found that hassles were better predictors of concurrent and subsequent psychological health than life events were. Lazarus and DeLongis (1983) found only a weak correlation between hassles and life events. One interpretation of this finding is that daily hassles are independent of life events. Lazarus and Folkman (1984) have shown that daily hassles may be better predictors of somatic and psychological health than life events are.

More recently, Zika and Chamberlain (1987), found that chronic daily stressors or daily hassles have a direct effect on subjective reports of well-being. Weinberger, Hiner, and Tierney (1987) found that hassles were better predictors of physical and psychological health status than life events were. These same researchers also noted that life-change events had a negative effect on health status by increasing daily hassles. For the purposes of this study,

perceived stress is considered as a score on a daily hassles scale.

As discussed previously, it has been shown that psychological stress can elevate BP in normotensive persons for a short time (Bahlmann et al., 1982; Light et al., 1983). However, the effect that psychological stress can have on the BP of persons being treated for hypertension has been less well documented. Eliasson, Hjemdahl, and Kahan (1983) found that the cardiovascular systems of patients with newly diagnosed hypertension were more reactive to mental or psychological stress than to physical stress. Ditto (1986) also found exaggerated cardiovascular responses to situations requiring active coping (mental computations) in persons with a family history of EH compared with the responses of subjects without a positive family history of EH.

Brody (1980) measured psychological distress in 99 hypertensive patients immediately after they saw their physician. He found that those patients who had the highest levels of psychological distress also had the smallest reductions in their diastolic BP and were more likely to have resistant hypertension. As defined by Brody, psychological distress was the subject's assessment of personal stress. In a small study (N = 30) comparing

selected characteristics of patients with controlled hypertension versus those with uncontrolled hypertension (DeVon & Powers, 1984), patients with uncontrolled hypertension reported significantly greater difficulties in their domestic environments, more family disturbances, and more psychological distress.

In contrast, in a large study (N = 200) comparing a control group of hypertensive patients versus an educational intervention group of hypertensive patients, Caplan et al. (1976) found no direct correlation between strain and BP in either group. Strains for this study were defined as the psychological effects (such as depression, anxiety, and boredom) of stress. Also, Powers and Jalowiec (1987) found that hypertensive patients who were psychologically well-adjusted to their illness related lower stress levels. In their study, psychosocial adjustment to illness was the most important predictor of control of hypertension, although stress itself was not a significant predictor of control. These findings point to the need for more studies in this area.

Demographic variables and health status. The demographic variables discussed in relation to health status are age (in years), level of education (considered as years of school completed), and

time since diagnosis (considered as years since the person first learned he or she had EH).

Blood pressure is normally lower in children than in adults. During childhood and adulthood, it gradually rises. Recent longitudinal studies suggest that persons with the highest BPs in childhood will be at increased risk of hypertension as adults (Chobanian, 1982). High BP or EH affects persons of all ages; however, the prevalence rates of EH do rise steadily with age in the U.S. population. Risks related to hypertension are associated with increases in diastolic and systolic BP and duration of those elevations (Joint National Committee, 1984).

In a study of 200 patients under treatment for EH, Caplan et al. (1976) found that systolic BP was weakly correlated ($r = .24$, $p \leq .01$) with age and that diastolic BP was uncorrelated with age. These findings would be consistent with treatment goals that BP levels should be the same for all patients regardless of age. In a later study, Caplan et al. (1980) found that BP was positively correlated with age and time in treatment. This could indicate an increase in BP with age, a decrease in adherence with increased time in treatment, or both.

Pollack (1986), in a study of physiological and psychological adaptation to chronic illness, did not find any significant relationship between age, length of time with illness, and physiological adaptation. Physiological adaptation for the hypertensive group of 20 subjects was not well defined; the author stated that control of the disease indicated adaptation.

Using a path analytic model, Markides and Martin (1979) found that education had a small, but significant, positive ($\beta = .172$, $p \leq .05$), direct effect on the self-rated health of 480 elderly persons. This indicated that persons of lower educational levels reported poorer levels of health. Age had small, negative, indirect effects on self-rated health as mediated through education and income.

DeVon and Powers (1984), compared patients with controlled and uncontrolled hypertension ($N = 30$), and found no significant correlation between BP and level of education in either group. Marmot and Khaw (1982), studied men employed in the different positions of the British Civil Service, and found that occupational status and education were inversely associated with BP. In an experimental study of 486 hypertensive patients, using social

support from health care professionals as an intervention, Caplan et al. (1980) found that education, occupation, sex, marital status, and race had no significant relationship to BP.

These results need to be interpreted with caution as level of education is interrelated with sex, occupation, socioeconomic status, and race. In the United States, blacks have a significantly higher prevalence of EH and a higher prevalence of complications from EH than whites do (Joint National Committee, 1984). This trend does not hold for all black populations outside the United States (Marmot & Khaw, 1982). In only one study, that of DeVon and Powers (1984), was the race of the subjects mentioned. As noted by a task force at a national conference on behavioral medicine and cardiovascular diseases, many clinical studies of psychosocial factors in hypertension do not study important biological and subject variables such as duration of illness, age, sex, and socioeconomic status (Krantz, DeQuattro, Blackburn, Eaker, Haynes, James, Manuck, Myers, Shekelle, Syme, Tyroler, & Wolf, 1987). Research including these demographic variables as well as psychosocial variables needs to be done.

Summary. From this review of the literature, it can be stated

that the relationship of predictors to adherence and health status in hypertensive patients should be studied further. Although adherence has been shown to have an inverse effect on BP, the relationship between adherence and physical health status in hypertensive patients is not clear. It has been assumed by health care workers that adherence to a therapeutic regimen would result in better physical and psychological health. Recently, this assumption has been challenged. Some authors have indicated that the demands of a therapeutic regimen actually may result in a lower health status. Empirical studies need to be carried out to examine this relationship.

Recent psychological and social literature has examined the role of coping on health outcomes. Most of these studies have been carried out with well populations: college students or married couples in communities. These studies have indicated that persons use both types of coping (problem focused and emotion focused) in most situations. Some preliminary studies of stress and coping in ill populations indicate that problem-focused coping may indicate better adjustment to illness. Further studies need to look at the coping processes in a population of hypertensive patients to

examine whether the results are similar.

Social support can be considered a coping resource. Early research pointed to a positive relationship between psychological and physical health and social support. Haynes et al. (1982) suggested that the relationship between social support, adherence, and BP showed promise for future research. Recently, it has been noted that social support can be a source of distress for some populations. This relationship needs further exploration in hypertensive patients. Professional support, as a coping resource separate from social support, has received little or no attention in the literature. However, professional support is a concept that may be of importance to adherence. Again, this relationship deserves more research.

Although the concept of stress has received much attention, the evidence for a direct link between psychological stress and sustained elevation of BP in humans has not been substantiated. This possibly is due to the complex cognitive way in which humans respond to stressful stimuli. From the review of the literature, it is evident that more research needs to be done on the variables (coping and coping resources) that mediate the stress response in

humans to try to determine the effect of these variables on health. Also, because most of the research on stress and coping has been done on well populations, the process needs to be studied more closely in ill populations, such as hypertensive patients.

Finally, most research examining the influence of psychosocial variables on hypertensive patients has included important demographic variables, such as time since diagnosis, age, and level of education. This study will address that problem.

Relationship of Predictor Variables (Coping and Coping Resources, Perceived Stress, Selected Demographic Variables) to Adherence.

Coping/coping resources and adherence. Essential hypertension is a disease for which there is no known cure, and once diagnosed, it requires lifelong therapy and surveillance. As previously discussed under the relationship of coping and health status, most research on ways of coping has been done on well populations. It cannot be assumed that patients with hypertension will follow the same patterns. A study specifically relating ways of coping in hypertensive patients was not located. This is an area in need of research.

In a review of the literature on factors influencing adherence

in many areas (Sackett & Haynes, 1976), 10 studies were noted in which family characteristics such as influence of family and friends, and good social environment had an influence on adherence. In 8 (80%) of those studies, support from family and friends had a positive correlation with adherence. In 2 studies (20%), the correlation was negative. These discrepancies may indicate the negative effect some social supports can have on overall functioning as noted by Fiore et al. (1983).

In one study of adherence to health care regimens among 268 elderly women (Chang, Uman, Lang, Ware, & Kane, 1985), researchers found intent to adhere was significantly positively correlated ($r = .10$, $p \leq .05$) with social networks. Whether intent to adhere is translated into the actions of adhering is open to further research. Gervasio (1986) noted that although family support would seem to be an obvious and important factor in a patient's adherence, few studies have examined the relationship. According to Haynes et al. (1982), the role of social support offers promising new directions for research on adherence.

Much has been written about the influence of the health caregiver in effecting patient's adherence. Stone (1979) discussed

adherence as a shared responsibility between client and health caregiver. Dimatteo and DiNicola (1982) wrote about the importance of communication in increasing adherence. However, few empirical studies could be located that tried to measure the impact of professional support on adherence. In a study in which social support was provided by a nurse to hypertensive patients in a group setting, Caplan et al. (1976) found no relationship between measures of social support and adherence. This finding did not support the a priori hypotheses of the study. The researchers concluded that there may have been intervening variables between social support and adherence that were not hypothesized and studied. In a later study, Caplan et al. (1980) found that support from the nurse and the physician was positively correlated with adherence in hypertensive patients. Further studies are needed in this area.

Perceived stress and adherence. In a multiple regression analysis of variables predictive of adherence in hypertensive patients, Caplan et al. (1976) found that Competing Motives was one of the best predictors (partial $r = -.34$, $p = .003$) of adherence. Competing measures were described as motives or goals that

competed for the time, money, and energy that the patients had to spend on taking care of their BPs. No study was located that examined specifically the relationship between daily hassles and adherence. Again, this is an area in which further study is suggested.

Demographic variables and adherence. Demographic variables consistently have not been shown to relate to adherence. According to DiMatteo & DiNicola (1982), age specifically has not been a variable related to adherence. In a review of correlates of compliance in more than 5,000 hypertensive patients, no association between levels of adherence and age was noted (Schulman, Cutter, Daugherty, Sexton, Pauk, Taylor, & Tyler, 1982). In contrast, Caplan et al. (1980) found that age did correlate positively with adherence ($r = .30, p \leq .05$) in a sample of 238 hypertensive patients.

Schulman et al. did find a significant positive correlation between adherence and level of education. In an extensive review of the adherence literature done by Sackett and Haynes (1976), only 8 (25%) of 32 studies found a positive correlation between adherence and level of education, none found a negative correlation, and 75% found no evidence of any relationship. A study of adherence to

health care regimens in 268 elderly women found that age, education, and self-reported health status were not significantly correlated with intent to adhere (Chang et al., 1985). In the study, intent to adhere was defined as the extent to which the respondents would perform health behaviors similar to those performed by simulated patients on a videotape. However, intent to adhere is not the same as carrying through with adherence behaviors.

Duration of the therapeutic regimen has been implicated in level of adherence. Sackett and Haynes (1976) found that duration of illness had a negative correlation with adherence in 7 (54%) of 13 of the studies reviewed. In a 1 year follow-up study of hypertensive patients begun immediately after diagnosis, Schulman et al. (1982) found that problems with adherence manifested themselves in the first few months of follow-up. More than 10% of the subjects dropped out of the treatment program in the first 2 months of care. After the first 2 months, however, adherence rates leveled off and remained stable over the course of the year. Research should be done that examines adherence over different time frames.

Summary. Although much has been written about factors that influence adherence, little research has been done in some areas.

Areas deserving of more research are the relationship between perceived stress and adherence and the relationship between ways of coping and adherence.

The relationship identified between social support and adherence shows promise but has not been consistent. This could be an artifact of the way in which social support has been measured. Also, findings on the relationship between demographic variables and adherence have not been clear and consistent. More research in these areas is needed also.

Relationship of Predictor Variables (Demographic Variables) to Perceived Stress, Coping and Coping Resources

Demographic variables. In an early study, Folkman and Lazarus (1980) found no effects of age on coping patterns. In an examination of daily hassles as indicators of overall stress levels, differences were found in the pattern or types of daily hassles reported by college students and by middle-aged respondents (Lazarus & DeLongis, 1983). In a later study specifically comparing younger and older community-dwelling adults, Folkman, Lazarus, Pimley and Novacek (1987) found clear age differences in hassles and ways of coping. Younger persons reported more hassles with finances, work,

home maintenance, personal life, and family and friends. Older people reported more hassles with environment, social issues, home maintenance, and health. There were also age differences in ways of coping. Younger persons used more problem-focused ways of coping (confrontive, seeking social support, and planful problem solving). Older persons used more emotion-focused ways of coping (distancing, accepting responsibility, and positive reappraisal). Ewedemi and Linn (1987) noted no difference in the types of hassles reported by men 45-64 years old and by men more than 65 years old. However, men who perceived their health as poor reported more hassles, mostly from events related to care of their health.

Felton and Revenson (1987) examined age differences in coping with chronic illness and found that older adults used less emotional expression and information seeking than middle aged adults. They also noted that persons who perceived their illness as very serious were more likely to cope by minimizing the illness's threat. This study has implications for hypertensive patients but its results need to be replicated.

Lin et al. (1986) looked at the distribution of social support over different ages and found that social support increased with

age. After a decrease in the mid-20s to early 30s, there was a marked increase until age 50, when the increase was slower. The peak of social support was in the late 60s and stabilized after that. The researchers did not discuss social support in persons over 70 years old.

No studies were located that examined the relationship between level of education and daily hassles, ways of coping, social support, or professional support.

Summary. In this review of the literature, age had a positive relationship with social support (up to age 65). No relationship between level of education and other variables was noted. Recent research has shown that types of daily hassles also may change with age. Ways of coping also seem to vary with age, and age differences in ways of coping with chronic illness are evident. More research needs to be done to see if these trends hold for other populations.

Overall Summary

Perceived stress, ways of coping, the coping resource of social support, and the impact of these variables on health status have received much attention in the psychosocial, theoretical and

research literature. The relationship between these variables in ill populations, specifically a sample of hypertensive patients, has been less well documented. Professional support and its relationship to adherence and health have not been studied extensively either. This nursing study is unique in that it proposes to explain and describe the impact of demographic variables on subsequent psychosocial variables (perceived stress, ways of coping, professional and social support) and on adherence and health status in hypertensive patients.

Person/
Environment Factors → Cognitive Appraisal → Coping/
Coping Resources → Adaptational Outcomes

Figure 1. Hypothesized Causal Model Illustrating Influences on Adherence and Health Status in patients With Hypertension.

Chapter III

Methodology

Development of the Model

In this correlational study, the stress-transactional framework of Lazarus and Folkman (1984) supported the development of a causal model in which variables influencing adherence and health status in hypertensive patients are identified. In the Lazarus and Folkman framework, personal and environmental factors influence how the person appraises any given event. Through a process termed cognitive appraisal, a person assesses an event or situation as being benign or positive, irrelevant, or stressful. If an event is appraised as stressful, then the person further evaluates the resources available for coping with the stressful situation. How a person copes with a situation influences the adaptational outcomes.

By using this abstract framework and the research cited, variables were selected and placed into a recursive causal model that is temporally ordered (see Figure 1). The direct relationships

among the variables as predicted by the model are illustrated in Figure 1 with unidirectional arrows. The positive or negative influence of the predictor variable on the criterion variable is indicated also.

In this correlational study, a path analytic model was used to identify variables predictive of the adaptational outcomes of adherence (X_8) and health status (X_9) in hypertensive patients. The design was used to test the proposed model in which adherence and health status are the criterion or outcome variables. In this model, the personal and environmental factors are considered the demographic variables of age (X_1), level of education (X_2), and time since diagnosis (X_3). These variables are exogenous variables entered at Time 1 and are not influenced by other variables in the model. All remaining variables are endogenous and are influenced by preceding time-ordered variables. Cognitive appraisal is viewed as perceived stress (X_4), which is an intervening variable entered at Time 2. Coping and coping resources are viewed as coping (X_7), professional support (X_6), and social support (X_5), which are

intervening variables entered at Time 3. Adherence (X_8) is an adaptational outcome at Time 4 and health status (X_9) is the adaptational outcome variable at Time 5 in the model.

Hypotheses

The model implies 30 direct hypotheses and 24 indirect hypotheses. From the review of the literature, only 15 of the direct hypotheses were expected to reach $p \leq .05$ level of significance; 21 were not expected to show significance. The major hypotheses that summarize the expected direct relationships are as follows:

1. Adherence to a therapeutic regimen, social support, and coping will have direct positive effects on health status.
2. Social support, professional support, and coping will have direct positive effects on adherence.
3. Perceived stress will have direct inverse effects on social support, professional support, coping, adherence, and health status.
4. Age, educational level, and time since diagnosis will have direct inverse effects on perceived stress.
5. Age will have a direct positive effect on social support.

The model implies 24 indirect hypotheses. These can be summarized as follows:

1. Age, level of education and time since diagnosis will have indirect effects on health status as influenced through perceived stress, social support, professional support, coping, and adherence.
2. Age, level of education, and time since diagnosis will have indirect effects on adherence as influenced through perceived stress, social support, professional support, and coping.
3. Age, level of education, and time since diagnosis will have indirect effects on social support, professional support, and coping as influenced through perceived stress.
4. Perceived stress will have an indirect effect on health status as influenced through social support, professional support, coping, and adherence.
5. Perceived stress will have an indirect effect on adherence as influenced through social support, professional support, and coping.
6. Social support, professional support, and coping will have an

indirect influence on health status as influenced through adherence.

The system of structural equations for the hypothesized causal model of Figure 1 is as follows:

Age

$$X_1 = e_1$$

Level of education

$$X_2 = e_2$$

Time since diagnosis

$$X_3 = e_3$$

Perceived stress

$$X_4 = p_{41}X_1 + p_{42}X_2 + p_{43}X_3 + e_4$$

Professional support

$$X_5 = p_{51}X_1 + p_{52}X_2 + p_{53}X_3 + p_{54}X_4 + e_5$$

Coping

$$X_6 = p_{61}X_1 + p_{62}X_2 + p_{63}X_3 + p_{64}X_4 + p_{65}X_5 + e_6$$

Social support

$$X_7 = p_{71}X_1 + p_{72}X_2 + p_{73}X_3 + p_{74}X_4 + p_{75}X_5 + p_{76}X_6 + e_7$$

Adherence

$$X_8 = p_{81}X_1 + p_{82}X_2 + p_{83}X_3 + p_{84}X_4 + p_{85}X_5 + p_{86}X_6 \\ + p_{87}X_7 + e_8$$

Health status

$$X_9 = p_{91}X_1 + p_{92}X_2 + p_{93}X_3 + p_{94}X_4 + p_{95}X_5 + p_{96}X_6 \\ + p_{97}X_7 + p_{98}X_8 + e_9$$

In these structural equations (Asher, 1983),

p_{ij} = unknown weights that represent the impact of one variable on another. Later these weights were labeled path coefficients.

X_i = measured variables; variables for which data have been collected.

e = the residual or error terms that represent those factors not actually measured that impinge on the variable.

Procedure

Human subject criteria were met and approved by the Committee on Human Subjects Protection at the University of San Diego and at three large health care institutions with outpatient clinics. After human subjects approval was obtained, nurses with a minimum of a bachelor's degree in nursing who manage the health care of patients with hypertension were identified. These nurses were approached individually or at group meetings to explain the study and its' purpose. The nurses who agreed to participate also agreed to obtain the subject's signature on the informed consent and give the questionnaire packets to the subjects. The procedure for measuring BPs (Maxwell, 1974) (see Appendix A) and inclusion criteria (Appendix B) were reviewed with these nurses. They were also given a copy of both to keep.

Potential subjects were identified at clinic visits by the nurses and invited to participate. Interested persons were given the informed consent letter (see Appendix B) explaining the study and inviting their participation. If they agreed to participate, the informed consent was signed. Information was taken by the nurse from the subject's chart and noted on the Chart Review Sheet

(Appendix C). The subjects were given a packet containing an informed consent form, human subjects' bill of rights, packet of questionnaires selected for inclusion in this study (see Appendices D-K for copies of the questionnaires), and a separate sheet for respondents who wished to receive an abstract of the results of the study. Respondents were asked to fill out the questionnaires while they waited for their appointments or if time did not permit, they were given a stamped self-addressed envelope to return the questionnaires to the investigator within 2 weeks. The order of the instruments in the packet, with the exception of the Demographic Information Sheet, which was always first, was counterbalanced in order to control for possible testing-order effects on the responses. It was estimated that it would take less than 50 minutes for each respondent to answer all the questionnaires.

Data were collected on each subject at only that one point in time. One hundred and sixty packets were handed out and 95 returned. The response rate was 59%. Data were collected over a period of one year.

Tabachnick and Fidell (1983) have suggested a ratio of 20 cases for each variable measured for regression analysis. However,

they also suggested that a minimal requirement is to have at least 4 to 5 cases per variable. This study had a maximum of 18 predictor variables yielding a ratio of 5.28 cases per variable.

Sample

The sample consisted of 95 persons whose diagnosis of EP was determined and confirmed by a physician. The subjects were recruited from four outpatient clinics in San Diego County. The demographic characteristics of the sample are summarized in Table 1. The majority of subjects' (60%) health care was covered by a Health Maintenance Organization. Additionally, 17% were covered under Medical or Medicare, and 23% had private insurance or paid for their visit in cash.

The sample ranged in age from 28 to 90 with a mean of 59.9 years (SD = 12.0 years). Sixty-two women (65%) and 33 (35%) men participated. The educational level ranged from 8 to 18 years with a mean of 12.9 years (SD = 2.3 years). Fourteen (15%) had an educational level of 11 years or less; 36 (38%) had a high school education; 30 (32%) had 1 to 2 years of education after high school; 8 (8%) had a college degree; and 7 (7%) had 1 to 2 years of education beyond college.

Table 1. Demographic Characteristics of Sample (N=95)

	N	(%)
Sex		
Female	62	(65%)
Male	33	(35%)
Marital Status		
Married	57	(60%)
Never married	6	(6%)
Divorced	13	(14%)
Separated	6	(6%)
Widowed	13	(14%)
Educational Level		
8 to 11 years	14	(15%)
High school	36	(38%)
1 to 2 years after H.S.	30	(32%)
College	8	(8%)
1 to 2 years after college	7	(7%)
Race		
Caucasian	75	(75%)
Black	14	(15%)
Hispanic	6	(6%)
Asian	3	(3%)
Native American	1	(1%)
Method of Payment		
Health Maintenance Org.	57	(60%)
Medicare or Medical	16	(17%)
Private insurance or cash	22	(23%)
Age	59.9	$\pm$ 12.0 years
Systolic Blood Pressure	141.0	$\pm$ 16.8 mm Hg
Diastolic Blood Pressure	84.77	$\pm$ 8.8 mm Hg
Known of Hypertension	11.9	$\pm$ 9.6 years

Fifty-seven (60%) of the subjects were married; 6 (6%) never married; 13 (14%) were divorced; 6 (6%) separated, and 13 (14%) were widowed. The racial background of the subjects was mixed; 75 (75%) were Caucasian, 14 (15%) Black, 6 (6%) Hispanic, 3 (3%) Asian, and 1 (1%) Native American.

The sample had known about their diagnosis of hypertension for a mean of 11.9 years with a range of 0 to 53 years (SD = 9.6 years). The subjects took 1 to 4 different medications (M = 1.7 medications) to control their hypertension, and they took these medications 1 to 9 times per day (M = 2.5 times per day). Systolic blood pressure ranged from 93 to 190 mm Hg with a mean of 141 mm Hg (SD = 16.8 mm Hg). Diastolic blood pressure ranged from 65 to 112 mm Hg with a mean of 84.77 mm Hg (SD = 8.8 mm Hg).

Instruments

The packet given to subjects who consented to participate in the study contained the following instruments: Demographic Information Sheet, Hassles Scale, Ways of Coping Checklist (Revised), Professional Support Scale, Social Support Scale, Adherence Self-Report, Brief Symptom Inventory, and the Health Perceptions Questionnaire. The psychometric properties of these

Table 2. Psychometric Properties Instruments

<u>Variable</u>	<u>Measure</u>	<u>Author/Date</u>	<u>Reliability Coefficients</u>	<u>Types of Validity</u>
Age (X1)	Demographic Information			
Level of Education(X2)	Demographic Information			
Time Since Diagnosis(X3)	Demographic Information			
Perceived Stress(X4)	Hassles Scale	Kanner, Coyne, Schaefer & Lazarus (1981)	.48-.79 ^a	Content Criterion Construct
Social Support(X5)	Social Support Scale	Schaefer, Coyne & Lazarus (1981)	.56-.66 ^a .81 Informational ^b .95 Emotional ^b	Content
Professional Support(X6)	Professional Support Scale	Goldberger(1987)	.88-.94 ^b	Content Discriminant Construct
Coping(X7)	Ways of Coping (Revised) 66 items	Folkman, Lazarus, Dunkel-Schetter, DeLongis & Gruen (1986)	.61-.79 ^b	Content
Adherence(X8)	Adherence Self-Report	Caplan, Robinson, French, Caldwell & Shinn (1976)	.52-.62 ^a	Content
Health Status(X9)	Health Perception Questionnaire	Davies & Ware (1981)	.56-.88 ^a .50-.88 ^b	Content Discriminant
	Brief Symptom Inventory	Derogatis & Spencer (1982)	.68-.90 ^a .71-.85 ^b	Content Convergent Discriminant Construct
	Systolic BP	Chart Review		
	Diastolic BP	Chart Review		

^a Test-Retest^b Internal Consistency-Cronbach's Alpha

instruments are summarized in Table 2.

Demographic information sheet. The Demographic Information Sheet included items measuring the following variables: a) age, as measured in years; b) level of education, as measured in years; and c) time, in years, since patient was aware of the diagnosis of EH. These variables were selected for inclusion in this study on the basis of related research that found these variables influenced adherence and coping resources. Data also were collected on sex, marital status, and ethnic background so that the sample could be described.

Perceived stress. For the purposes of this study, perceived stress will be defined as a score from the Hassles Scale. Kanner et al. (1981) and Weinberger, Hiner, and Tierney (1987) found that daily hassles were a better predictor of concurrent and subsequent psychological symptoms and health status than life-event scores. The Hassles Scale developed by Kanner et al. (1981) is a list of 117 hassles generated by the authors; it includes the areas of work, health, family, friends, environment, practical considerations, and chance occurrences.

Subjects are presented with a list of 117 hassles and are

asked to circle the number of any items that they have experienced in the last month. Then they are asked to evaluate the severity of that hassle. Severity is indicated on a 3-point scale (1 = somewhat severe, 2 = moderately severe, and 3 = extremely severe). Then they are asked (item 118) if any hassles were missed and, if so, what are the hassles. A final question asks if there has been any change in their lives that affected the way the scale was answered. If so, they are asked to identify what change has occurred.

Two summary scores are generated by the Hassles Scale: a frequency score, which is the simple summation of the number of hassles checked; and a severity score, which is the sum of the 3-point severity ratings. Frequency scores can range from 0-117; severity scores can range from 0-351. For the purposes of this study, the frequency and intensity scores of only the first 117 items were summed, and one score represented the Hassles Scale. Scaling then was in a logical direction, with a higher score indicating more frequent and severe hassles.

In the study of Kanner et al. (1981) content validity was obtained from the research staff members who generated the items, although no validity index was reported. In addition, Kanner et al.

reported that an earlier version of the scale had been tested and that those subjects had been encouraged to suggest hassles not on the scale. These items later were incorporated into the scale. This would be indicative of ecological validity. Finally, Kanner et al. found that hassles had a high correlation with psychological symptoms. The scale was administered nine times in a 12-month period to 100 subjects. Averaging over 9 months of hassles, the correlation between hassles and the psychological symptoms checklist at Month 2 was $r = .60$, $p \leq .001$. This was considered by the researchers as offering construct validation for the Hassles Scale. In analyzing the results, the authors also reported an average month-to-month test-retest reliability coefficient of .79 for frequency of hassles and .48 for severity of hassles.

Coping. The Ways of Coping Checklist (Revised) (WOCCR) as originally developed by Folkman and Lazarus in 1980 and revised in 1985, is a self-report checklist of 67 items describing a broad range of behavioral and cognitive coping strategies that a person might use in a specific stressful episode. The response format is a Likert-type scale with 0 = not used, 1 = used somewhat, 2 = used quite a bit, and 3 = used a great deal. Scores are calculated by

summing the ratings for each scale. Originally, the instrument was tested on a community sample of 100 subjects, and the items on the checklist were classified into two categories: emotion-focused coping and problem-focused coping. Content validity of the scale was established from the literature and the stress-transactional model.

From a later study (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986), that used 75 married couples who were tested five times each for a total of 750 observations, factor analysis of the instrument revealed eight empirically derived subscales: a) confrontive coping, b) distancing, c) self-controlling, d) seeking social support, e) accepting responsibility, f) escape-avoidance, g) planful problem-solving, and h) positive reappraisal. These eight subscales resembled the factor structures from two previous studies with three substantially different populations. The similar factor structure across three different populations helps to establish construct validity of the instrument. Alpha coefficients for these subscales ranged from .61 to .79. Two of the subscales (confrontive coping and planful problem solving) were considered problem-focused ways of coping, seeks social

support was considered a mixed emotion- and problem-focused way of coping and the other five scales were considered emotion-focused ways of coping.

In another study (Vitaliano, Russo, Carr, Maiuro, & Becker, 1985), the WOCCR was factor analyzed using a sample of 425 medical students. Forty-two items on five subscales emerged, explaining 71.9% of the variance. The subscales were: a) problem focused, b) seeks social support, c) blamed self, d) wishful thinking, and e) avoidance. Alpha coefficients for the revised scales ranged from .74 to .88. When compared to the one obtained by Folkman et al. (1987), the factor structure contained quite similar items, although Vitaliano et al. named the factors differently. The original 67 item WOCCR was used in the present study.

Professional support scale. The Goldberger Professional Support Scale (GPSS) (Goldberger, 1987) is an instrument developed to measure clients' rating of the amount of support they feel they get from a professional. In this study, patients were asked to rate the amount of professional support they received from the nurse managing their hypertensive care. Professional support is seen as distinct and separate from social support. The 65-item tool is a

self-administered Likert-type summated rating scale that uses a 5 category response (1 = never, 5 = a great many times). Some items are stated in the negative direction to avoid set response, but these items are reversed to a positive direction in the scoring process. A range of scores from 65 to 325 is possible. Overall scoring is done so that a high score indicates high professional support and a low score indicates low professional support.

Content validity was done by using a panel of experts. The tool originally was conceptualized as having three major dimensions: communication skills, indirect problem-solving skills, and direct problem-solving skills. The initial testing of the tool was done on a nonprobable sample of 60 subjects. Alpha coefficients ranged from .21 to .93, with 12 of the 16 scales or subscales above the .7 recommended range. Discriminate validity was examined by comparing the pattern of reliabilities with correlations between the scales or subscales. No substantial difference was noted; this suggested that professional support was a unidimensional concept. Another 68 subjects were added, and a preliminary and exploratory factor analysis was done. Although four factors emerged that explained 64% of the variance, correlation among the factors was

high, again suggesting a unidimensional concept of professional support. Standardized alpha coefficients for the factors ranged from .58 to .94.

Social support. The Social Support Scale (SSS) as developed by Schafer, Coyne & Lazarus (1981) was designed to measure emotional, tangible, and informational support from spouse, 3 friends, work associates (supervisor and 3 coworkers), 3 close relatives and 3 neighbors. The respondents rate each person on the list on a 1- to 5-point scale (1 = not at all, 5 = extremely) for each of five questions: a) How much did this person give you information, suggestions, and guidance over the last month that you found helpful?; b) How reliable is the person? (Is this person there when you need them?); c) How much does this person boost your spirits when you feel low?; d) How much does this person make you feel he/she cares about you?; 5) How much do you feel you can confide in this person? A range of scores from 0 to 400 is possible. The score is a summed score, with a high score indicating a high level of social support.

Content validity was established by the researchers in developing the instrument. The tool was tested on a sample of 100

subjects. The measure showed considerable stability over the 9 months between administrations. Test-retest reliability correlations ranged from .56 ($p \leq .001$) for tangible support to .66 ($p \leq .001$) for emotional support. Because correlations ($r = .93$) between some of the subscales were high, only the dimensions of informational and emotional support were kept as separate subscales. Internal consistency coefficients for these scales were .81 for informational support and .95 for the emotional support.

Adherence self-report scale. The Adherence Self-Report Scale (ASRS) was adapted from questions used by Caplan et al. (1976) in measuring adherence. The scale consists of eight items related to medications, return appointments, sodium restricted diet, weight loss, exercise, smoking, alcohol intake, and stress reduction. Respondents were asked if they have been asked to do any of these things in the last 6 months to help their BP. If the answer is yes, then they are asked to rate their attempts at adherence on a Likert-type 5-point scale (1 = never, 3 = sometimes, 5 = almost always). Two types of information were yielded by these scales. Complexity of the therapeutic regimen was taken from the number of yes answers (no = 0, yes = 1). Complexity scores range from 0 to

8. Adherence scores were obtained by multiplying complexity rating by adherence self-rating. Adherence scores can range from 1 to 40. Summed adherence scores are in the rational direction, with high scores indicating high self-reported adherence and low scores indicating low self-reported adherence.

Having patients rate their own adherence level is an indirect method of measuring adherence. Direct methods such as blood or urine assays for the presence of medications were deemed not feasible for this study. Studies have shown that the major problem with self-rated adherence is that patients overestimate their adherence level. When self-reports were compared to the results of urine assays for certain medications, it was found that patients overrated their adherence by as much as 20-30%. However, those patients who admit to being nonadherent have been shown, by more direct methods, to be truly nonadherent. Estimates of adherence by health caregivers has been shown to be quite inaccurate and unreliable (Cluss & Epstein, 1985). Caplan et al. (1980) found that trying to validate patients' self-reports of number of appointments kept by using chart records also was inaccurate because of errors in record keeping by health care workers.

Caplan et al. (1980) argued that an indication of the validity of self-report measures of adherence in hypertensive patients is the ability to use the self report to predict BPs. They found that systolic BP (SBP) correlated with medication self-report at $-.21$ ($p \leq .05$) and that diastolic BP (DBP) correlated at $-.20$ ($p < .05$). Although these are weak correlations, Caplan et al. argued that they supported the construct validity of self-reported adherence in hypertension.

Caplan et al. (1980) used only four items (medications, appointments, sodium-restricted diet, and weight reduction) for their self-reports of adherence. These items were taken from the recommendations in the literature on the treatment of EH. Blood pressure and overall self-reported adherence scores correlated at $.25$ ($p < .05$). Test-retest coefficients on these four items were $.55$ from Time 1 to Time 2 (4 months), $.62$ from Time 2 to Time 3 (6 months), and $.52$ from Time 3 to Time 4 (12 months).

Four additional items concerning adherence were added for the purposes of this study. They were added on the basis of experience and after a review of the literature on recommendations for the treatment of EH. They included self-reports on decreasing smoking,

decreasing alcohol intake, increasing exercise, and decreasing stress levels. None of these items were tested for reliability.

Health status. For the purposes of this study, health status was defined as a composite score of mean SBP, mean DBP, a score on the Brief Symptom Inventory (BSI), and a score on the Health Perception Questionnaire (HPQ).

Mean systolic blood pressure. Blood pressures were measured as specified according to the guidelines of Maxwell (1974) (see Appendix A). Because at least two BPs were obtained at each visit (sitting and supine), the SBPs were averaged giving a mean SBP.

Mean diastolic blood pressure. Blood pressures were measured according to the guidelines of Maxwell (1974) (see Appendix A). Because at least two DBPs were obtained at each visit (sitting and supine), the DBPs were averaged to give a mean DBP.

Brief symptom inventory. The Brief Symptom Inventory (BSI) (Derogatis & Spencer, 1982) is a 53-item self-report symptom inventory designed to reflect the psychological symptom patterns of both patients and nonpatients. The BSI is a shortened form of the Symptom Checklist-90-Revised (SCL-90-R) (Derogatis, 1977). Each item on the BSI is rated on a 5-point scale of distress, ranging from

from 0 = not at all to 4 = extremely. The BSI is scored and profiled according to nine subscales or symptom dimensions: a) somatization, b) obsessive-compulsive, c) interpersonal sensitivity, d) depression, e) anxiety, f) hostility, g) phobic anxiety, h) paranoid ideation, and i) psychoticism. Three global indexes of distress also are included.

Scoring involves summing distress scores for each of the nine dimensions and the additional items. This is done by adding together all the scores for each item composing the dimension. The sum is then divided by the number of items on each dimension carried out to two decimal places. These are the raw scores. The manual (Derogatis & Spencer, 1982) provides for further calculations of the global indexes. By using the manual, the raw scores can be converted into standardized T scores for gender and setting appropriateness (i.e., inpatient or outpatient). The T scores were recoded for the purposes of this study so that a higher score indicated better psychological health. Because T scores have a mean of 50 and a standard deviation of 10, and mathematically five standard deviations from the norm are possible, although unlikely (Welkowitz, Ewen, & Cohen, 1976), a suggested coding scheme is to

use 100 minus the standardized T score.

The BSI has strong psychometric properties. Coefficient alpha (N = 719), showing internal consistency, for the dimensions ranged from .71 to .85. Test-retest coefficients (N = 60 at 2 weeks) for the dimensions ranged from .68 to .90, showing stability over time. Correlation coefficients between alternative forms (SCL-90-R and BSI) ranged from .92 to .99 on the subscales. An important feature of the BSI is factorial invariance. That is, the dimensions of the scale as outlined have remained constant across populations and settings. Convergent validity was established by comparing results on the BSI with other scales (Minnesota Multiphasic Personality Inventory) designed to measure similar dimensions of psychopathology. Correlations ranged from .30 to .72 for the different dimensions.

Health perceptions questionnaire. The Health Perceptions Questionnaire (HPQ), as developed by Davies and Ware (1981), was designed to measure self-reported general health ratings that are assumed to assess a construct underlying both physical and psychological health. The HPQ has six dimensions or subscales: a) current health (eight items), b) prior health (three items), c) health

outlook (four items), d) resistance to illness (four items), e) health worry or concern (four items), and f) sickness orientation (eight items). The HPQ was tested with more than 2000 subjects in four different locales in the United States.

The HPQ consists of 32 statements, each with a 5-point response scale (1 = definitely false, 3 = don't know, and 5 = definitely true). The HPQ can be self-administered in 7 minutes. Scores for the subscales are computed by summing the responses on the items for that scale. Content validity for the items was established on the basis of a review of the literature and from previous empirical studies. Estimates of internal consistency reliability ranged from .50 to .88 (N = 4717). Estimates of stability over time (1 year, N = 1200) ranged from .56 to .88. Convergent and discriminant validity was estimated by comparing the subscales of the HPQ with 32 other health related variables. With only one exception, the hypothesized direction of association for all HPQ subscales with the validity variables that defined physical health, mental health, use of services, and life events was observed. The correlations ranged from .58 to .98 in the directions hypothesized (Davies & Ware, 1981).

Statistical Analysis

Descriptive statistics were computed for all variables in the study. These statistics were used to describe the sample and all variables in the model.

Path analysis was used to define and explain the model. First, assumptions underlying the statistical method were tested. In testing the causal model, regression techniques were used. Output was examined for beta weights, significance level, amount of variability (R^2), and adjusted R^2 to account for sample size. The Statistical Package for the Social Sciences Interactive version (SPSS^X) was used for all analyses.

Assumptions Underlying Statistical Procedure

Since path analysis is a special application of regression analysis, it therefore must meet the underlying assumptions of regression analysis, as well as underlying assumptions of path analysis. Those underlying assumptions are as follows (Asher, 1983; Walz & Bausell, 1981):

1. The variables are measured on an interval scale.
2. The relations among the variables are linear, additive, and causal.

3. The variability of the exogenous variables is assumed to be determined by causes outside the model and are not influenced by endogenous variables.
4. There is constant variance of the error term for different values of X (homoscedasticity).
5. The residual variables are not intercorrelated nor are they correlated with other variables in the model.
6. There is a one-way causal flow in the model.
7. All relevant variables are included in the model.

Chapter IV

Results

Data Reduction

Initially, the psychometric properties of the instruments (SSS, GPSS, WOCCR, ASRS, BSI, and HPQ) were examined. The results are summarized in Table 3.

With the HPQ, since the mean inter-item correlation was below the recommended level of $\geq .25$ and only 31% (10 of 32) of the items reached the critical level of $\geq .35$ for the corrected item-total correlation, it was decided to factor analyze the questionnaire to determine the latent structure.

The HPQ has 32 items and there were 95 subjects which yielded an item to subject ratio of 1 to 3. Principal components factor analysis with Varimax® rotation was used to analyze the data. Output was interpreted using the criteria of root one (Eigen value of ≥ 1.0), scree test, interpretability, and factor loadings $\geq .30$ (Hair, Anderson, Tatham, & Grablovsky, 1984). Using these criteria, the cleanest structure which emerged was a four factor solution.

Table 3. Initial Reliabilities of Instruments

Scale Subscale	Mean Inter-item Correlation	# of Items ≥ .35 for Corrected Item-Total Correlation (%)	Alpha Coefficient Standardized
Social Support Scale			
Information	.26	15/16 (94%)	.85
Emotional	.29	63/64 (98%)	.96
Goldberger Professional Support Scale	.36	59/65 (91%)	.97
Ways of Coping			
Confrontive Coping	.33	5/6 (83%)	.75
Distancing	.36	6/6 (100%)	.77
Self-Controlling	.34	7/7 (100%)	.78
Seeks Social Support	.39	6/6 (100%)	.79
Accepts Responsibility	.34	4/4 (100%)	.72
Escape-Avoidance	.30	6/7 (86%)	.78
Planful Problem Solving	.38	6/6 (100%)	.78
Adherence Self-Report			
Medications	.70	2/2 (100%)	.83
Sodium	.84	2/2 (100%)	.92
Appointments	.89	2/2 (100%)	.94
Exercise	.86	2/2 (100%)	.92
Weight	.90	2/2 (100%)	.95
Smoking	.92	2/2 (100%)	.96
Alcohol	.95	2/2 (100%)	.97
Stress	.91	2/2 (100%)	.95
Brief Symptom Inventory	.27	51/53 (96%)	.95
Health Perception Questionnaire	.07	10/32 (31%)	.70

None of the new factors resembled the originally conceptualized dimensions.

The newly factored four scales of the HPQ were subjected to reliability testing. Reliability estimates were examined for mean inter-item correlation $\geq .25$, corrected item-total correlation $\geq .35$ and standardized alpha coefficient $\geq .70$. Only one of the new factors met these criteria. Therefore, only one factor was retained for further analyses. The new factor was called Health Perceptions (HP). The HP had a mean inter-item correlation of .41, 11 of 11 items (100%) were above the recommended .35 level for corrected item-total correlation, and the standardized alpha was .88. Table 4 lists, by original item number, those items which were identified by the factor and were retained to make up the HP. This factor accounted for 50% of the variance.

The seven subscales of the WOCCR noted in Table 3 are the same subscales as derived by Folkman & Lazarus et al. (1986) using factor analytic techniques and exhibiting strong psychometric properties. Additionally, there were 16 items from the WOCCR not included in the seven subscales noted in Table 3. These 16 items were examined to see how they clustered theoretically. From this

Table 4. Items Retained to Form Revised Health Perceptions Scale
With Factor Loadings

Item	Factor Loading
1. According to the doctors I've seen, my health is now excellent.	.707
4. I feel better now than I ever have before.	.694
5. I will probably be sick a lot in the future.	.558
9. I am somewhat ill.	.520
10. In the future, I expect to have better health than other people I know.	.539
12. I'm not as healthy now as I used to be.	.676
17. I'm as healthy as anybody I know.	.510
18. I think my health will be worse in the future than it is right now.	.511
22. My health is excellent.	.801
23. I expect to have a very healthy life.	.699
32. I feel as good now as I ever have.	.699

examination, two subscales were formed. One subscale contained five items and was titled Buying Time (BT). The other subscale contained eleven items and was titled Cognitive Restructuring (CR). The psychometric properties were then tested.

CR had a mean inter-item correlation of .35, 11 of 11 (100%) of the items $\geq$.35 for corrected item-total correlation and a standardized alpha of .85. The CR subscale was retained for further analyses.

BT had a mean inter-item correlation of .28, 4 of 5 (80%) of the items $\geq$.35 for the corrected item-total correlation and a standardized alpha of .65. The BT subscale was not retained for further analyses.

A Pearson correlation was done to examine the bivariate correlations between the existing seven subscales of the WOCCR and the newly created subscale of CR. This was done to test for multicollinearity. The bivariate correlation between CR and Self-Control (SC) was .84 and suggested multicollinearity. Therefore, the items of CR subscale were combined with the items of SC subscale to form a new subscale, SCCR.

This new subscale SCCR was tested for reliability. SCCR's

mean inter-item correlation was .34, 17 of 18 (94%) items were $\geq .35$ for corrected item-total correlation and standardized alpha (with an item with low corrected item-total correlation deleted) was .91. Another Pearson correlation was done to test all eight subscales of the WOCCR for multicollinearity. The range of correlations was from .43 to .62 indicating no multicollinearity.

Path Analysis

Bivariate correlations and residual analysis. Prior to undertaking multiple regression for path analysis, an assumption underlying multiple regression was tested. Pearson bivariate correlation coefficients were run on all variables included in the model to test for multicollinearity (Berry & Feldman, 1985). Since the bivariate correlation between the subscales of Emotional and Informational of the Social Support Scale was .73, these subscales were combined into one scale called Social Support (SS). Reliability of the combined SS scale produced a mean inter-item correlation of .27, corrected item to total correlation ranging from .25 to .65 with 79 of 80 (99%) falling above the recommended .35 level. Standardized alpha coefficient for the combined scale was .97.

A Pearson correlation was done for all variables eventually

included in the model and this matrix is shown in Table 5.

Multicollinearity was not a problem since none of bivariate correlations were $\geq .7$.

After the regressions were run but, prior to analysis of the data, the residuals were examined. Assessment of residuals was used to check for violations of the statistical assumptions underlying regression analysis (Hair et al, 1984; Verran & Ferketich, 1984). The means of the residuals were checked to see that they were equal to zero. An examination of the scatterplot of residuals indicated that the points appeared to scatter randomly and evenly about the line. This indicated independence and constant variance of the error terms and linearity of the phenomenon measured. Histograms of the residuals were checked to see if they appeared to have a normal distribution. This indicated the normality of the error term distribution (Hair, 1984).

Analyzing the Model Through Regression

For the causal model all the variables were entered into a regression analysis, solving multiple regressions for each dependent variable. Ordinary regression with simple inclusion of all variables was used. The regressions began with the earliest dependent or

Table 5. Correlation Matrix for All Variables

	Age	Ed	TSD	PST	SS	ProS	CC	DC	SCCRC	SSSC
Age										
Ed	-.26									
TSD	.29	-.08								
PST	.01	-.26	.12							
SS	-.29	.11	-.16	-.24						
ProS	.18	.02	.13	-.15	.09					
CC	-.11	-.21	.09	.36	-.10	-.16				
DC	.04	-.26	.10	.45	-.25	-.02	.42			
SCCRC	-.07	-.03	.14	.39	-.06	.17	.63	.65		
SSSC	-.06	-.10	.08	.32	.06	.10	.49	.31	.56	
ARC	-.08	-.19	-.02	.50	-.18	-.12	.50	.55	.50	.31
EAC	-.14	-.15	.03	.49	-.14	-.16	.54	.50	.54	.44
PPSC	-.07	.03	.04	.22	-.05	.20	.48	.48	.69	.55
PRC	-.03	-.15	.15	.37	-.13	.12	.42	.65	.67	.46
ADHMED	-.02	.15	.10	-.15	-.01	.21	-.08	-.16	-.01	.06
ADHNA	.09	-.06	.19	-.03	-.09	.08	.03	.02	.06	.02
ADHAP	.19	-.13	.12	-.18	-.12	.07	.06	-.00	-.02	.13
ADHEX	-.06	.05	.08	-.11	.05	.06	.01	.05	.08	.21
ADHWT	-.02	-.21	.15	.21	-.19	.02	.21	.36	.28	.23
ADHSM	-.09	.01	-.01	.12	-.15	-.09	.18	.06	.09	.04
ADHAL	.07	-.16	-.07	.09	-.08	-.02	.19	.04	.03	.16
ADHST	-.06	-.20	-.10	.11	-.08	-.13	.18	.23	.08	.02
HP	.01	.06	.08	-.20	.10	-.03	.14	.10	.12	-.01
BSI	-.19	-.06	-.08	.63	.03	-.05	.30	.33	.39	.38
SBP	.42	-.19	.18	-.05	-.01	.27	-.09	-.03	-.04	-.01
DBP	-.28	.16	.13	-.05	.08	.02	.05	-.05	.07	.04

KEY: Age=age	PPSC=Coping by Planful Problem Solving
Ed=Education	PRC=Coping by Positive Reappraisal
TSD=Time Since Diagnosis	ADHMED=Adherence to medications
PST=Perceived Stress (Hassles)	ADHNA=Adherence to low sodium diet
SS=Social Support	ADHAP=Adherence to appointments
ProS=Professional Support	ADHEX=Adherence to exercise
CC=Confrontive Coping	ADHWT=Adherence to weight reduction
DC=Coping by Distancing	ADHSM=Adherence to cessation of smoking
SCCRC=Coping by Self-control/Cognitive Restructuring	ADHAL=Adherence to decreasing alcohol
SSSC=Coping by Seeking Social Support	ADHST=Adherence to stress reduction
ARC=Coping by Accepting Responsibility	HP=Health Perceptions
EAC=Coping by Escape-Avoidance	BSI=Brief Symptom Inventory
	SBP=Systolic blood pressure
	DBP=Diastolic blood pressure

If $r \geq .166$, then $p \leq .05$, if $r \geq .226$, then $p \leq .01$, if $r \geq .306$, then $p \leq .001$.

Table 5. Correlation Matrix for All Variables (Continued)

	ARC	EAC	PPSC	PRC	ADHMED	ADHNA	ADHAP	ADHEX	ADHWT	ADHSM
Age										
Ed										
TSD										
PST										
SS										
ProS										
CC										
DC										
SCCRC										
SSSC										
ARC										
EAC	.40									
PPSC	.46	.23								
PRC	.47	.39	.55							
ADHMED	-.18	-.09	.04	-.12						
ADHNA	-.01	-.10	.13	.07	-.07					
ADHAP	-.10	-.22	.17	.02	.28	.41				
ADHEX	-.11	.07	.08	.11	-.09	.25	-.17			
ADHWT	.14	.20	.23	.32	-.03	.12	.30	.18		
ADHSM	.05	.17	.03	-.04	-.06	.04	-.17	-.02	.04	
ADHAL	.13	.09	.11	-.06	-.05	.04	.14	-.13	.20	.26
ADHST	.22	.11	-.04	.10	-.00	.08	.04	.07	.13	.28
HP	-.08	-.23	.29	.09	-.01	.11	.05	.21	.02	.09
BSI	.39	.51	.23	.30	.03	-.11	-.23	-.10	.12	.06
SBP	-.02	-.03	.04	-.12	-.04	-.12	.05	-.11	-.15	-.10
DBP	-.09	.04	.19	.05	-.12	.14	.05	.16	.17	-.07

KEY: Age=age

Ed=Education

TSD=Time Since Diagnosis

PST=Perceived Stress (Hassles)

SS=Social Support

ProS=Professional Support

CC=Confrontive Coping

DC=Coping by Distancing

SCCRC=Coping by Self-control/Cognitive Restructuring

SSSC=Coping by Seeking Social Support

ARC=Coping by Accepting Responsibility

EAC=Coping by Escape-Avoidance

PPSC=Coping by Planful Problem Solving

PRC=Coping by Positive Reappraisal

ADHMED=Adherence to medications

ADHNA=Adherence to low sodium diet

ADHAP=Adherence to appointments

ADHEX=Adherence to exercise

ADHWT=Adherence to weight reduction

ADHSM=Adherence to cessation of smoking

ADHAL=Adherence to decreasing alcohol

ADHST=Adherence to stress reduction

HP=Health Perceptions

BSI=Brief Symptom Inventory

SBP=Systolic blood pressure

DBP=Diastolic blood pressure

If $r \geq .166$, then $p \leq .05$, if $r \geq .226$, then $p \leq .01$, if $r \geq .306$, then $p \leq .001$.

Table 5. Correlation Matrix for All Variables (Continued)

	ADHAL	ADHST	HP	BSI	SBP	DBP
Age						
Ed						
TSD						
PST						
SS						
ProS						
CC						
DC						
SCCRC						
SSSC						
ARC						
EAC						
PPSC						
PRC						
ADHMED						
ADHNA						
ADHAP						
ADHEX						
ADHWT						
ADHSM						
ADHAL						
ADHST	.26					
HP	-.07	.03				
BSI	.04	.09	-.24			
SBP	.11	.00	-.08	-.09		
DBP	.10	-.04	-.10	-.07	.10	

KEY: Age=age

Ed=Education

TSD=Time Since Diagnosis

PST=Perceived Stress (Hassles)

SS=Social Support

ProS=Professional Support

CC=Confrontive Coping

DC=Coping by Distancing

SCCRC=Coping by Self-control/Cognitive Restructuring

SSSC=Coping by Seeking Social Support

ARC=Coping by Accepting Responsibility

EAC=Coping by Escape-Avoidance

PPSC=Coping by Planful Problem Solving

PRC=Coping by Positive Reappraisal

ADHMED=Adherence to medications

ADHNA=Adherence to low sodium diet

ADHAP=Adherence to appointments

ADHEX=Adherence to exercise

ADHWT=Adherence to weight reduction

ADHSM=Adherence to cessation of smoking

ADHAL=Adherence to decreasing alcohol

ADHST=Adherence to stress reduction

HP=Health Perceptions

BSI=Brief Symptom Inventory

SBP=Systolic blood pressure

DBP=Diastolic blood pressure

If $r \geq .166$, then $p \leq .05$, if $r \geq .226$, then $p \leq .01$, if $r \geq .306$, then $p \leq .001$.

endogenous variable. Each endogenous variable was regressed on those variables that were prior to it in the model. Regression analysis concluded with the final outcome variables of Health Status being regressed on all preceding variables. Each of the outcome variables for Health Status (DBP, SBP, health perceptions [HP], and symptom inventory [SI]) were treated as separate dependent variables.

Path analysis resulted in the development of four models (see Figures 2, 3, 4, and 5). Different predictor variables explained significant variance in each of the four outcome variables of DBP (14%), SBP (23%), HP (23%), and SI (44%). Since the outcome variables were not correlated above the $r = -.23$ level and because different variables were predictive of different outcome variables, a decision was made to keep each outcome variable as a separate variable and not combine them into a composite as previously planned. This was done for the sake of clarity and simplicity of the models.

Regression output for each of the four models was examined for standardized regression coefficients or beta weights (path coefficients) and their significance level. The amount of variance

Standardized beta weights are shown on the paths between variables.

Figure 2. Simplified Path of Model 1 Relating Systolic Blood Pressure to Predictor Variables (path coefficient $\geq .15$).

Note: Path Significance: * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.
Standardized beta weights are shown on the paths between variables.

Figure 3. Simplified Path of Model 2 Relating Diastolic Blood Pressure to Predictor Variables (path coefficient $\geq .15$).

Note: Path Significance: $*p \leq .05$, $**p \leq .01$, $***p \leq .001$.
Standardized beta weights are shown on the paths between variables.

Figure 4. Simplified Path of Model 3 Relating Health Perceptions to Predictor Variables (path coefficient $\geq .15$).

Note: Path Significance: * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.
Standardized beta weights are shown on the paths between variables.

Figure 5. Simplified Path of Model 4 Relating Symptom Inventory to Predictor Variables (path coefficient $\geq .15$).

(R^2 and adjusted R^2) accounted for by the variables in each equation was also examined (Munro, Visintainer, & Page, 1986). Predictive ability was determined by either a salient beta weight of $\geq .150$ or by a significance level of $\leq .05$. If these criteria were met, then the variable path was retained. Table 6 presents the significant and salient standardized regression coefficients, R^2 , adjusted R^2 , F value, and significance of F value for the four outcome variables. The direction of the effects and precise prediction are provided for in the 4 path models in Figures 2, 3, 4, and 5. Table 7 presents the standardized regression coefficients ($\underline{b} \geq .150$) relating the remaining endogenous variables to the predictor variables for all 4 models.

In all of the four models age, level of education, and time since diagnosis accounted for 5% of the variance in perceived stress with a significant inverse effect coming from education ($\underline{b} = -.269$, $p \leq .01$). In the next time ordering for all the four models, social support and professional support were regressed on the antecedent variables of age, level of education, time since diagnosis and perceived stress. In all four of the models age, level of education, time since diagnosis, and perceived stress accounted for 10% of the

Table 6. Significant and Salient Standardized Regression Coefficients ($b \geq .15$) for the Simplified Models Relating Diastolic Blood Pressure, Systolic Blood Pressure, Health Perceptions, and Brief Symptom Inventory to Predictor Variables

Independent Variables	Dependent Variables			
	Systolic Blood Pressure: Model 1	Diastolic Blood Pressure: Model 2	Health Perceptions: Model 3	Symptom Inventory: Model 4
Age	.301**	-.351**	.....	.....
Ed	-.154	.....	.....	.....
TSD	.213*	.268*	.....	.....
PST	.....	.....	.....	.503***
ProS	.239*	.....	-.207	.....
EAC	.248	.206	-.427**	.186
SCCRC	.....	.....	.....	.....
SSSC	.....	-.201	-.151	.179
CC	-.193	.....	.316*	.....
ARC	.....	-.240	-.264	.....
DC	.....	-.197	.250	.....
PPSC	.302*	.430**	.442**	.....
PRC	-.258	.....	.150	.....
ADHMED	-.193	-.233*	.....	.160
ADHNA	-.250*	.....	.....	.....
ADHWT	-.201	.....	.....	.....
ADHAL	.....	.175	.....	.....
ADHSM	.....	-.174	.....	.....
ADHEX	.....	.....	.153	.....
ADHAP	.....	.....	.....	-.187
$R^2 =$	.40825	.34326	.41028	.57012
Adjusted $R^2 =$	.22744	.14259	.23008	.43876
F =	2.25788**	1.71056*	2.27687**	4.34031***

KEY: Age=age

Ed=Education

TSD=Time Since Diagnosis

PST=Perceived Stress (Hassles)

ProS=Professional Support

EAC=Coping by Escape-Avoidance

SSSC=Coping by Seeking Social Support

SCCRC=Coping by Self-Cont./Cog.Restr.

CC=Confrontive Coping

ARC=Coping by Accepting Responsibility

DC=Coping by Distancing

PPSC=Coping by Planful Problem Solving

PRC=Coping by Positive Reappraisal

ADHMED=Adherence to medications

ADHNA=Adherence to low sodium diet

ADHWT=Adherence to weight reduction

ADHAL=Adherence to decreasing alcohol intake

ADHAP=Adherence to appointments

ADHSM=Adherence to cessation of smoking

ADHEX=Adherence to exercise

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 7. Standardized Regression Coefficients ($b \geq .15$) Relating Remaining Endogenous Variables to the Predictor Variables for All the Models

<u>Variables</u>		MODEL			
Dependent	Independent	1	2	3	4
Perceived Stress					
Education		-.269*	-.269*	-.269*	-.269*
Social Support					
Age		-.275*	-.275*	-.275*	-.275*
Perceived Stress		-.233*	-.233*	-.233*	-.233*
Professional Support					
Age		.199	.199	.199	.199
Escape-Avoidance Coping					
Age		-.171	-.171	-.171	-.171
Perceived Stress		.451***	.451***	.451***	.451***
Self-Control/Cog.Restruc. Coping					
Perceived Stress			.409***	.....	.....
Professional Support			.238*	.....	.....
Seeking Social Support Coping					
Perceived Stress			.351***	.351***	.351**
Confrontive Coping					
Age		-.191	-.191	-.191	-.191
Education		-.169	-.169	-.169	-.169
Perceived Stress		.294**	.294**	.294**	.294**
Accepts Responsibility Coping					
Perceived Stress		.461***	.461***	.461***	.431***
Distancing Coping					
Education		-.165	-.165	-.165	.....
Perceived Stress		.369***	.369***	.369***	.....
Social Support		-.172	-.172	-.172	.....
Planful Problem Solving Coping					
Perceived Stress		.258*	.528*	.258*	.258*
Professional Support		.266*	.266*	.266*	.266*
Positive Reappraisal Coping					
Perceived Stress		.352***	.352***	.352***	.352***
Professional Support		.192	.192	.192	.192

Table 7. Standardized Regression Coefficients ($b \geq .15$) Relating Remaining Endogenous Variables to the Predictor Variables for All the Models (Continued)

Variables	MODEL			
	1	2	3	4
Dependent				
Independent				
Adherence to Medications				
Professional Support	.168	.168	.....	.168
Positive Reappraisal Coping	-.166	-.166	.....	-.166
Adherence to Low Sodium Diet				
Time Since Diagnosis	.171	.....	.....	.....
Adherence to Weight Reduction				
Education	-.174	.....	.....	.....
Accepting Responsib. Coping	-.190	.....	.....	.....
Distancing Coping	.233	.....	.....	.....
Adherence to Decreas. Alcohol				
Self-Cont./Cog. Restr. Coping	.....	-.177	.....	.....
Seeks Social Support Coping	.....	.170	.....	.....
Confrontive Coping	.....	.194	.....	.....
Adherence to Cessation of Smoking				
Social Support	.....	-.173	.....	.....
Confrontive Coping	.....	.168	.....	.....
Positive Reappraisal Coping	.....	-.200	.....	.....
Adherence to Exercise				
Perceived Stress	.....	.....	-.197	.....
Seeks Social Support Coping	.....	.....	.271	.....
Accepting Responsib. Coping	.....	.....	-.169	.....
Adherence to Appointments				
Perceived Stress	.....	.....	.....	-.211
Social Support	.....	.....	.....	-.160
Escape-Avoidance Coping	.....	.....	.....	-.320*
Seeks Social Support Coping	.....	.....	.....	.239
Confrontive Coping	.....	.....	.....	.171
Accepting Responsib. Coping	.....	.....	.....	-.151
Planful Problem Solv. Coping	.....	.....	.....	.213

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

variance in social support with significant inverse effects coming from age ($\underline{b} = -.275, p \leq .01$) and perceived stress ($\underline{b} = -.233, p \leq .05$). In each four of the models the antecedent variables only accounted for 3% of the variance in professional support with the greatest influence coming from age ($\underline{b} = .199$). This was a trend toward significance at the $p \leq .08$.

In the next time ordering, the eight coping strategies of the WOCCR were regressed on the antecedent variables of professional support, social support, perceived stress, time since diagnosis, level of education, and age. When entered into the four separate models, all of the coping strategies were correlated with the antecedent variables in the models, but different coping strategies were predictive of different variables in the next time ordering of adherence as well as being predictive of different outcome variables. Table 7 presents the standardized regression coefficients ($\underline{b} \geq .150$) relating the remaining endogenous variables to the predictor variables for all 4 models. In Table 7 values are omitted where linkages did not support retention of that variable in the model.

In Model 1 with the outcome variable of SBP, the six coping

strategies of escape avoidance (EAC), confrontation (CC), accepting responsibility (ARC), distancing (DC), planful problem solving (PPSC), and positive reappraisal (PRC) were retained because they had predictive validity with adherence to medications (ADHMED), adherence to a low sodium diet (ADHNA), adherence to a weight reduction program (ADHWT) or SBP.

In Model 2 with the outcome variable of DBP, the eight coping strategies of EAC, self-control/cognitive restructuring (SCCRC), seeking social support (SSSC), CC, ARC, DC, PPSC, and PRC were retained because they had predictive validity with ADHMED, adherence to decreasing alcohol (ADHAL), adherence to smoking cessation (ADHSM) or DBP.

In Model 3 with the outcome variable of HP, the seven coping strategies of EAC, SSSC, CC, ARC, DC, PPSC, and PRC were retained because they had predictive validity with adherence to exercise (ADHEX) or HP.

In Model 4 with the outcome variable of SI, the six coping strategies of EAC, SSSC, CC, ARC, PPSC, and PRC were retained because they had predictive validity with adherence to appointments (ADHAP), ADHMED, or SI.

Age, level of education, time since diagnosis, perceived stress, social support, and professional support accounted for 22% of the variance in EAC with perceived stress having a significant, direct effect ($\underline{b} = .301, p \leq .01$) and age having a direct, negative effect ($\underline{b} = -.171$).

Age, level of education, time since diagnosis, perceived stress, social support, and professional support accounted for 16% of the variance in SCCRC with direct, significant effects from perceived stress ($\underline{b} = .409, p \leq .001$) and professional support ($\underline{b} = .238, p \leq .05$).

Age, level of education, time since diagnosis, perceived stress, social support, and professional support accounted for 9% of the variance in SSSC with only perceived stress having a direct, significant effect ($\underline{b} = .351, p \leq .01$).

Age, level of education, time since diagnosis, perceived stress, social support, and professional support accounted for 13% of the variance in CC with perceived stress having a significant, direct effect ($\underline{b} = .294, p \leq .01$) and direct, negative effects from age ($\underline{b} = -.191$) and level of education ($\underline{b} = -.191$).

Age, level of education, time since diagnosis, perceived

stress, social support, and professional support accounted for 23% of the variance in ARC with only perceived stress having a direct, significant effect ($\underline{b} = .461, p \leq .001$).

Age, level of education, time since diagnosis, perceived stress, social support, and professional support accounted for 20% of the variance in DC with perceived stress having a significant, direct effect ($\underline{b} = .369, p \leq .001$) and direct negative effects from social support ($\underline{b} = -.172$) and level of education ($\underline{b} = -.165$).

Age, level of education, time since diagnosis, perceived stress, social support, and professional support accounted for 6% of the variance in PPSC with direct, significant effects from perceived stress ($\underline{b} = .258, p \leq .05$) and professional support ($\underline{b} = .266, p \leq .05$).

Age, level of education, time since diagnosis, perceived stress, social support, and professional support accounted for 14% of the variance in PRC with a direct, significant effect from perceived stress ($\underline{b} = .352, p \leq .001$) and a direct effect from professional support ($\underline{b} = .192$).

In the next time ordering the eight adherence strategies were regressed on the antecedent variables of EAC, SCCRC, SSSC, CC, ARC, DC, PPPS, PRC, professional support, social support, perceived

stress, time since diagnosis, level of education, and age. When entered into the four separate models, seven adherence strategies were correlated with the antecedent variables in the models, but different adherence strategies were predictive of different outcome variables. The only adherence strategy that did not remain in any of the models was adherence to stress reduction techniques.

In Model 1 with the outcome variable of SBP, the three adherence strategies of ADHMED, ADHNA, and ADHWT were retained because they were predictive of SBP. In Model 2 with the outcome variable of DBP, the three adherence strategies of ADHMED, ADHAL, and ADHSM were retained because they were predictive of DBP. In Model 3 with the outcome variable of HP, only the adherence strategy of ADHEX was retained because it was predictive of HP. In Model 4 with the outcome variable of SI, the two adherence strategies of ADHMED and ADHAP were retained because they were predictive of SI.

Age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SCCRC, SSSC, CC, ARC, DC, PPSC, and PRC accounted for less than 2% of the variance in ADHMED. Professional support had a positive, direct effect

($\beta = .168$) and PRC had a negative, direct effect ($\beta = .168$) on ADHMED.

Age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SCCRC, SSSC, CC, ARC, DC, PPSC, and PRC accounted for 7% of the variance in ADHNA. There were direct, positive effects from time since diagnosis ($\beta = .171$) and PPSC ($\beta = .173$) on ADHNA.

Age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SCCRC, SSSC, CC, ARC, DC, PPSC, and PRC accounted for 8% of the variance in ADHWT. There was a direct, positive effect from DC ($\beta = .233$) and negative, direct effects from ARC ($\beta = -.190$) and time since diagnosis ($\beta = -.269$, $p \leq .05$) on ADHWT.

Age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SCCRC, SSSC, CC, ARC, DC, PPSC, and PRC accounted for less than 1% of the variance in ADHAL. There were direct, positive effects from SSSC ($\beta = .170$) and CC ($\beta = .194$) and negative, direct effects on ADHAL from PRC ($\beta = -.249$) and SCCRC ($\beta = -.177$).

Age, level of education, time since diagnosis, perceived

stress, social support, professional support, EAC, SCCRC, SSSC, CC, ARC, DC, PPSC, and PRC accounted for 6% of the variance in ADHSM. There was a direct, positive effect from CC ($\underline{b} = .168$) and direct, negative direct effects from PRC ($\underline{b} = -.200$) and social support ($\underline{b} = -.173$) on ADHSM.

Age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SCCRC, SSSC, CC, ARC, DC, PPSC, and PRC accounted for 3% of the variance in ADHEX. There was a direct, positive effect from SSSC ($\underline{b} = .271$) and negative, direct effects from ARC ($\underline{b} = -.264$) and perceived stress ($\underline{b} = -.197$) on ADHEX.

Age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SCCRC, SSSC, CC, ARC, DC, PPSC, and PRC accounted for 13% of the variance in ADHAP. There were direct, positive effects from SSSC ($\underline{b} = .239$), CC ($\underline{b} = .171$), and PPSC ($\underline{b} = .213$) on ADHAP. There were also significant, negative, direct effects were from EAC ($\underline{b} = -.320$, $p \leq .05$) and nonsignificant, negative, direct effects from ARC ($\underline{b} = -.151$), social support ($\underline{b} = -.160$), and perceived stress ($\underline{b} = -.160$) on ADHAP.

For the outcome variable SBP in Model 1, 23% of the variance was accounted for by the predictor variables of age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, CC, ARC, DC, PPSC, PRC, ADHMED, ADHNA, and ADHWT. EAC had a direct, positive effect on SBP ($b = .246$), as did PPSC ($b = .302, p \leq .05$), professional support ($b = .239, p \leq .05$), time since diagnosis ($b = .213, p \leq .05$) and age ($b = .301, p \leq .01$). In contrast, direct negative effects were from ADHMED ($b = -.193$), ADHNA ($b = -.250, p \leq .05$), ADHWT ($b = -.201$), CC ($b = -.193$), PR ($b = -.258$), and level of education ($b = -.154$).

For the outcome variable DBP in Model 2, 14% of the variance was accounted for by the predictor variables of age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SCCRC, SSSC, CC, ARC, DC, PPSC, PRC, ADHMED, ADHAL, and ADHSM. ADHAL had a direct, positive effect on DBP ($b = .175$), as did EAC ($b = .206$), PPSC ($b = .430, p \leq .01$), and time since diagnosis ($b = .268, p \leq .05$). In contrast, direct negative effects were from ADHMED ($b = -.233, p \leq .05$), ADHSM ($b = -.174$), SSSC ($b = -.201$), ARC ($b = -.240$), DC ($b = -.197$), and age ($b = -.154, p \leq .01$).

For the outcome variable HP in Model 3, 23% of the variance was accounted for by the predictor variables of age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SSSC, CC, ARC, DC, PPSC, PRC, and ADHEX. ADHEX had a direct, positive effect on HP ($\beta = .153$), as did CC ($\beta = .316$, $p \leq .05$), DC ($\beta = .250$), and PPSC ($\beta = .442$, $p \leq .05$). In contrast, direct negative effects were from EAC ($\beta = -.427$, $p \leq .01$), SSSC ($\beta = -.151$), ARC ($\beta = -.264$), and professional support ($\beta = -.207$).

For the outcome variable SI in Model 4, 44% of the variance was accounted for by the predictor variables of age, level of education, time since diagnosis, perceived stress, social support, professional support, EAC, SSSC, CC, ARC, PPSC, PRC, ADHMED, and ADHAP. ADHMED had a direct, positive effect on SI ($\beta = .160$), as did EAC ($\beta = .186$), SSSC ($\beta = .179$), and perceived stress ($\beta = .503$, $p \leq .001$). In contrast, there was a direct, negative effect was from ADHAP ($\beta = -.187$).

Given that 44% of the variance was explained in Model 4, 23% of the variance in Model 3, and 23% of the variance in Model 1 with a sample of 95, the power obtained for all three models was greater

than .92. Given that 14% of the variance was explained in Model 2 with a sample of 95, the power obtained dropped to .54 (Cohen, 1977).

Since the outcome variables were of major interest, the decomposition table (see Table 8) displays the decomposition of variance for the outcome variable for each model. Column A presents the bivariate correlation coefficients. Column B presents the direct effects which are the standardized beta weights or the path coefficients. If these path coefficients are $\underline{b} \geq .150$, they are also noted in Figures 2, 3, 4 and 5. Column C presents the indirect effects which are calculated by adding the multiplicatives of the beta weights of involved pathways. Column D presents the total effects and is the sum of the direct and indirect effects. Column E presents the non-causal or spurious effects and is derived from subtracting the total effects from the total covariance.

Since professional support and its effect on adherence was of major interest for this study, its indirect effects on SI are presented in Figure 6. For Model 1 age had the strongest indirect effect ($\underline{b} = .296$, $p \leq .05$) on SBP. The indirect effects of two types of coping, EA ($\underline{b} = .287$, $p \leq .05$) and PR ($\underline{b} = -.287$), also were

Table 8. Decomposition of Covariance for the Outcome Variable of Each Model

Bivariate Relationship	(A) Total Covariance	(B) Direct Effects	Causal		(E) Non-causal Effects (A-D)
			(C) Indirect Effects	(D) Total (B + C)	
Systolic Blood Pressure (Model 1)					
X ₉ X _{8C}	-.039	-.201	---	-.201	.162
X ₉ X _{8B}	-.110	-.250*	---	-.250	.140
X ₉ X _{8A}	-.150	-.193	---	-.193	.043
X ₉ X _{7H}	-.123	-.258	.008	-.250	.127
X ₉ X _{7G}	.036	.302*	-.106	.196	-.160
X ₉ X _{7F}	-.033	-.087	-.009	.096	-.129
X ₉ X _{7E}	-.017	.047	.086	.133	-.116
X ₉ X _{7D}	-.090	-.193	.009	-.184	.094
X ₉ X _{7A}	-.034	.248	.039	.287	-.321
X ₉ X ₆	.269**	.239*	-.030	.209	.060
X ₉ X ₅	-.010	.036	-.004	.032	-.042
X ₉ X ₄	-.054	-.053	.003	.050	-.104
X ₉ X ₃	.183*	.213*	.001	.214	-.031
X ₉ X ₂	-.193*	-.154	-.001	-.155	-.038
X ₉ X ₁	.421***	.301**	-.005	.296	.125
Diastolic Blood Pressure (Model 2)					
X ₉ X _{8E}	-.068	-.174	---	-.166	.098
X ₉ X _{8D}	.104	.175	---	.175	-.071
X ₉ X _{8A}	-.116	-.233*	---	-.233	.117
X ₉ X _{7H}	.050	.138	.030	.168	-.118
X ₉ X _{7G}	.193*	.430**	.001	.431	-.238
X ₉ X _{7F}	-.046	-.197	.023	-.174	.128
X ₉ X _{7E}	-.088	-.240	.054	-.186	.098
X ₉ X _{7D}	.052	-.035	.016	-.019	.071
X ₉ X _{7C}	.035	-.201	.003	-.198	.233
X ₉ X _{7B}	.065	-.066	-.069	-.135	.200
X ₉ X _{7A}	.043	.201	-.012	.189	.241
X ₉ X ₆	.017	.023	-.009	.014	.003
X ₉ X ₅	.083	-.003	-.011	-.014	.097
X ₉ X ₄	-.053	.018	.004	.022	-.075
X ₉ X ₃	.134	.268*	.001	.269	-.135
X ₉ X ₂	.159	.093	.001	.094	.065
X ₉ X ₁	-.281**	-.351**	.000	-.351	.070

Table 8. Decomposition of Covariance for the Outcome Variable of Each Model (Continued)

Bivariate Relationship	(A) Total Covariance	Causal			(E) Non-causal Effects (A-D)
		(B) Direct Effects	(C) Indirect Effects	(D) Total (B + C)	

Health Perceptions (Model 3)					
X ₉ X _{8F}	.206*	.153	---	.153	.053
X ₉ X _{7H}	.087	.150	.014	.164	-.251
X ₉ X _{7G}	.288**	.442**	-.001	.441	-.153
X ₉ X _{7F}	.010	.250	.017	.267	-.257
X ₉ X _{7E}	-.080	-.264	-.025	-.289	.209
X ₉ X _{7D}	.136	.316*	-.017	.299	-.163
X ₉ X _{7C}	-.014	-.151	.041	-.110	.096
X ₉ X _{7A}	-.233**	-.427**	.012	-.415	.182
X ₉ X ₆	-.029	-.207	.009	-.198	.169
X ₉ X ₅	.099	.129	-.001	.128	-.029
X ₉ X ₄	-.203*	-.146	-.001	-.147	-.056
X ₉ X ₂	.056	-.017	.000	-.017	.073
X ₉ X ₁	.006	.072	.000	.072	-.066

Symptom Inventory (Model 4)					
X ₉ X _{8G}	-.234**	-.187	---	-.187	-.047
X ₉ X _{8A}	.034	.160	---	.160	-.126
X ₉ X _{7H}	.299**	-.035	-.021	-.056	.355
X ₉ X _{7G}	.226**	-.025	-.028	-.053	.279
X ₉ X _{7E}	.390***	.034	.012	.046	.344
X ₉ X _{7D}	.297**	-.060	-.040	-.100	.397
X ₉ X _{7C}	.376***	.179	-.024	.155	.221
X ₉ X _{7A}	.507***	.186	.061	.247	.260
X ₉ X ₆	.269**	.024	-.013	.011	.258
X ₉ X ₅	.026	.116	-.003	.113	-.087
X ₉ X ₄	.631***	.503***	.003	.506	.125
X ₉ X ₂	-.057	.060	-.006	.054	-.111
X ₉ X ₁	-.193*	-.062	.003	-.059	-.134

Figure 6. Indirect Effects of Professional Support on Symptom Inventory.

significant in predicting SBP. In Model 2 PPS coping ($b = .431$, $p \leq .01$) had the strongest indirect effect on DBP; while age ($b = -.351$, $p \leq .01$) and time since diagnosis ($b = .269$, $p \leq .05$) also had significant indirect effects. In Model 3 the strongest indirect effect on HP came from PPS coping ($b = -.441$, $p \leq .01$), while EA coping ($b = -.415$, $p \leq .01$) and confrontive coping ($b = .299$, $p \leq .05$) were also significant. In Model 4 only perceived stress ($b = .506$, $p \leq .001$) had a significant indirect effect on SI.

In summary, the results of the path analysis demonstrated the direct and indirect effects of demographic variables (age, education, time since diagnosis) and subsequent psychosocial variables (perceived stress, ways of coping, social support, and professional support) on adherence, and ultimately on health status (SBP, DBP, subjective health and, psychological symptoms). Path analysis resulted in the development of four models with significant variance in each of the four outcome variables explained.

Testing of the Hypotheses

For testing of the hypotheses, a significance level of .05 was set. The direct hypotheses and results are summarized and presented in Table 9. None of the 5 complex direct hypotheses was

Table 9. Results by Hypotheses and Model

Hypothesized Variables With Direction (+ or -)		Results (+ or -)	
H1	Adherence + Health Status	Model 1	ADHNA - SBP
		Model 2	ADHMED - DBP
		Model 3	0
		Model 4	0
	Social Support + Health Status	Model 1	0
		Model 2	0
		Model 3	0
		Model 4	0
	Coping + Health Status	Model 1	PPS + SBP
		Model 2	PPS + DBP
		Model 3	EAC - HP CC + HP
		Model 4	0
H2	Social Support + Adherence	Model 1	0
		Model 2	0
		Model 3	0
		Model 4	0
	Professional Support + Adherence	Model 1	0
		Model 2	0
		Model 3	0
		Model 4	0
	Coping + Adherence	Model 1	0
		Model 2	0
		Model 3	0
		Model 4	EAC - ADHAP

Key:	SBP=Systolic Blood Pressure	ADHNA=Adherence to Low Sodium Diet
	DBP=Diastolic Blood Pressure	EAC=Coping by Escape-Avoidance
	HP=Health Perceptions	SSSC=Coping by Seeking Social Support
	SI=Symptom Inventory	CC=Confrontive Coping
	AGE=Age in Years	ARC=Coping by Accepting Responsibility
	ED=Education	DC=Coping by Distancing
	PST=Perceived Stress	PPSC=Coping by Planful Problem Solving
	SS=Social Support	PRC=Coping by Positive Reappraisal
	ADHMED=Adherence to meds	SCCRC=Coping by Self-Control/Cog. Restr.

Table 9. Results by Hypotheses and Model (Continued)

Hypothesized Variables With Direction (+ or -)		Results (+ or -)	
H3	Perceived Stress - Social Support	Model 1	PST - SS
		Model 2	PS T- SS
		Model 3	PST - SS
		Model 4	PST - SS
	Perceived Stress - Professional Support	Model 1	0
		Model 2	0
		Model 3	0
		Model 4	0
	Perceived Stress - Coping	Model 1	PST + EAC PST + DC PST + PRC
		Model 2	PST + EAC PST + CC PST + SCCRC PST + ARC
	Perceived Stress - Coping	Model 2	PST + DC PST + PRC
		Model 3	PST + EAC PST + CC PST + DC PST + PRC
		Model 4	PST + EAC PST + CC PST + PPSC
	Perceived Stress - Adherence	Model 1	0
		Model 2	0
		Model 3	0
		Model 4	0
Key:	SBP=Systolic Blood Pressure	ADHNA=Adherence to Low Sodium Diet	
	DBP=Diastolic Blood Pressure	EAC=Coping by Escape-Avoidance	
	HP=Health Perceptions	SSSC=Coping by Seeking Social Support	
	SI=Symptom Inventory	CC=Confrontive Coping	
	AGE=Age in Years	ARC=Coping by Accepting Responsibility	
	ED=Education	DC=Coping by Distancing	
	PST=Perceived Stress	PPSC=Coping by Planful Problem Solving	
	SS=Social Support	PRC=Coping by Positive Reappraisal	
	ADHMED=Adherence to meds	SCCRC=Coping by Self-Control/Cog. Restr.	

Table 9. Results by Hypotheses and Model (Continued)

Hypothesized Variables With		Results
Direction (+ or -)		(+ or -)
H3	Perceived Stress - Health Status	
	(con't)	
	Model 1	0
	Model 2	0
	Model 3	0
	Model 4	PST - SI
H4	Age - Perceived Stress	
	Model 1	0
	Model 2	0
	Model 3	0
	Model 4	0
	Education - Perceived Stress	
	Model 1	ED - PST
	Model 2	ED - PST
	Model 3	ED - PST
	Model 4	ED - PST
	Time Since Diagnosis - Perceived Stress	
	Model 1	0
	Model 2	0
	Model 3	0
	Model 4	0
H5	Age + Social Support	
	Model 1	AGE - SS
	Model 2	AGE - SS
	Model 3	AGE - SS
	Model 4	AGE - SS
Key:	SBP=Systolic Blood Pressure	ADHNA=Adherence to Low Sodium Diet
	DBP=Diastolic Blood Pressure	EAC=Coping by Escape-Avoidance
	HP=Health Perceptions	SSSC=Coping by Seeking Social Support
	SI=Symptom Inventory	CC=Confrontive Coping
	AGE=Age in Years	ARC=Coping by Accepting Responsibility
	ED=Education	DC=Coping by Distancing
	PST=Perceived Stress	PPSC=Coping by Planful Problem Solving
	SS=Social Support	PRC=Coping by Positive Reappraisal
	ADHMED=Adherence to medications	SCCRC=Coping by Self-Control/Cog. Restr.

supported in any of the four models as stated.

Hypothesis 1 was partially supported in Models 1 and 2. In Model 1 adherence to a low sodium diet had a negative effect on SBP which is in the hypothesized positive direction of health. In Model 2 adherence to medications had a negative effect on DBP which is in the hypothesized positive direction of health. Adherence did not have any effect on health status in Models 3 and 4. Social support was not predictive of health status in any of the models. One coping strategy (PPSC) had a positive effect on SBP in Model 1 and a positive effect on DBP in Model 2; however, this is not in the hypothesized positive direction of health and does not support hypothesis 1. Coping had a contradictory effect on HP in Model 3 with EAC having a negative effect on HP and CC having a positive effect on HP. Coping was not predictive of positive health status in any of the models as hypothesized.

Hypothesis 2 was not supported in any of the models. Social support, professional support and coping were not positively predictive of adherence. Although in Model 4 EAC was negatively predictive of ADHAP, this was not in the hypothesized direction.

Hypothesis 3 was partially supported in all of the models with

perceived stress having a negative effect on social support as hypothesized. However, in all of the models perceived stress was not predictive of professional support as hypothesized. Although perceived stress had a positive direct effect on coping in all models, this was contrary to the hypothesized direction. Perceived stress was not negatively predictive of adherence in any of the models. In Model 4, hypothesis 3 was partially supported because perceived stress was found to have a direct negative effect on SI. However, in none of the other models was perceived stress directly and negatively predictive of health status.

Hypothesis 4 was partially supported in all of the models with level of education having a direct inverse effect on perceived stress. Age and time since diagnosis did not have an effect on perceived stress in any of the models.

Hypothesis 5 was not supported in any of the models. In all of the models age had a negative effect on social support which was contrary to the hypothesized direction.

The theoretical model implied 24 indirect hypotheses presented in six complex hypotheses. None of the indirect hypotheses were supported in any of the models.

Post Hoc Analysis

A post hoc analysis was done using a series of factorial design two-way analysis of variance to examine the effects of age (pre- and post-retirement) and education (12 years and below, and 13 years and above) on DBP, SBP, HP, and SI. Pre-retirement age was set at 28 to 61 years and post-retirement age was from 62 to 90 years. The only significant main effect was of age on SBP ($F = 16.957, p \leq .001$). There were no significant two way interactions. The mean SBP for the pre-retirement group was 134.4 mm Hg and for the post-retirement group it was 147.5 mm Hg.

For further analysis, a series of one way analysis of variance was done for sex with DBP, SBP, HP, and SI. There were no significant sex differences in any of the outcome variables.

Chapter V

Discussion

For this sample the strongest positive predictors for systolic blood pressure were age, time since diagnosis, coping, and professional support. Adherence to a low sodium diet was the strongest negative predictor of systolic blood pressure. The strongest positive predictors of diastolic blood pressure were time since diagnosis and coping, with age and adherence to medications the strongest negative predictors. The strongest positive predictors of health perceptions were two ways of coping and the strongest negative predictor was another way of coping. The strongest positive predictor of psychological symptoms was perceived stress. These findings support those aspects of the Lazarus and Folkman (1984) stress and coping transactional framework in which cognitive appraisal of stress is mediated by the effects of coping and coping resources and impacts on the adaptational outcomes of adherence and health status. Using the analytic tool of path analysis, this study lends further support to

the previous research on support, coping, adherence and health status. Predictor variables explained 23% of the variance in systolic blood pressure, 14% of the variance in diastolic blood pressure, 23% of the variance in health perceptions, and 44% of the variance in psychological symptoms. Whereas previous studies investigated the effect of social support and coping on health status, this study investigated the effects of social support, professional support, and coping on health status as mediated by adherence to a therapeutic regimen.

The following discussion will first focus on how the models were alike in their predictions. Each model will then be discussed separately. In all of the models, age had a negative predictive relationship with social support. This is in contrast to the findings of Lin et al. (1986) who looked at social support and age. They found that after a decrease in the mid-20s, social support increased until it peaked in the late 60s. This discrepancy could be due to the fact that 18% of this sample was over the age of 70 and that social support decreases in the upper age brackets due to the death of friends and loved ones. This study also found that age was not a predictor of coping patterns. These findings are consistent with the

findings of Folkman and Lazarus (1980) who found no effects of age on coping patterns. Age was a significant predictor of outcome variables in two of the models, but this will be discussed later.

Education in all the models was a negative predictor of perceived stress as measured by daily hassles. This is interesting since no previous studies were located that examined the relationship between education and daily hassles. The educational level of the sample ranged from eighth grade to two years beyond college. Fifty-three percent of the sample had a high school education or less and 47% were educated above the high school level. One explanation for the negative relationship between level of education and perceived stress may be that many of the items of hassles scale identify social and financial issues. Education is closely related with socioeconomic status and it may be that as income goes up, many daily hassles can be dealt with more easily. Time since diagnosis was predictive of two of the outcome variables in the models and will be discussed later.

For all models in this study, perceived stress was a negative predictor of social support. This is in contrast to the findings of Dunkel-Schetter et al. (1987) who found that a highly stressful

encounter was characterized by more support from more people.

Dunkel-Schetter et al. asked clients to rate social support received during one highly stressful encounter. It may be that the effects of daily hassles on social support is very different than the effects of one particular stressful encounter on social support. Friends and relatives come to one's aid in a time of crisis, but can not assist with one's daily hassles.

Perceived stress was not a predictor of professional support in any of the models. Since professional support is a concept newly defined and developed for this study, this finding is interesting to note. Since stress was a negative predictor of social support but not a predictor of professional support, this lends credence to the idea that they are separate concepts. Professional support and its effect on SBP will be discussed later.

Perceived stress was predictive of from 6 to 8 ways of coping in the four models. Stress was predictive of six ways of coping in Model 1; eight ways of coping in Model 2; seven ways of coping in Model 3; and, six ways of coping in Model 4. Both emotion and problem ways of coping were present in all models. This is consistent with the findings of Lazarus and Folkman (1980) and

Folkman and Lazarus (1985) that persons use both problem- and emotion-focused of ways of coping to deal with stressful situations.

Social support was not significantly predictive of any other variables in any of the models. This is in contrast to studies of Holahan and Moos (1981), Schaefer et al. (1981), Billing and Moos (1982), and Lin et al. (1986) who noted a negative relationship between social support and poor psychological and physical health. It also contrasts with the findings of Fiore et al. (1983) and Pagel et al. (1987) who found a positive relationship between social support and illness. An explanation for this finding may be that since social support was separated from professional support in this study, it resulted in a more narrowly defined concept of social support and therefore its effect on health status was not noted. Another possible explanation may be that the subjects with hypertension did not view themselves as being in ill and therefore did not engender social support from others to help them deal with an illness.

Professional support was predictive of planful problem solving coping in all of the models. Perhaps the nurses encouraged the

subjects to make a plan of action and follow it or try different solutions to a problem. Perhaps the nurses by giving information helped the subjects to focus on a problem and try to deal with it. Again since professional support is a concept newly defined measured in the literature, this is an intriguing finding.

Only one way of coping was predictive of adherence in any of the models. Escape avoidance coping was a negative predictor of adherence to appointments in Model 4; as reliance on escape avoidance coping increased, adherence with appointments decreased. This would seem to be a logical outcome of this type of coping. No other preceding variables in any of the models were predictive of adherence. This is similar to the findings of Caplan (1976) that support from a nurse did not increase adherence to a therapeutic regimen. However, this finding is in contrast to the findings of Sackett and Haynes (1976) and Caplan (1980) that support from family, friends, and health care givers had a positive correlation with adherence. Adherence and its relationship to the outcome variables will be discussed separately under each model.

Model 1. In Model 1, 23% of the variance in systolic blood pressure (SBP) was explained. Age was the strongest positive

predictor of SBP. This is consistent with the findings of Caplan (1976) that SBP correlated positively with age and also with the findings of the Joint National Commission (1984) that systolic hypertension is seen most commonly in the elderly. In addition over half of this sample was over the age of 61 years.

The next strongest predictor of SBP was professional support but in a positive direction. This is contrary to the findings of Caplan (1980) that support from a nurse had no effect on BP. This is also contrary to the findings of Powers and Jalowiec (1987) that confidence in, and satisfaction with, health care workers was predictive of well-controlled BP. One explanation for this relationship might be that the nurse caregivers tend to spend more time with older patients and it is the older patients who had the higher SBPs. However, the relationship between age and professional support was not significant. No previous studies were located which looked at the relationship between professional support and SBP.

The next strongest predictors of SBP were time since diagnosis and adherence to a low sodium diet. Time since diagnosis had a positive influence on SBP. This is inconsistent with the

findings of Pollack (1986) that BP was not significantly correlated with time since diagnosis. These findings are similar to findings of the Joint National Commission (1984) that systolic hypertension is seen most common in the elderly. The older patients probably also had the longer times since diagnosis. Adherence to a low sodium diet had a negative effect on SBP. This is consistent with the expectations of WHO/ISH guidelines (1986) that adherence to a diet low in sodium has the effect of lowering blood pressure.

Planful problem solving as a way of coping was also a significant positive predictor of SBP. PPSC is a problem focused way of coping that requires concentration on a situation. This is in line with the findings of Eliasson and Atterhog (1982) and Brody et al. (1987) that the mental stress of concentration can elevate BPs.

Model 2. In Model 2, 14% of the variance in diastolic blood pressure (DBP) was explained. Age was the strongest negative predictor. This is contrary to the findings of Caplan et al. (1980) that BP was positively correlated with age. In another study (Caplan, 1976) BP was uncorrelated with age in patients being treated for EH. One explanation for this finding is that older patients in the sample had their hypertension under better control.

Planful problem solving coping was a strong positive predictor of DBP. This is similar to the finding of the effect of PPSC on SBP. Again, perhaps the concentration on a situation that PPSC requires is enough to sustain an elevation in DBP. Another explanation may be that those persons who tend to use problem focused coping strategies (determining a plan of action and sticking to it, concentrating on the next step, or trying different approaches) also tend to be those persons with the highest DBPs and SBPs.

Time since diagnosis was a strong positive predictor of DBP. This is consistent with Caplan et al. (1980) who found BP positively correlated with time in treatment. Explanations for this might be that DBP worsens with time; patients and health care givers are more lenient with DBP parameters over time; or, patients are less adherent with therapeutic regimens over time and this is reflected in higher DBPs.

Adherence to medications was a significant negative predictor of DBP. This is consistent with the findings of Sackett et al. (1976) and Caplan et al. (1980; 1976) that self-reported adherence to medications was negatively correlated with BP. Adherence with medications is a prime goal of antihypertensive therapy.

Model 3. In Model 3, 23% of the variance in health perceptions (HP) was explained. The strongest negative predictor of perceptions of health was EAC. Two other ways of coping (PPSC and CC) were strong positive predictors of HP. EAC is an emotion-focused way of coping; PPS and CC are problem-focused ways of coping. These findings are similar to the findings of Roberts et al. (1987), Yarcheski and Mahon (1986), and Powers and Jalowiec (1987) that patients who were better adjusted psychologically used more problem coping responses and fewer avoidance responses.

Model 4. In Model 4, 44% of the variance in symptom inventory (SI) was explained. The only significant positive predictor of psychological symptomatology was perceived stress. This finding is consistent with the findings of Lazarus and Folkman (1984), Weinberger et al. (1987), and Zika and Chamberlain (1987) that daily hassles have a direct effect on subjective reports of well-being.

Model 4 was the only model in which a way of coping was predictive of adherence. Escape avoidance coping was negatively predictive of adherence to appointments.

Strengths and Limitations

Internal Validity. The explanation credibility was evident

because the explanation of each relationship was developed, these explanations were plausible, these relationships were tied to underlying theory, and the hypotheses were tested and explained.

Translation fidelity exists in the way the hypotheses were stated, in the way the hypotheses followed from the theory advanced, and in the way the model was diagramed. Descriptive statistics for this sample show a cross section of races, ages, sexes and levels of education which seem to be representative of the group and situations to which the results would apply.

Since all of the the questionnaires were returned by mail, it is assumed that data collection occurred at the leisure of each subject and in their own environment. The unit of sampling was consistent with that implied in the problem statement. Stratification was not necessary to control for extraneous variables.

Statistical Package for the Social Sciences (SPSS^X) was utilized for data analysis. Statistical analysis was appropriate to the methodology and the assumptions underlying the statistical analysis were not violated. The estimate of power of the statistical test was indicated for the given sample size.

The predictions of relationships between the exogenous

variables (age, level of education and time since diagnosis) to the endogenous variables (perceived stress, social support, professional support, coping, adherence and health status) was described. Prior explanations fit the current evidence.

History and maturation could have been a problem if the subjects had taken a great deal of time to answer the questionnaires and return them. A two week limit was requested of subjects to try to control for this potential problem. Mortality was not a problem since data collection occurred at only one point in time.

The results were credible and were consistent with other published results. If results were not consistent with other published results, the differences were explainable (Krathwohl, 1985).

External Validity. The generality of the problem was plausible to infer. The importance of knowledge of factors effecting control of patients' blood pressure for health care givers is easy to argue and support. The identification of the study population as adult persons with EH whose therapeutic regimen is managed by a nurse provides structure and boundries to the generality. Patients with EH

were studied and the sample was selected from among the patients of nurses at three large outpatient settings in San Diego.

The instruments used were reliable and valid and measured constructs as defined. Relationships between the variables as they influenced health status were found. The relationships demonstrated appeared over a broad set of instances (age, sex, race, and institutions) demonstrating generality.

Path analysis was an appropriate design for examining the relationships between demographic variables, perceived stress, coping and coping resources, adherence, and health status (Munro et al., 1986). Common design errors were considered or controlled for in the this study. Selection or treatment interaction may be a consideration. Those subjects who were adherent with appointments were the only individuals who received the study questionnaires. Those subjects who were the most adherent with their therapeutic regimens may also have been the subjects who conscientiously filled out the questionnaires. Also those subjects who are experiencing the fewest daily hassles may have been those persons who had time to answer the questionnaires. Testing may have been a problem since subjects were asked to answer multiple

questionnaires and their answers may have decayed over time due to fatigue. In an effort to avoid this problem the sequence of questionnaires was counterbalanced. Whether or not the results are replicable is yet to be tested (Kratwohl, 1985).

A major limitation of the study is that the correlational design is structurally static and may not be the best way to study the dynamic variables of perceived stress, support, coping, blood pressure, health perceptions, and psychological symptoms (Lazarus, 1978).

Implications for Nursing Research

How stress and coping impacts on adherence and health status will continue to be of research interest to nurses. This study suggests that perhaps nursing has been too broad in thinking of systolic and diastolic blood pressures as having the same predictors and responding to the same therapeutic modalities. Perhaps nurse caregivers should not be outlining a whole program of lifestyle changes for persons with hypertension. This study suggests that more research be done on adherence to medications, decreasing alcohol intake, and cessation of smoking as more specific therapeutic approaches for persons with diastolic hypertension.

Based on this study adherence to medications, a low sodium diet and a weight reduction program show more promise as therapeutic modalities for persons with systolic hypertension and deserve more investigation. Since nurses are the managers of therapeutic regimens for persons with hypertension, nurses need to be doing research on predictors of blood pressure control and efficacy of treatment programs.

This study also pointed out how certain ways of coping can effect systolic and diastolic blood pressures in both directions. Especially interesting to note is the significant positive relationship planful problem solving had on systolic and diastolic blood pressure. A prime question is, can these results be replicated in future nursing research? If the relationship between ways coping and blood pressure are found to be similar in future studies, other research could look at trying to enhance or dampen certain coping strategies as therapeutic interventions for blood pressure control. Nursing research should also investigate whether the relationship between certain coping patterns and untoward physiological outcomes holds across different disease processes. Nurses are in a unique position and could be leaders in researching how ways of

coping influence physiologic parameters.

The impact that stress has on psychological symptomatology shows promise as a research area for nursing. How ways of coping influence adherence is also an area that could be further elucidated with more nursing research.

According to Fawcett (1984), the metaparadigm of nursing includes the person and their environment. Because this is true, social and professional support systems and the ways in which they influence adherence and health status deserve further study. A promising concept on which future nursing research can focus is professional support. Current research is examining social support as resource as well as a source of distress. This study showed that professional support can be a significant predictor of planful problem solving. Ordinarily this might be considered to be a positive influence. However, this study also demonstrated that with this sample the use of planful problem solving as a way of coping was a positive predictor of systolic and diastolic blood pressure. Do professionals encourage ways of coping which are not therapeutic? Many questions remain to be answered.

In this study professional support also had a direct positive

effect on systolic blood pressure. Future nursing research needs to examine professional support as a possible resource or a possible source of distress. Does nurse caregiver professional support have any untoward consequences with patients with other health problems? Does professional support from physicians have the same effect on the blood pressures of hypertensives patients? Does the professional support from teachers have any untoward psychological or physiological effects on students? Again replication of results is the first step and then, examining to see if the relationship holds up across different populations of patients as well as caregivers. The current research raises many questions for future study.

Implications for Nursing Practice

This study suggests that a nursing assessment of patients with health complaints should also include an assessment of the patients' perceived stress levels. Interventions could then be aimed at alleviating the physical problems as well as reducing stress levels.

Nursing assessments might also focus on the ways in which a patient is coping with any given situation. This study suggests that

persons use a variety of ways of coping with any given situation, but that perhaps certain ways of coping may have stronger influences on certain health outcomes. Nursing interventions need to be developed that assist a person in enhancing certain coping patterns. Nursing interventions could focus on assisting persons to cope in ways that enhance health rather than detract from it.

Healthcare workers in general have assumed that their influence on patients is positive. This research suggests that assumption may not always be true. The current study implies that a caregivers' professional support may even contribute to unhealthy outcomes. Future practice may include an assessment of professional support from the healthcare giver and how the healthcare giver actually influences the patient and the desired health outcomes.

Perhaps the greatest influence on practice suggested by this study is in the the type of therapeutic approaches the caregiver may suggest to a person with hypertension. If future research also shows that there are different predictors for systolic and diastolic hypertension and that different therapeutic approaches are needed for each type of hypertension, then this could have a significant

impact on practice. Caregivers would be suggesting different therapeutic modalities for different types of hypertension.

Caregivers could help patients decide which lifestyle change will have the most effect on their blood pressure. Currently, patients are requested to make many lifestyle changes including taking medications, stopping smoking, decreasing alcohol, decreasing salt in the diet, losing weight, increasing exercise, and reducing stress levels. Caregivers in the future may be able to request fewer lifestyle changes of the patients with hypertension. Fewer requests for lifestyle changes may result in better adherence and better health for patients with hypertension.

Implications for Nursing Education

Nurse educators need to include content on stress and coping in undergraduate and graduate nursing curriculums. The content needs to be specific: how to assess a patient's stress level, how to assess ways of coping, and how to assess coping resources available to individual patients. Specific nursing interventions need to be developed for stress reduction, coping enhancement, and coping resource enhancement. Evaluation techniques need to be developed for determining the effectiveness of interventions of stress

reduction, coping enhancement, and coping resource enhancement.

Nursing students at all educational levels need to be made aware of their impact and effect on patients, both at the psychological and physiological levels. Caregivers can not assume that their effect on patients is always positive. Nurses could be taught how to evaluate their impact on patients.

At the post-baccalaureate level, nursing curricula might include different therapeutic approaches for persons with hypertension than are currently outlined. This study suggests that requested lifestyle changes could be prioritized for hypertensive patients. This would give nurse caregivers a more specific focus and better directed care for patients. The desired outcome would be a better prognosis for hypertensive individuals.

Nurse educators need to evaluate stress, coping, and coping resources in their own students. This would be done with the aim of avoiding problems in the areas of health, academic success, and the social arena. The professional support that teachers give to students could be evaluated. Perhaps the professional support that teachers offer has can not always be considered to be positive and must be evaluated for negative consequences also.

Summary

This correlational study which described and explained the impact of demographic variables (age, level of education, and time since diagnosis) and subsequent psychosomatic variables (perceived stress, ways of coping, social support, and professional support) on adherence and, ultimately on health status (systolic blood pressure, diastolic blood pressure, health perceptions, and psychological symptoms) is substantive. The relationships are supported by the literature and by the theoretical framework. Data analysis provided further information regarding the strength and direction of the relationships. Internal and external validity can be considered balanced in this study. Additional research needs to be done to see if these relationships are supported in other samples with the same health problem and in other populations with different health problems.

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Appendices

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Appendix B

Criteria for inclusion of subjects into the Goldberger nursing study are:

1. Primary diagnosis of essential hypertension as determined by a physician.
2. Majority of health care related to hypertension managed by the same nurse.
3. Age between 25 and 65.
4. Ability to read and understand English at a ninth grade level.
5. Willingness to participate.

KAISER PERMANENTE
UNIVERSITY OF SAN DIEGO

CONSENT TO ACT AS A RESEARCH SUBJECT

Diane Goldberger, R.N., a doctoral student in nursing at the University of San Diego, is conducting a study to find out more about the effects of stress and coping on adherence with prescribed treatments and on the health of persons with high blood pressure. I have been asked to participate in this study because I have high blood pressure and am seeing a nurse for the care of my blood pressure.

If I agree to participate in the study, I will be given a packet containing eight questionnaires to complete and return to the investigator in an enclosed pre-paid envelope within two weeks. These questionnaires include questions about daily hassles, coping, support, questions about the treatment of high blood pressure, and how I am feeling mentally and physically. It may take as long as 45 minutes to answer the questionnaires. I do not need to answer them all in one sitting.

There are no risks associated with this study other than the time it takes to fill out the questionnaires.

Although there will be no direct benefit to me from this study, the new knowledge gained may help others in the future.

Diane Goldberger or her assistant has explained this study to me and answered my questions. If I have other questions or research-related problems, I may write or call:

Diane Goldberger
San Diego State University
School of Nursing
San Diego, CA 92182
619-265-6399

Mary P. Quayhagen, DNSc
University of San Diego, Alcalá Park
Philip Y. Hahn School of Nursing
San Diego, CA 92110
619-260-4578

Appendix C (continued)

Participation in this research is entirely voluntary. I may refuse to participate or withdraw at any time without jeopardy to my medical care at Kaiser Permanente or to my relationship to The University of San Diego. There is no agreement, written or verbal, beyond that expressed in this consent form.

Research records will be kept confidential. No names, only numbers, are put on the questionnaires to ensure anonymity. My identity will not be disclosed without my written consent unless required by law.

I have received a copy of this consent form.

I agree to take part in this study.

Signature of Subject

Date

Location

Date

Signature of Principal Investigator

Date

Signature of Witness

Date

Number: _____

CHART REVIEW INFORMATION

1. Blood pressures this visit:

Sitting #1 _____

Sitting #2 _____

Sitting #3 _____

Supine #1 _____

Supine #2 _____

Supine #3 _____

2. Diagnoses: _____

3. Method of payment for visit: _____

4. Medications prescribed for hypertension (including dose and frequency):

Appendix E

Number: _____

DEMOGRAPHIC INFORMATION SHEET

Directions: The following items relate to information about you.
Please answer all items in the spaces provided.

1. Age: _____ years.

2. Sex: _____ Male _____ Female

3. What is your highest educational level? (Indicate highest level completed. For example, eighth grade, one year of college, etc.)

4. How long (in years) has it been since you were first told that you had essential hypertension or high blood pressure?

_____ years

5. Marital Status: (Please check the appropriate category.)

____ Married ____ Never married ____ Divorced ____ Separated ____ Widowed

6. Race: (Please check the appropriate category. If you check "Other" please specify what your race is in the space provided.)

____ Anglo ____ Black ____ Hispanic ____ Oriental ____ Other

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Appendix L

The Brief Symptom Inventory is copyrighted and cannot
be reproduced here.