REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
		THESIS/[redacted]

4. TITLE AND SUBTITLE
Factors Influencing Medication Adherence in Hypertensive Women Ages 35 to 50 Years

5. FUNDING NUMBERS

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
AFIT Student Attending: University of Washington

8. PERFORMING ORGANIZATION REPORT NUMBER
AFIT/CI/CIA- 91-033

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
AFIT/CI
Wright-Patterson AFB OH 45433-6583

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for Public Release IAW 190-1
Distributed Unlimited
ERNEST A. HAYGOOD, 1st Lt, USAF
Executive Officer

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

14. SUBJECT TERMS	15. NUMBER OF PAGES 141
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

Factors Influencing Medication Adherence in Hypertensive Women Ages 35 to 50 Years

by

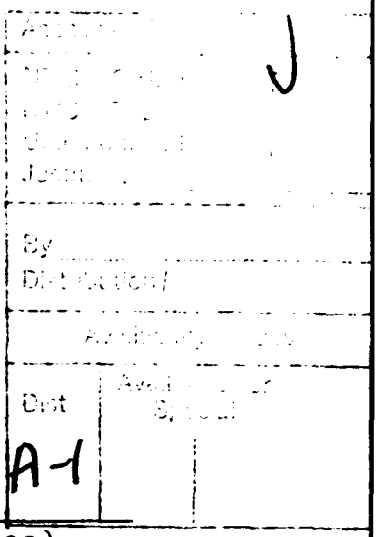
Joyce Marie Shively

A thesis submitted in partial fulfillment
of the requirements for the degree of

Master of Nursing

University of Washington

1991



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Abstract

Factors Influencing Medication Adherence
in Hypertensive Women
Ages 35 to 50 Years

by Joyce Marie Shively

Chairperson of the Supervisory Committee:

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Nearly 62 million people have high blood pressure, making it the leading precipitating factor of cardiovascular disease. Adherence to a prescribed treatment regimen is necessary to decrease the rates of morbidity and mortality associated with CVD. The purpose of this study was to describe antihypertensive medication adherence, health-promoting behaviors, and their relationships. The Health Promotion Model (Pender, 1982) was utilized; this model proposes that cognitive and perceptual factors influence individual health-promoting behaviors (Pender, 1982).

Twenty women, contacted through medical records at a local Seattle hospital, completed the Health-Promoting Lifestyle Profile (Pender, 1988) and the Hypertension-Adherence Survey (developed by the investigator). Correlations were computed to describe the relationship between selected demographic variables and health-promoting behaviors with medication adherence.

Ninety percent (n=18, data missing on two women) reported they were adherent. No demographic factors had any significant relationship with adherence ($p>.05$). A negative relationship was found between the number of children living in the household and health-promoting behaviors. Adherence behavior was related to two subscales of the Health-Promoting Lifestyle Profile: Self-Actualization ($r=.456$, $p=.03$) and Interpersonal Support ($r=.507$, $p=.01$). Other findings indicated a lack of exercise in this group of women.

The adherence behaviors of this sample demonstrated the incorporation of positive actions associated with increasing one's level of well-being (Pender, 1987). Since demographic variables did not appear to influence medication adherence, other factors should be assessed. Further research should be conducted with a larger sample and include motivators to treatment in the same population.

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ACKNOWLEDGEMENTS

The author wishes to express sincere thanks and appreciation to my thesis advisor, Dr. Susanna Cunningham, for the idea for this work and for all her guidance and support. Additional thanks go to Dr Susan Woods for her valuable input. My deepest thanks must be given to my family and friends for their love, patience, and support. Special gratitude is extended to those women who participated in this study. And last, but certainly not least, my warmest thanks to Dr. Marie Cowan, to whom I am indebted for her guidance and support during the initial stages of planning and implementing this study.

DEDICATION

To my husband, Michael, who's love and support has never failed.

To the women who have molded my life: my mother, Shirley, my two sisters, Patty and Janet, and my grandmother, Nora.

FACTORS INFLUENCING MEDICATION ADHERENCE IN HYPERTENSIVE WOMEN

CHAPTER I

Problem Statement

Cardiovascular disease (CVD) is the leading cause of death in the United States in both men and women. According to the American Heart Association (1991), 982,574 deaths in 1988 were attributed to cardiovascular disease. Mortality rates related to CVD are greater in men, however, CVD is the leading cause of death in middle-aged women (Thom, 1978).

It was estimated that Americans will spend $101.3 billion in 1991 treating CVD (American Heart Association, 1991). Atherosclerosis is a major cause of CVD, though its exact etiology is not known. However, it is known that hypertension leads to the development of atherosclerosis.

Nearly 62 million people have high blood pressure, making it the leading precipitating factor of cardiovascular disease (American Heart Association, 1991). Due to the lack of symptoms for high blood pressure, only about 54 percent of hypertensive individuals are aware they have this disease (American Heart Association, 1991).

The cause of high blood pressure is not known in about 90 percent of those diagnosed. However, pharmacological as well as non-pharmacological interventions have been documented as effective in the treatment of high blood

pressure (Joint National Committee, 1988). In the remaining 10 percent of the cases, high blood pressure is a symptom of an underlying disease process, such as kidney, adrenal gland, and neurological disorders (Sollek and Lee, 1989). Treatment for these individuals is targeted at the cause of the disease process.

Cardiovascular disease is manifested by myocardial infarction, angina, congestive heart failure, stroke, intermittent claudication (Hubert, Feinleib, McNamara, & Castelli, 1983) and sudden cardiac arrest (Summers, 1984). Activities or conditions (risk factors) that increase a person's likelihood of developing CVD can be classified as controllable and uncontrollable. Age, gender, race, and family history are risk factors over which individuals have no control. Controllable risk factors include: diabetes, hypertension, smoking, elevated serum cholesterol, obesity, sedentary lifestyle, and personality type (Kannel, 1983).

Multiple studies have shown that controlling risk factors can decrease the morbidity and mortality associated with CVD. The Veterans Administration Cooperative Study (1967) demonstrated a reduction of blood pressure and fewer fatal CVD events in those who were treated with medication than those who received a placebo. Results from the Lipid Research Clinics Coronary Primary Prevention Trial (1984) showed that the medication, cholestyramine, reduced both total serum and low-density lipoprotein cholesterol with

subsequent decreases in primary end points (CHD death and/or nonfatal myocardial infarction). An additional finding was that dietary lowering of cholesterol alone, successfully reduced total and low-density lipoprotein cholesterol, though not to the levels of the cholestyramine group. Imai and associates (1986) found that dietary weight loss of at least 3.3 kg was associated with 7.1 mm Hg decrease in mean arterial pressure, as well as a decrease in the amount of antihypertensive medication required for blood pressure control. Rosenburg and Kaufman (1985) reported that men who quit smoking for more than 23 months reduced their risk of myocardial infarction to the same level as those who never smoked. Similarly, women who had abstained from smoking for more than 35 months reduced their risk of myocardial infarction to that of women who had never smoked (Rosenberg, Palmer, and Shapiro, 1990).

According to the American Heart Association (1991), the death rate from high blood pressure has decreased from 56 percent in 1950 to 6.6 percent in 1987. Since the 1960's, the rate of CVD related deaths has decreased (National Center for Health Statistics, 1986). These decreases are probably due to increased public knowledge and awareness of controllable risk factors. Media attention and early detection through free or inexpensive public blood pressure and cholesterol screenings have played an important part in increasing the public's awareness. However, despite the

public's increased knowledge of CVD and associated health problems, many individuals identified as having a CVD risk factor either fail to modify their lifestyle or fail to continue a treatment regimen (Caldwell, Cobb, Dowling, & de Jongh, 1970; Sackett et al., 1975; Podell, 1983).

There have been numerous changes in society over the past few decades which have impacted health practices, especially for women. The household structure reflects these societal changes. In 1988, 56.6 percent of women were employed either full or part time as compared to 43.3 percent in 1970 (U.S. Bureau of the Census, 1990, p. 378). They are frequently single parents, or the bread-winners of the family, or both. In 1970, 21 percent of American households were headed by women (U. S. Bureau of the Census, 1990, p. 46). By 1988, that percentage had grown to 31.1 percent (U. S. Bureau of the Census, 1990, p. 46).

The working woman is becoming increasingly like her male counterpart. High blood pressure, smoking, and coronary-prone behavior (Type A) are evident in full-time employed women (Waldron, 1978). Findings from the Framingham Heart Study (Haynes & Feinleib, 1980) indicated that working women had a slightly higher incidence (7.8 %) of CHD as compared to housewives (5.4 %), though the results were not statistically significant. However, those women in clerical positions had twice the incidence rate of CHD (10.6 %) as compared to housewives (p=.06). Additionally, among

all clerical workers, women had a greater incidence of CHD (10.6%) than men (5.8%). Independent predictors for women clerical worker's increased risk for CHD were suppressed hostility, lack of support from their boss, and family responsibilities (Haynes and Feinleib, 1980).

La Rosa (1988) points out it is not only the amount of job-related stress, but also the degree of perceived control over the job which contributes to the risk of CHD. Other societal changes affecting women are the increasing rates of poverty among women, and the increasing proportions of older women in the population (Gentry, 1987).

For high blood pressure to be controlled, early detection and treatment is paramount (Joint National Committee, 1988). Regardless of whether the prescribed treatment includes pharmacologic, non-pharmacologic, or a combination of both types of intervention, adherence to the prescribed regimen is necessary to decrease the rates of morbidity and mortality associated with CVD. Since adherence equates to adding or deleting a behavior, it is important for health care professionals to assist the individual in integrating the change into their lifestyle.

Factors which influence modification of one's lifestyle in order to control hypertension and decrease the development of CVD need to be examined further. An individual with high blood pressure may not perceive a specific health threat because of the lack of symptoms.

Therefore, adherence to a treatment regimen must be perceived as beneficial in order for this behavior to occur.

This study focused on women being treated with antihypertensive medications. Identifying what influences adherence to antihypertensive medications, will assist the health care providers to understand the impact that pharmacologic treatment has on hypertensive women. Interventions can then be identified and implemented to promote adherence, and further decrease CVD morbidity and mortality in women.

CHAPTER II

Conceptual Framework

This chapter presents a discussion of the similarities and differences between men and women developing CVD. Hypertension as a precursor for developing CVD is discussed, including current classifications, etiology, and pathology. A review of the literature on treating hypertension is included. Factors that affect adherence, both positively and negatively, are discussed. The Health-Promotion Model is described as the basis for conducting this study. Studies that have used this model are presented and the chapter concludes with a statement of the purpose of this study.

CVD risk and women

Developing CVD and hypertension at a slower rate and at an older age than men, do not make these disease processes less of a health problem for women. On the contrary, due to the large population of elderly women, in 1983 proportionally more women than men (52% versus 46%, respectively) died of CVD (Thom, 1987).

Several differences exist between men and women which may have an impact on the development of CVD. Gordon (1978), in discussing results from the Framingham Study, states that "...blood pressure, serum cholesterol, glucose intolerance and cigarette smoking are CHD risk factors of similar importance for young women as for young

men...However the level of all these characteristics is lower in women than men under age 45" (p. 14). Therefore, a woman's risk for CHD is lower than a man's risk at comparable ages. Gordon (1978) stresses however, that "historical shifts" can occur that can impact the risk factors for heart disease (an example is the increasing rates of cigarette smoking in women).

Other protective factors for women include having a higher level of high-density lipoprotein (HDL) than men, and hormonal factors (Gordon, 1978). The Framingham Study (Castelli, Garrison, Wilson, Abbott, Kalousdian, & Kannel, 1986) found a decreased risk for CHD with higher levels of HDL cholesterol for both men and women. The study also found HDL cholesterol to be consistently higher in women than in men. At the four year follow-up, the mean HDL level for women was 58 mg/dl compared to 46 mg/dl in men. At 12 years of follow-up, the mean HDL level in women was 54.2 mg/dl, while in men the mean level was 44.5 mg/dl.

Most prospective studies have focused on the development of and risk factors associated with CVD in the male population, though a few studies have included women. The Lipid Research Clinics (LRC) Follow-up Study included a total of 2270 women, age 40 to 69 years, who were followed for 8.5 years. Two-thirds of the participants were randomly selected; one-third was enrolled due to elevated lipid levels or because they were taking lipid-altering

medications. Conclusions from multivariate analysis were similar between men and women. There was a significant association between levels of systolic and diastolic blood pressure and risk of CVD death ($p=.04$). Additionally, in women, "each 10-year increment in age was associated with a seven-fold increase in CVD mortality" (Bush et al., 1987a, p. 109).

Timio and colleagues (1988) followed 144 white nuns of a secluded monastic order and 138 white laywomen (controls) for a period of 20 years in a prospective study to determine the effects of the environment on blood pressure. Life-style behaviors were relatively equal between the two groups at entry to the study (sodium intake, use of alcohol, tobacco, and caffeine, family history, age at menarche, and use of contraceptives). Unique to the nuns' life-style was isolation and participation in silence and meditation. Both systolic and diastolic pressures were taken every four years in the nuns and the controls. Systolic and diastolic pressures were found to increase with age among child-bearing and no-childbirth controls, and were significantly higher ($p<.0001$) in these control groups than in the nuns for all ages. In the nuns, the systolic and diastolic pressures showed relatively no increase with age. Significantly higher ($p<.001$) systolic and diastolic blood pressures were found in relation to age among the no-childbirth control women. The conclusion from the study was

that a low-stress environment (experienced by the nuns) over a period of 20 years appeared to prevent an increase in blood pressure.

Results from the Framingham study (Garcia, McNamara, Gordon, & Kannell, 1974) showed that diabetics, both men and women, had increased morbidity and mortality rates from cardiovascular-related causes (CHD, cerebral vascular accident, and intermittent claudication). Diabetic women had two and one-half times the risk for CHD as diabetic men. Additionally, women who were receiving insulin for glucose control, had the highest rate of cardiovascular mortality.

The role of estrogens has been looked at in an attempt to explain the differences in onset of CVD and high blood pressure between men and women. In early studies looking at CVD risk and estrogens, oral contraceptives were shown to increase risk of CVD by increasing blood pressure and predisposing the individual for thrombosis (Jick & Rothman, 1978; Shapiro, Slone, Rosenberg, Kaufman, Stolley, & Miettinen, 1979). A compounding factor in these studies was that all the women included in the case-control studies had had myocardial infarctions, indicating they had cardiovascular disease prior to the study.

Mann and associates (1975) studied the risk for myocardial infarction associated with the use of oral contraceptives in women under age 45. Their study reviewed the use of oral contraceptives in 63 women who had sustained

a myocardial infarction and 189 women (controls) without myocardial infarction. The relative risk for myocardial infarction in women using oral contraceptives during the previous month as compared to women who had never used oral contraceptives was 4.5 to 1. The actual risk may have been higher since the control group had evidence of CVD disease and associated risk factors (for example: hypertension and diabetes).

Historical differences in the make-up of oral contraceptives is evident. According to Godsland, Crook, and Wynn (1990), the amount of estrogen in oral contraceptives has decreased from greater than 50 ug (high-dose oral contraceptives) in the 1960s, to 50 ug (medium-dose) in the 1970s, to less than 50 ug (low-dose) in the 1980s. Phasic oral contraceptives and various progestogens were also introduced during the low-dose era (Godsland et al., 1990).

In reviewing the studies completed on using various doses of estrogen, Furman (1981) found that users of medium- to high-dose oral contraceptives showed an increase in glucose intolerance. The effects of low-dose oral contraceptives on glucose levels were inconsistent. Additional evidence from studies that have looked at combination oral contraceptives indicated that both the type and dose of progestogen affected the glucose and insulin response, with the higher doses producing larger effects

(Wynn et al., 1979; Godsland et al., 1990). Furman (1981) cautioned that the dose of estrogen contained in combination with the progestogen may have enhanced the latter's effect on glucose and insulin levels.

It has been shown that oral contraceptives induced glucose intolerance as well as hyperinsulinemia (Godsland, Crook, & Wynn, 1990). The cause and effect between oral contraceptive use and the development of diabetes mellitus has not been established, though there may be an association as evidenced by age-related onset of diabetes (Godsland et al., 1990).

Elevated glucose levels interfere with normal fat metabolism, which can result in the deposition of lipids in the vascular walls (Guyton, 1981). Insulin promotes "arterial smooth muscle cell proliferation, stimulate(s) cholesterol synthesis in smooth muscle cell, induce(s) lipid-containing lesions in the arteries of animals fed a normal diet, and augment(s) lipid synthesis in arteries" (Godsland et al., 1990).

Results from the LRC Follow-up Study (Bush et al., 1987b), found a protective effect in non-contraceptive estrogen against cardiovascular mortality in women. These women had significantly ($p<.05$) higher levels of HDL and lower levels of LDL that was linked to the use of estrogen. In this study, CVD mortality among users of estrogen was reduced by one-third.

Both the LRC Follow-up Study (Bush et al., 1987a) and another prospective inquiry, the Nurses Health Study (Colditz, Willett, Stampfer, Rosner, Speizer, & Hennekens, 1987), described differences in pre- and post-menopausal women's risk for CVD. Both studies found increased risk for CVD in post-menopausal women, regardless of whether menopause had occurred naturally or was due to surgical removal of the ovaries. With non-contraceptive estrogen replacements, the women's risk for CVD was decreased to that of pre-menopausal women. Additionally, the LRC Follow-up Study found that women with high blood pressure, regardless of menopausal state, had a 3.6 times increased risk for CVD when compared to normotensive women (Bush et al., 1987a).

High blood pressure

Definition. "Arterial blood pressure is defined as the pressure exerted against the walls of the arteries" (Brown & Albright, 1988, p. 661), and is the product of cardiac output and systemic vascular resistance. Therefore, anything that affects either factor will affect blood pressure (see Figure 1). Cardiac output is influenced by heart rate, contractility of the heart, afterload, preload, and blood volume. Systemic vascular resistance is dependent upon the contractile state of the blood vessels, the viscosity of the blood, and input from the sympathetic nervous system (Berne and Levy, 1990).

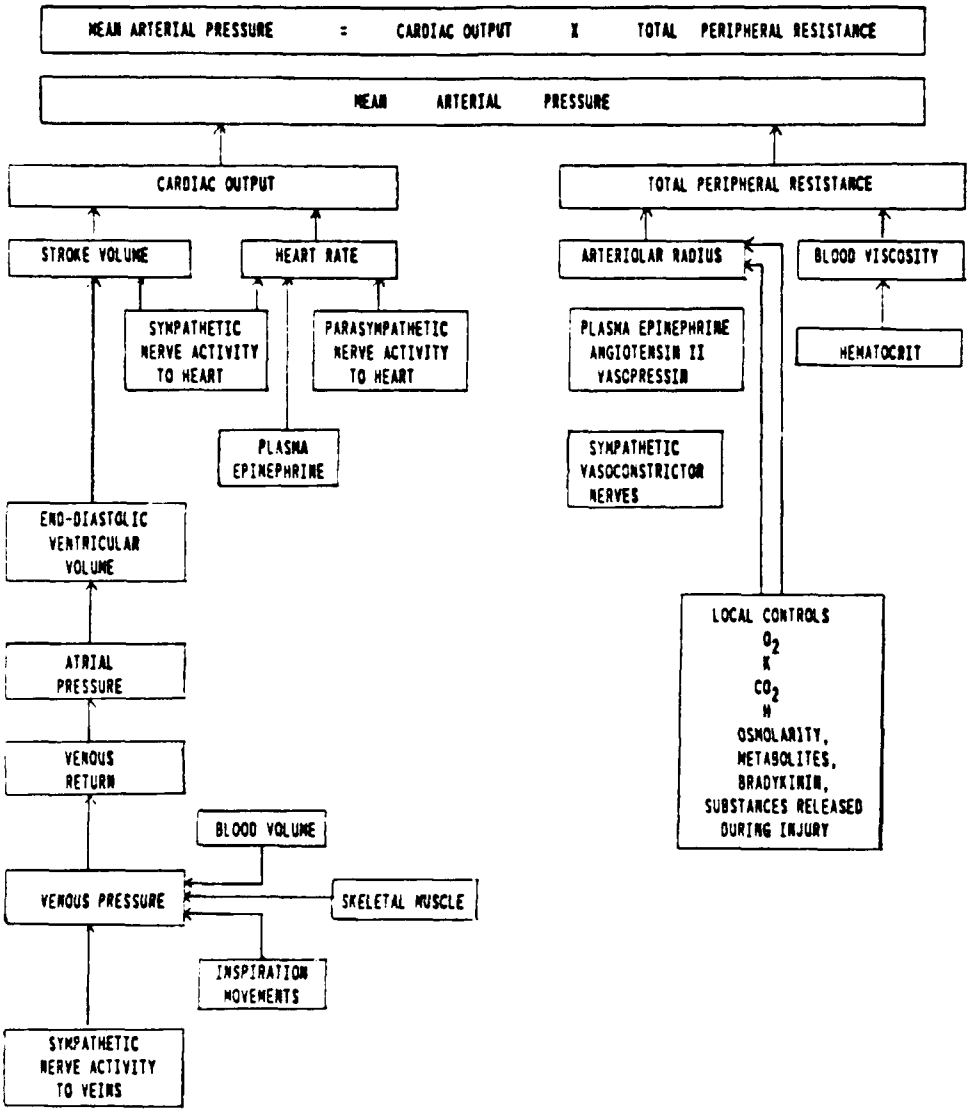

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Figure 1. Components of arterial blood pressure.

Blood pressure regulation. The regulation of blood pressure is complex and is dependent on the inter-relationship of the cardiovascular, neural, endocrine, and renal systems. The cardiovascular system responds to blood pressure changes through autoregulation, "the intrinsic tendency of an organ to maintain constant blood flow despite changes in arterial perfusion pressure" (Feigl, 1989, p. 854). Neural control is mediated through the baroreceptors in the carotid sinus and aortic arch (responsive to increased stretch) and chemoreceptors (sensitive to hypoxia and hypercapnea) located in the carotid and aortic bodies. The baroreceptors are not considered an important element in the long-term regulation of blood pressure because of their ability to adapt to whatever pressures to which they are exposed (Guyton, 1981). However, resetting of the baroreceptors could be the answer to maintaining elevated blood pressure (Krieger, Salgado, & Michelini, 1982). Hormonal regulation of blood pressure is via the renin-angiotensin-aldosterone system (Brown & Albright, 1988).

Classifications of high blood pressure. According to Sollek and Lee (1989), the World Health Organization (WHO) initially categorized individuals with elevated blood pressures according to end-organ involvement. In 1978, WHO introduced the terms of mild, moderate, and severe

hypertension, though no specific measurement criteria were given.

The current classifications of blood pressure, screening and referral, and management directives are based on a report from the 1975 Joint National Committee on the Detection, Evaluation, and Treatment of High Blood Pressure (U. S. Department of Health, 1986). This report has since been revised and updated during subsequent meetings of the Committee in 1980, 1984, and 1988.

According to the 1988 report from the Joint National Committee (JNC), high blood pressure is defined as a systolic blood pressure above 140 mm Hg, or a diastolic blood pressure greater than 90 mm Hg or both. Classification of hypertension is broken down further, depending on the elevation of the diastolic and systolic pressures (see Table 1). At least three measurements of elevated blood pressure are recommended before making the diagnosis of hypertension (Joint National Committee, 1988).

Etiology. Since blood pressure is dependent on a variety of factors that affect cardiac output and systemic vascular resistance, compensatory processes may actually mask the initiating factor of hypertension (Kaplan, 1988). While it is not clear what is the primary cause of hypertension, several theories exist. These theories include the autoregulatory hypothesis, genetic

Table 1

Classification of BP in Adults Aged 18 Years or Older*

BP Range, mm Hg	Category
DBP	
<85	Normal BP
85-89	High-normal BP
90-104	Mild hypertension
105-114	Moderate hypertension
≥115	Severe hypertension
SBP, when DBP <90 mm Hg	
<140	Normal BP
140-159	Borderline isolated hypertension
≥160	Isolated systolic hypertension

*Classification based on the average of two or more readings on two or more occasions. BP indicates blood pressure; DBP, diastolic blood pressure; and SBP, systolic blood pressure.

Note. From "The 1988 Report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure" by 1988 Joint National Committee, 1988, Archives of Internal Medicine, 146(5), p. 1024. Copyright 1988 by E. J. Rocella. Reprinted by permission.

predisposition, excessive intake of sodium, increased intracellular sodium concentration, and abnormal retention or problems with excretion of sodium.

The autoregulation hypothesis proposes that due to increased cardiac output, the autoregulatory response causes peripheral vasoconstriction to limit flow to the "un-needing tissues" (Solleck & Lee, 1989; Mueller & Laragh, 1990). This increased systemic vascular resistance, occurring before the rise in blood pressure, maintains the blood pressure at the elevated level (Kaplan, 1988).

Genetic predisposition for developing high blood pressure has been studied in young children and twins. Kaplan (1988), in reviewing the literature, noted a range of 25 to 60 percent of reported familial elevated blood pressures was linked to a genetic mechanism. The mechanisms involved could be an increased sympathetic response to stress, or defects in sodium transport across cell walls or sodium excretion (Kaplan, 1988). Other explanations for familial hypertension were linked to environmental factors, for example smoking, sodium intake, and inactivity (Kaplan, 1988).

Excessive sodium intake may also lead to the development of hypertension, though an increased intake may not be the soul cause. Genetic defects in sodium handling may also be present. Vasopressin and the renin-angiotensin-aldosterone mechanisms regulate fluid volume in response to

osmolality and sodium concentration in the renal distal tubule, respectively (Cunningham, 1989; Stirling, 1989). "When sodium intake is chronically elevated... extracellular volume increases and remains elevated" (Stirling, 1989. p. 1086). Therefore, if fluid volume (cardiac output) is elevated, systemic vascular resistance could increase through the autoregulatory process, resulting in elevated blood pressure.

Alterations in active transport mechanisms results in an increased intracellular sodium concentration and prevents calcium transport (Kaplan, 1988). The increase intracellular calcium concentration results in an increase in systemic vascular resistance (Kaplan, 1989).

Other theories propose an increase in fluid volume resulting from abnormal retention or a defect in the excretion of sodium that leads to the resetting of autoregulation at higher levels and is known as the pressure-natriuresis hypothesis (Sollek & Lee, 1989). Increased resistance in the renal efferent arteriole due to exposure of elevated or increased sensitivity to angiotensin II or catecholamines (Kaplan, 1989), is proposed. This increased resistance "would increase the fraction of blood filtered (filtration fraction), increasing the peritubular oncotic pressure and thereby, exerting a greater force for reabsorption of tubular sodium" (Kaplan, 1989, p. 831).

Secondary causes of hypertension include renal disorders, endocrine disorders (in particular, adrenal and thyroid gland involvement), toxemia associated with pregnancy, neurological problems, and other iatrogenic causes including oral contraceptive use, mineral or glucocorticoid therapies, alcohol abuse, and excessive salt intake (Mueller & Laragh, 1990).

Pathology of high blood pressure. High blood pressure, because of its damaging effects to all organs, is a major health problem in the United States (Gordon, 1978; Brown & Albright, 1988). Hypertension's primary effects cause an increase in the amount of work required of the heart and damage to the integrity of the arteries from the increased pressure (Guyton, 1981). The cardiovascular, cerebral, renal, and retinal vessels can all be affected (Guyton, 1981: Sollek & Lee, 1989; Muller & Laragh, 1990).

The increased work done by the heart is to over come the increased systemic vascular resistance. The left ventricle must generate greater force to open the aortic valve against increased aortic diastolic pressure. Sustained high blood pressure results in left ventricular hypertrophy (Sollek & Lee, 1989). Congestive heart failure and pulmonary edema can also result from high blood pressure due to the inability of the left ventricle to fully empty against the high resistance. The coronary arteries can be damaged from the sheering forces of high pressure. Ischemia

of the heart can occur from decreased perfusion through sclerotic vessels and increased myocardial work and oxygen consumption related to left ventricular work (Sollek & Lee, 1989).

High blood pressure impacts the blood vessels throughout the body by causing sclerotic changes and infarction of tissue, as well as enhancing the formation of aneurysms and resulting hemorrhages. Arterial walls are composed of three layers: the intima, the media, and the adventitia. The intima is the inner-most layer made up of a layer of endothelial cells. The middle layer, the media, consists of smooth muscle and elastic tissue, allowing for dilation and constriction of the vessel. The adventitia is the outer layer and is composed of collagenous and elastic tissue; it acts to anchor the blood vessel in the surrounding connective tissue.

Hypertension is the major cause of atherosclerosis. The shearing force from high blood pressure causes injury to the intimal layer, exposing collagen fibers and altering the permeability of the vessel wall (Ross & Glomset, 1976a). Platelet adhesion is enhanced, and aggregation occurs easily with collagen structures exposed (Ross & Glomset, 1976a, 1976b; Ross, 1986; Vermylen, Verstraete, & Fuster, 1986). The platelets then release their granules and growth factors which stimulate smooth muscle cell migration and proliferation (Ross, 1986; Cowan, 1989). The resulting

lesions can lead to the development of plaques, since the increased permeability of the intima allows for the accumulation of collagen and lipids in the intimal layer surrounded by the subsequent connective-tissue matrix (Ross & Glomset, 1976b). "Further proliferation of smooth-muscle cells and accumulation of connective tissue and lipid occur if injury to the endothelium is continuous or repeated (Ross & Glomset, 1976a, p. 420). This re-endothelialization and subsequent accumulation of lipoproteins may thus cause more injury, resulting in uneven, scarred areas that further increases turbulent flow and can lead to clot formation. Increased pressure on the vessels walls can also stimulate endothelial proliferation (Sollek & Lee, 1989). The final result is plaque formation, hyperplasia, or both causing a thickening of the vessel walls and narrowing of the lumen (Ross & Glomset, 1976b).

Impact of treatment. "Risk of cardiovascular complications related to hypertension increases continuously with increasing levels of both SBP (systolic blood pressure) and DBP (diastolic blood pressure)" (Joint National Committee, 1988, p. 2). Therefore, detection and continued monitoring is essential in controlling hypertension and postponing CVD morbidity and mortality.

Perhaps the most dramatic study demonstrating reduced mortality and morbidity due to treatment of hypertension was the Veterans Administration Cooperative Study Group (1967).

In this double-blind study, 143 middle-aged men with diastolic blood pressures between 115 and 129 mm Hg, were randomized into a treatment group (70 men) and a placebo-control group (73). The treatment group received hydrochlorothiazide, reserpine, and hydralazine hydrochloride. Both groups were relatively equal for demographic and physical data. The control group had no significant changes in blood pressure levels. The treatment group had reductions in both systolic (by a mean of 43mm Hg) and diastolic blood pressures (by a mean of 30mm Hg), as well as a significant ($p<.001$) decrease in mortality. Though the importance of these results should not be overlooked, the sample sized was small, the participants had varying degrees of organ damage already (eye, heart, renal, and brain), and they were all male veterans, making it impossible to generalize the results to the female population.

The Hypertension Detection and Follow-up Program (1979) was a community-based, randomized-control trial involving 10,940 men and women with hypertension. This study compared five-year mortality rates of a step-care antihypertensive medication program with those of a community referral therapy program. Results showed that those treated step-wise with medication had 17% lower ($p<.01$) five-year all-cause and 19% lower cardiovascular-cause mortality rates, compared to the referral group. The investigators

attributed these results to the participant's adherence to the step-care medication program. One must remember, however, these participants received their medication free of charge, transportation was provided if needed, appointments were made at convenient times, and each person in the treatment program was seen at least every four months. All of these factors would serve to enhance adherence to a treatment regimen. The community referral group also showed a decrease in their diastolic blood pressure. Entry diastolic blood pressures ranged from 90 to 104 mm Hg. At four and five years of follow-up, the diastolic blood pressures ranged from 88 to 95 mm Hg, with a mean of 90 mm Hg. The decrease in the community referral group was attributed to detection and referral for treatment, and to increased awareness by the medical profession to treat blood pressure elevations.

While treatment of hypertension has been shown to decrease morbidity and mortality, antihypertensive therapy has not been shown to prevent CVD (Wenger & Roberts, 1987; Joint National Committee, 1988). Strategies of treatment vary with the degree of seriousness of the blood pressure, but are the same for men and women. Pharmacological, as well as non-pharmacological regimens, or a combination of both, have been shown to be effective in controlling hypertension. Recommendations in the 1988 Joint National Committee Report on Hypertension are, that the type of

treatment chosen must be individualized for the patient to increase adherence, and is dependent on the severity of elevation of blood pressure and the presence of other risk factors.

The Joint National Committee Report (1988), recommended that pharmacological therapy be initiated when the diastolic blood pressure is greater than 94 mm Hg or when the individual's diastolic blood pressure is between 90 and 94 mm Hg and they smoke, have diabetes and/or have a serum cholesterol greater than 240 mg/dl. This committee further advocated an individualized, step-care approach (see Figure 2), using thiazide-type diuretics or beta-blockers for initial therapy, unless contraindicated. Progression to more of the first drug (up to the recommended maximum), addition of another drug from another class, or discontinuance of the first drug with substitution of a drug from another class is recommended in one to three-month intervals, depending on the patient's response to the initial therapy. This step-care approach is the same type of treatment regimen utilized in the Hypertension Detection and Follow-up Program. The benefits of this regimen are strong adherence to the plan (possibly because of its individualized approach), a controlled decrease in blood pressure, and a decreased mortality rate.

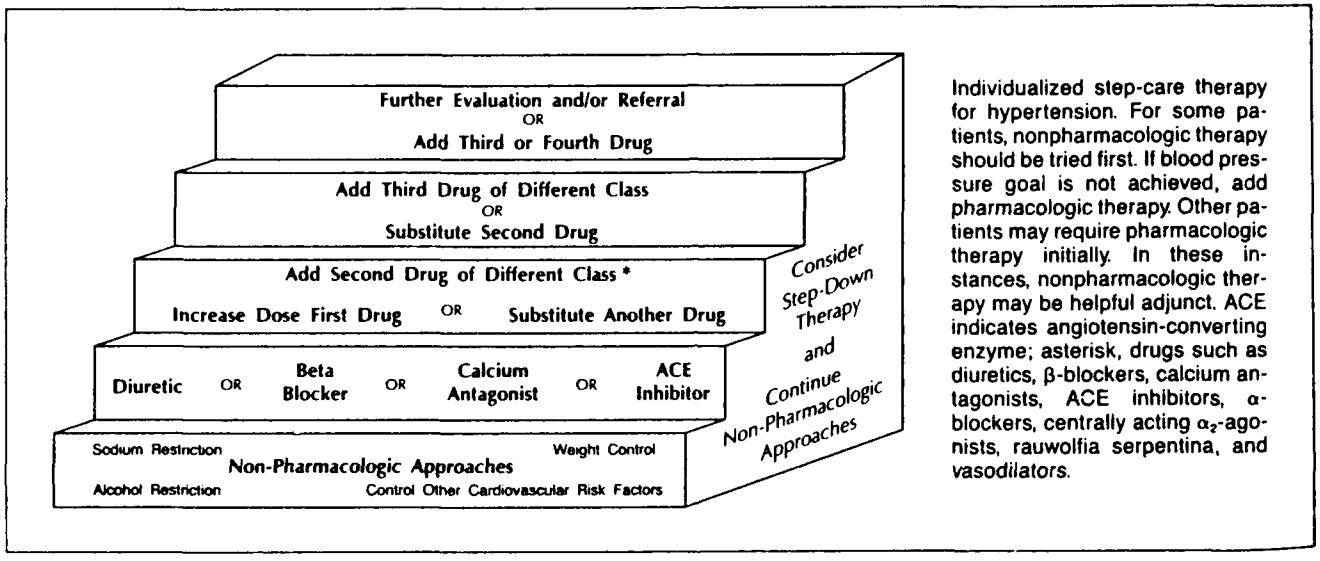


Figure 2. Step Care Therapy Approach

Note. From "The 1988 Report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure" by the 1988 Joint National Committee, 1988, Archives of Internal Medicine, 146(5), p. 1028. Copyright 1988 by E. J. Rocella. Reprinted by permission.

Pharmacological treatment of high blood pressure has its drawbacks. Drugs have side effects which causes changes in physical functioning. Drug therapy is expensive. Not only are the medications themselves costly, but initial and follow-up appointments can be as well. Access to medical care, such as transportation and appointments convenient for the individual, must also be considered in the treatment of high blood pressure.

Adherence

The control of hypertension does contribute to decreasing the morbidity and mortality related to CVD (HDFP, 1979). While there is general agreement in the literature that public awareness of hypertension as a CVD risk factor has increased, there are conflicting reports about whether the rate of blood pressure control among hypertensives has increased. The National Health Survey from 1960 to 1980 reports that the prevalence of definite hypertension decreased 5.3 and 12.6 percent for white and black adults, respectively, while the proportion of hypertensives controlled with medication increased from 39.3 to 51.7 percent. The increase in treatment of those with high blood pressure can be related to increased screening and improved management techniques and recommendations by the Joint National Committee (Kaplan, 1983). However, the American Heart Association stated that 67 percent of all persons with

hypertension are not on any type of therapy, while 22 percent are on inadequate therapy (American Heart Association, 1991).

Studies involving pharmacologic as well as non-pharmacologic interventions have demonstrated the ability to decrease and control blood pressure within normal limits (Veterans Administration Cooperative Study, 1967; Hypertension Detection and Follow-up Program, 1979). Why then, has the control of blood pressure in hypertensive individuals not improved more in the past 24 years? Unresponsiveness to medication can occur, however non-adherence to the treatment regimen seems to be the most frequent reason (Podell, 1983).

Terminology. The terms compliance and adherence are used interchangeably in the literature, although their definitions are slightly different. Compliance is the "yielding to a wish or demand" (American Heritage Dictionary, 1977, p. 148). Adherence means "to stick to,...to follow without deviation" (American Heritage Dictionary, 1977, p. 9). Foster and Kousch (1981) concluded that non-compliance takes on a negative connotation since it implies "disobedience" or fault on the part of the individual. Non-adherence, on the other hand does allows for personal choice and control, and also allows for factors outside the individual's control (Foster & Kousch, 1981). The terms adherence and non-adherence were chosen for use in

this study. Compliance and non-compliance were used if these terms were cited in the literature being reviewed.

Adherence by the individual to the prescribed therapy is necessary for any regimen to be successful. Unfortunately, "the gap between the therapy prescribed by the clinician and the therapy actually taken by the patient is distressingly wide for self-administered regimens" (Sackett, 1976, p. 9).

In his review of the literature on medication adherence, Sackett (1976) found a large variation in adherence rates between studies, attributed to study designs utilizing different definitions of "satisfactory compliance", as well as ways of measuring compliance. Compliance to prescribed medication ranged from 23 to 82% for short-term therapy; the average compliance rate for long-term medication therapy was 54%, based on the overall results of the studies (individual compliance rates were not obtainable).

Determining factors that allow the prediction of individuals who will and will not adhere to treatment regimens has proven difficult. Numerous studies have been undertaken in an attempt to identify non-adherence factors for hypertensive individuals (Caldwell, Cobb, Dowling, & de Jongh, 1970; Sackett et al., 1975; Given, Given, & Lewis, 1978; Rocella, Bowler, Ames, and Horan, 1986). Exactly what causes a person to adhere or not adhere to prescribed

therapy is unclear. The reasons seem endless and study results often conflict with each other. In interviewing 10 cardiac rehabilitation patients, Frenn, Borgeson, Lee, and Simandl (1989) found that perceived benefits and barriers to lifestyle change were individual; "...what one client perceived as a benefit, another perceived as a barrier" (p. 49).

Reasons for non-adherence from these studies included: the prescribed frequency of medication, the number of medications prescribed, duration of treatment, side effects, misunderstanding of the treatment regimen, a poor physician-client relationship, perceived efficacy of the treatment, lack of knowledge about hypertension and the associated risks, and the lack of symptoms to act as cues for lifestyle change (Foster & Kousch, 1981; Haynes, 1983; Podell, 1983). Other factors such as demographic attributes, personality traits, cost of medical treatment, access to health care, lack of familial support, and patient motivation have also been suggested as reasons for adherence problems (Becker, 1976; Daniels & Kochar, 1979; Podell, 1983).

In their reviews of the literature, Davidoff (1976), and Marston (1970) found that the person's level of education, age, race, and gender had no influence on adherence. However, the 1985 National Health Interview Survey found that "use of antihypertensives increased dramatically with age, decreased slightly with education

level, and was reported more frequently by females than males" (Roccella, Bowler, Ames, & Horan, 1986, p. 604). Increasing age, blacks, and people with lower education levels were also factors related to not taking prescribed antihypertensive medication (Roccella, et al., 1986). Kirscht and Rosenstock (1977) interviewed 132 hypertensive patients and also found that less educated (less than high school graduate) and older patients (over 60 years of age) adhered less to an antihypertensive medication regimen.

Caldwell et al. (1970) conducted a pilot study to determine why patients dropped out of an antihypertensive treatment program. Of 66 patients initially enrolled in the treatment program, 50% had quit within the first year and 74% had dropped out by the fifth year. Those who had discontinued treatment were younger, had been diagnosed with hypertension for less time, had less education and income than those who continued treatment, were more often black, and tended to have blue-collar jobs. Interestingly, 50 percent of those who stayed on their medication had experienced a hypertensive emergency (encephalopathy, congestive heart failure, intracranial hemorrhage, acute arterial occlusion), related to lack of or inadequate treatment, or knew of a family member who had had such an episode. The investigators felt that these experiences served as a conditioned response for treatment adherence and continuance.

While side effects are frequently suggested and reported by patients as reasons for not taking medication, several studies indicate that it may not be a strong contributing factor. Caldwell et al. (1970) found side effects of medications accounted for only seven percent of 74% of those who dropped out of a antihypertensive treatment program: of those who remained in treatment, 29% also experienced medication side effects.

Wenger and Roberts (1987) stated that women on antihypertensive therapy have reported more side effects with beta-blockers than diuretics, though these side effects did not necessitate withdrawing therapy. They explained the increased occurrence of side-effects in women are due to a greater dose-effect of the drug because of decreased body mass.

Blackwell (1973), in discussing discrepancies in compliance behaviors, places most of the "blame" for non-compliance on the patient. He does, however, acknowledge that "defaulting" may be situational, and depends on "...the illness, patient, physician, medication regimen or treatment milieu" (p. 249).

In a prospective study done by Given, Given, and Simoni (1978) with 88 hypertensive patients, knowledge and perceived benefits from medications correlated ($r=.50$ and $r=.42$, respectively) significantly ($p<.05$) with compliance. Further results from the study showed a significant decrease

($p<.05$) in blood pressure in more than two-thirds of the participants who complied with their medication regimen.

Kirscht and Rosenstock (1977) interviewed 132 hypertensive patients and reviewed their medication records in their study on adherence. Using the Health Belief Model, they looked at the beliefs that the patients' had about their susceptibility to the effects of high blood pressure, the severity of their condition, and the efficacy of the treatment regimen in relation to compliance. The higher the scores of perceived susceptibility of effects, severity of condition, and efficacy of treatment, the better the adherence. Those who reported side effects adhered less in taking their medication, but did get their prescriptions refilled. Individuals who had a lack of symptoms and lack of knowledge about hypertension were less adherent to the treatment regimen.

Strategies for improving medication adherence have been tried and studied. Dunbar and Agras (1980) reviewed the literature on adherence and found that while providing information was paramount to the individual's ability to adhere, having knowledge did not necessarily indicate that the person would adhere more often. Social support was found to positively influence adherence through encouragement and reinforcement of behaviors, but could be detrimental to the individual's perception of their self-efficacy. A relationship of trust and understanding between

the patient and the care giver was found to be associated with adherence. The setting and operation of the clinic also impacted adherence. Individual appointments, seeing the same physician, little or no waiting, and reminder systems accentuated adherence. A combination of treatment interventions or the level of complexity of the regimen were negatively correlated with adherence.

It remained unclear as to what influences adherence to prescribed treatment regimens. Techniques that can enhance adherence to pharmacologic control of hypertension are needed in order to promote an optimum level of wellness.

Health Promotion Model

The Health Promotion Model, developed by Pender, was selected as the theoretical framework for this study. The Health Promotion Model is based on social learning theory, which explains an individual's behavior as being determined by the individual's perceptions. Additionally, Pender has integrated research findings from several studies on health behaviors and practices, and on motivators of human behavior (Health Belief Model, Locus of Control, Self Efficacy, and reasoned action) in developing the Health Promotion Model (Pender, 1982).

Pender (1987) distinguished promotion activities from prevention activities. Promotion activities focus on the individual moving toward better health and increased well-

being. Prevention is directed at decreasing the risk of disease occurrence, shortening the disease process, or rehabilitating the individual to an optimum level of functioning. Put more simply, prevention is moving away from disease (negative action), while promotion is moving toward health (positive action) (Pender, 1987).

"Health promotion consists of activities directed toward increasing the level of well being and actualizing the health potential of individuals, families, communities and society" (Pender, 1987, p. 6). Those who engage in health-promoting behavior are motivated by high self-worth, the awareness of their capacity for growth, and the desire to perform what they learn (Pender, 1987).

The components of the Health Promotion Model are grouped under the headings of cognitive/perceptual factors and modifying factors. Together, these components influence participation in health-promoting behavior.

Cognitive/perceptual factors are considered to be motivational in nature and directly influence the likelihood of health-promoting actions. These factors include importance of health, perceived control of health, perceived self-efficacy, definition of health, perceived health-status, and perceived benefits and barriers to health-promoting behaviors (Pender, Walker, Sechrist, & Stromberg, 1988). Modifying factors indirectly influence health-promoting behavior by impacting on the cognitive/perceptual

factors. Modifying factors include demographic and biological characteristics, interpersonal influences, situational factors, and behavioral factors (Pender et al., 1988). Internal and external activating cues also impact on the likelihood of engaging in health-promoting behavior.

Richter, Malkiewicz, and Shaw (1987) assessed health promoting behaviors in three groups of nursing students for six months. One group was enrolled in a Health Promoting Behaviors course, the second group participated in a personalized health assessment experience, and a third group served as a control group. The only significant ($p<.01$) difference among the three groups was in the subscale of exercise. Those who were enrolled in the Health Promoting Behaviors course increased their exercise, while the other two groups reported a decrease in exercise. After six months, there was an unexpected decrease in scores on the wellness inventory (Lifestyle Assessment Questionnaire) in all three groups. Furthermore, anger was expressed by some students who knew "what they should do to be healthy, but were unable to achieve health goals because of school schedules and expectations" (Richter et al., 1987, p. 370). In this example, self-awareness of behaviors may have had positive and negative influences on health.

A comparison of health-promoting lifestyles between young, middle-aged and older adults was done to determine the relationship of age and socio-demographic

characteristics to life style in adulthood (Walker, Volkan, Sechrist, & Pender, 1988). The HPLP was used to measure health-promoting behaviors. Older adults (aged 55 to 88 years) had significantly ($p<.01$) higher HPLP scores on the health responsibility, nutrition, and stress management subscales than the young or middle-aged adults. There were not significant differences between the age groups in scores for the other subscales. Socio-demographic variables did demonstrate an impact on health-promoting life style. Women scored higher than men in all the subscale except self-actualization. Both income and education contributed to the variance in overall scores of health-promoting lifestyles and on the subscale of self-actualization. Additionally, higher income was associated with health responsibility and exercise. More education was associated with nutrition, interpersonal support, and stress management. Being married and unemployed were associated with a higher frequency of health-promoting nutrition behaviors. Ethnicity was not obtained in this study.

Fleetwood and Packa (1991) also utilized the Health Promotion Model and the Health Promotion Lifestyle Profile (HPLP) in their assessment of health-promoting behaviors and knowledge of actual or potential risk of developing coronary artery disease (CAD). Results from the study indicated that those subjects with knowledge of personal risk for CAD and knowledge of CAD risk factors were engaged in more health-

promoting behaviors, and believed they had control over their health.

This model fits well for the study of medication adherence in the hypertensive individual. The actual medical treatment is viewed as a "preventive action" to avoid complications or slow the progress of cardiovascular disease. Adherence to the treatment is viewed as health promoting; the individual is motivated to increase his level of well-being by incorporating this positive behavior (adherence).

Hypertension is not necessarily associated with perceived signs and symptoms. Therefore, an individual diagnosed with high blood pressure may not perceive a specific health threat. To adhere to the prescribed medication regimen, the individual must perceive benefits for engaging in this behavior.

According to the Health-Promotion Model, if the perceived benefits outweigh the perceived barriers, the individual should realize the value of controlling their blood pressure and adhere to taking their antihypertensive medication as prescribed. The medication may provide control of their blood pressure, and can decrease morbidity and mortality. Taking the prescribed medication is then, a health-promoting behavior.

Statement of the Purpose

The purposes of this study were to:

1. Describe the health-promoting behaviors of women 35 to 50 years of age.
2. Describe the reported adherence to antihypertensive medication.
3. Describe the relationship between the health-promoting behaviors and antihypertensive medication adherence.
4. Describe factors that influence medication-taking.

CHAPTER III

Methods

Study Design

A cross-sectional, descriptive survey design was utilized in assessing the cognitive/perceptual factors (perceived benefits and barriers to health-promoting behavior) and modifying factors (demographics) that affect medication adherence in hypertensive women. This type of design was chosen because it enabled the investigator to describe the prevalence of a phenomenon for a population at one point in time (Woods, 1988).

Sample

The target population for this study was women, aged 35 to 50 years, diagnosed with high blood pressure, and living in the Seattle metropolitan area. Past research on antihypertensive medication adherence has not targeted this age group for study. Furthermore, CVD rates have been increasing in women, with the disease process occurring at younger ages.

With the knowledge that return rates for questionnaires average 33 to 60%, a sample size of approximately 120 women was determined optimal for obtaining statistically significant results for this study. A convenience sample of those patients discharged with the diagnosis of hypertension

was obtained from the medical records at a local hospital. Permission for access to the records and contact of the patients was obtained from the Director of the Division of Cardiology and from an Associate Professor in Medicine (Division of Nephrology), both at the local hospital.

Criteria for inclusion and exclusion

Those women included in this study had to meet the following criteria: 1) diagnosed with hypertension, 2) antihypertensive medication was prescribed, and 3) able to read and write English. Those women who did not meet these criteria were excluded from the study.

Data Producing Instruments

The instruments chosen for this study were the Health-Promoting Lifestyle Profile (HPLP) and an adherence survey developed by the investigator (see Appendix A for combined survey). These surveys were paper and pencil tools, which allowed the individual privacy and the ability to complete them at their leisure.

The HPLP is a 48-item scale with six subscales, which examines the frequency of health-promoting behaviors. The subscales of the profile are: self-actualization, health responsibility, exercise, nutrition, interpersonal support, and stress management. The response format is an ordinal format of 1=Never, 2=Sometimes, 3=Often, and 4=Routinely. "The term routinely was chosen to represent the most

frequent response category because it suggests a regular pattern of behavior characteristic of life-style" (Walker, Sechrist, & Pender, 1987, p. 77). A higher score indicated greater involvement in health-promoting behavior.

The HPLP has been standardized for use on 1083 adults, ages 18 to 88 years. This tool has been used to explain health-promoting lifestyles in cancer and cardiac rehabilitation clients (Pender et al., 1988). Internal consistency reliability was 0.922 and the Cronbach's alpha between the subscales ranged from 0.702 to 0.904 (Walker et al., 1987). Permission for use, and directions for scoring and evaluation were obtained for use in this study (see Appendix B for scoring information).

The tool developed by the investigator focused more on the subject of hypertension and its control. This tool, the Hypertension-Adherence Survey, included questions concerning the type and frequency of prescribed antihypertensive medication, how often the individual actually took the medication, obstacles to adherence, and the demographic questions that were utilized during the evaluation of the data. Seven subscales were determined from the 33-item scale. The subscales were: side effects, cost, lifestyle, forgetting, worth, knowledge, and risk. One question was scored separately since it asked the participant how often she took her medication. To maintain consistency throughout the survey, the same ordinal measure of frequency as found

in the HPLP, was used (never, sometimes, often, and routinely). Content validity was obtained from experts in cardiovascular nursing. Since the tool had not been used previously, 10% (n=12) of the sample participants were sent both parts of the survey (HPLP and the Hypertension-Adherence Survey) a second time to determine its reliability. Fifty percent (n=6) of the participants returned a completed second survey. Correlation coefficients for the HPLP ranged from -.572 to .910 (mean r=.504), and for the Hypertension-Adherence Survey ranged from .478 to .997 (mean r=.837),(see Table 2).

Operational Definitions and Indicators

1. Health-Promoting Behavior: Actions taken by the individual to increase level of health and/or well-being.

Indicator: Takes antihypertensive medications as prescribed. Total and subscale scores from both the HPLP and the Hypertension-Adherence Survey.

2. Medication Adherence: For the purposes of this study if individuals responded that they took their medication two-thirds of time on question 14, they were considered to be adhering to the treatment regimen. Responses of routinely and often were considered adherent, never and sometimes were regarded as non-adherent.

Table 2

Test-retest reliability between subscales

Subscale	r
HPLP Tool (n=6)	
Self Actualization	.738
Health Responsibility	-.572
Exercise	.703
Nutrition	.910*
Interpersonal Support	.886*
Stress Management	.756
Total Score	.664
Hypertension-Adherence Survey (n=6)	
Side Effects	.478
Cost	.997**
Lifestyle	.900*
Forget	.842
Worth	.651
Knowledge	.939*
At-Risk	.919**
Total Score	.973**

* p=.05. ** p=.01.

3. Modifying factors: include demographic characteristics, biological characteristics, interpersonal influences, situational factors, and behavioral factors (Pender, 1987). Modifying factors indirectly influence health-promoting behavior by impacting on the cognitive/perceptual factors.

Indicator: Total and subscale scores from the HPLP and the Hypertension-Adherence Survey.

Methods of Procedure

The names of patients to be contacted were obtained through medical records at a local hospital. Permission for access to the medical records and patient contact was given by the Director of the Division of Cardiology and from an Associate Professor in Medicine, Division of Nephrology, both at the local hospital. A mailing list was compiled of those patients who met the selection criteria. A packet including a cover letter (see Appendix B), survey, and stamped-return envelope, was sent to each patient. The cover letter explained how their name was accessed, introduced the study, and invited participation in the study. It explained the purpose of, and directions for completing the survey, the approximate time needed for filling it out, and a deadline for return of the survey. To ensure confidentiality, the respondents were instructed not to put their name on the survey. Furthermore, the letter

explained that by filling out and returning the survey, the individual was giving consent to participate in the study.

Those surveys not returned by the final deadline were not included in the data analysis. The total number of returned and unreturned surveys are given in the results section.

Protection of Human Subjects

An oath of confidentiality (Appendix C) was signed by the investigator prior to examining the medical records. Permission for access to the records and for contacting patients was obtained from the Director of the Division of Cardiology and from an Associate Professor in Medicine, Division of Nephrology, both at a local Seattle hospital. The sole purpose of obtaining the patient names was to compile a mailing list to send the cover letter and survey to the subjects. The mailing list was destroyed after completion of the study.

The cover letter (see Appendix B) included with the survey, discussed the purpose of the study, specified that participation in the study was voluntary, and that by completing and mailing back the surveys, the individual had consented to participate. Also, the participant was instructed not to put her name on the surveys so as to protect her anonymity. Finally, the letter explained that

individual questions could be left unanswered should the person choose.

There were no anticipated risks to the participant. Participation was completely voluntary. At no time was the respondents' names attached to data. The survey and research proposal was submitted to the University of Washington Human Subjects Review Committee for approval prior to any data collection. Approval was granted on July 3, 1990.

Methods of Analysis

The total and individual subscale scores from the Hypertension-Adherence Survey were tallied to determine if there were factors that affected medication adherence. Individual items were worded both positively and negatively and were therefore scored differently (see Appendix D). The survey was designed so that a higher score would reflect greater adherence (or less impact of negative factors).

The total and individual subscale scores from the HPLP were tallied to determine the frequency of health-promoting behaviors. Pharmacological adherence (as defined under Operational Definitions) was assessed in relation to the prescribed medication regimen and the reported frequency of taking the medication.

Pearson's correlations were done to determine the extent that demographic and modifying factors were related

to health-promoting behavior (HPLP scores) and medication adherence (Hypertension-Adherence Survey scores). All mean scores are reported with the standard deviations.

CHAPTER IV

Results

Description of the sample

In the seven month period from July 20, 1990 to February 20, 1991, a total of 84 surveys were sent out to eligible women. Two individuals were excluded from the study when they notified the investigator by phone that they were no longer taking medications for hypertension. Twenty surveys were returned because of outdated addresses. A total of 27 out of 62 surveys were completed (44% return rate). Seven of these surveys could not be used; two were returned by uninterested subjects, four individuals indicated they were not taking medications for hypertension, and one survey could not be interpreted. Therefore, a total of 20 surveys were analyzed. The demographic information for the participants are listed in Table 3, listing the percentages, and number of respondents per item.

The mean age of the women participants was 44.3 $\pm$ 4 years, with a range of 35 to 50 years. Forty-five percent of the women were married, 25% were divorced, 15% were never married, and 5% were either separated or widowed. Ninety-five (n=19) percent of the women in the study were Caucasian. One woman (5%) was a native American.

The education level achieved by this sample was mostly high school diploma (45%). One woman (5%) had earned a GED, 10% had a vocational degree, 15% had a certificate, and 15%

Table 3

Demographic Information

	Percentage of Respondents	Number of Respondents
Age in years (mean = 44±4)		
35-39	15%	3
40-44	30%	6
45-50	55%	11
Ethnicity (N = 20)		
Caucasian	95%	19
American Indian	5%	1
Marital Status (n = 19)		
Married	45%	9
Divorced	25%	5
Separated	5%	1
Widowed	5%	1
Never married	15%	3
Education (N = 20)		
High School	45%	9
GED	5%	1
Vocational degree	10%	2
Certificate	15%	3
Bachelors degree	15%	3
No degree	10%	2
Job Title (n = 13)		
Homemaker	20%	4
Semi-skilled	20%	4
Skilled-manual	5%	1
Clerical or Sales	10%	2
Minor Professional	10%	2
No title given	35%	7
Hours Worked Weekly (n = 13)		
Under 10	5%	1
20-24	5%	1
30-34	5%	1
35-39	5%	1
40-44	25%	5
over 50	20%	4
No hours given	35%	7

(table continues)

Table 3 (Continued)

	Percentage of Respondents	Number of Respondents
Income in dollars from all sources (n = 17)		
Under &10,000	30%	6
10-19,999	25%	5
20-29,999	15%	3
30-39,999	10%	2
40-49,999	5%	1
Insurance Coverage (N = 20)		
100%	30%	6
80%	20%	4
70%	5%	1
Pay $5/medication	25%	5
No coverage	20%	4
Years Diagnosed with High Blood Pressure (n = 19)		
1-2 Years	10%	2
3-4 Years	15%	3
5-6 Years	30%	6
Over 7 Years	40%	8
Months Since Last Blood Pressure Measurement (n = 19)		
Less than 1 Month	50%	10
1-2 Months	40%	8
9 Months	5%	1

had earned a bachelors degree. Two women (10%) had no degree. The women were asked to provide their job title, which was then classified using the Hollingshead Index of Social Status Occupational Scale. Twenty percent listed their job title as homemaker, 20% gave occupations grouped as semiskilled, 5% were classified as skilled- manual worker, 10% had clerical or sales titles, 10% were minor professionals, and 35% did not respond.

The number of hours worked during a week was requested. Four women, one in each category, reported working under 10 hours, 20 to 24 hours, 30 to 34 hours and 35 to 39 hours a week. Five women (25%) reported working 40 to 44 hours weekly and four (20%) indicated working over 50 hours a week. Thirty-five percent did not respond.

The participants were asked to indicate their income from the previous year (to include all sources). Thirty percent (n=6) had incomes of less than $10,000. Twenty-five percent had incomes of between $10-19,999, 15% reported incomes between $20-29,999, 10% had household incomes between $30-39,999, and 5% had an income of $40-49,999. Three women did not respond to the question.

The amount of insurance coverage for medication was also obtained. Thirty percent of the women said they had 100% insurance coverage. Twenty percent had 80% coverage. One person had 70% of the cost of her medications covered by insurance. Twenty-five percent paid a set fee of five

dollars per prescription. Another 20% either had no insurance, or their insurance did not cover medication cost.

The number of children and their ages were also obtained, and are listed in Table 4. The mean number of children living within the household was one, with a range of zero to two (SD 2). One child was present in the 45% of the households. Their ages ranged from under six years of age to over 21 years of age. Fifteen percent of the women had two children at home. Ages of these children ranged from both being under ten to both being over 21 years of age. Forty percent of the women reported no children living at home.

The number of years that the women had been diagnosed with hypertension was asked. Forty percent reported being diagnosed for seven or more years. Thirty percent indicated the diagnosis had existed for five to six years. Fifteen percent and 10% reported three to four years and one to two years, respectively for duration of diagnosis. One person did not respond.

The women were asked to write down their last blood pressure. The range of systolic pressures were from 112 to 156 mm Hg, with a mean of 131 $\pm$ 12 mm Hg (see Figure 3). Diastolic blood pressures ranged from 67 to 107 mm Hg, with a mean of 85 $\pm$ 11 mm Hg (see Figure 4). Seventy-five percent of the women reported knowing their systolic blood

Table 4

Description of children within the household

	Percentage of Respondents	Number of Respondents
Women with one child in household (by child's age group in years)	45%	9
0-5	5%	1
6-10	30%	6
11-15	30%	6
16-21	15%	3
over 21	5%	1
Women with two children in household (by child's age group in years)	15%	3
both under 10	5%	1
both between 11-21	5%	1
both over 21	5%	1
Women with no children in household	40%	8

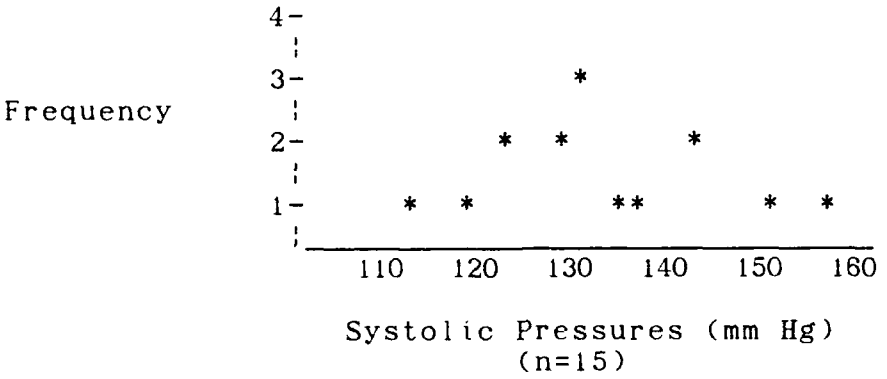


Figure 3. Reported systolic blood pressures.

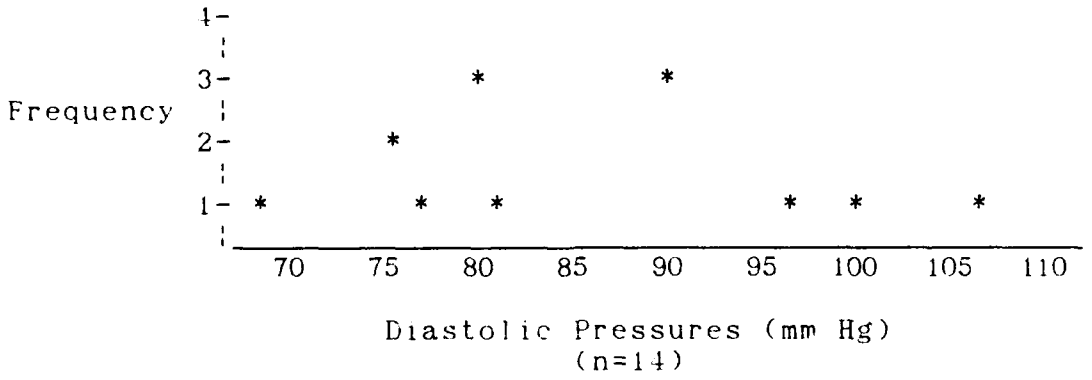


Figure 4. Reported diastolic blood pressures.

pressure and 70% knew their diastolic pressure. Four women (20%) reported systolic pressures of 140 mm Hg or greater; six (30%) reported diastolic pressures of 90 mm Hg or greater.

Fifty percent of the women reported having their blood pressure taken less than one month before receiving the questionnaire. Forty percent indicated that they had had their blood pressure taken within two months of the receiving the survey. One person reported that her blood pressure had not been taken for nine months. One person could not recall her last blood pressure check.

Other CVD indicated by the participants included coronary artery disease, congestive heart failure, angina, heart murmur, irregular rhythm, and stroke. Fifteen percent (n = 3) of the women reported having had a myocardial infarction. One participant had had a heart transplant. No woman reported more than one cardiovascular-related diagnosis except one of the women with myocardial infarction, who also reported CAD and congestive heart failure. Forty-five percent (n=9) reported no other CVD.

Adherence to medications

The women were asked to list the medication prescribed for their high blood pressure, the prescribed frequency, and how often they actually took the medication. The medications listed by the women [illegible]

Table 5

Medications Taken by Women

Diuretics	Beta Blockers	Calcium Channel Blockers
Hydrochlorothiazide Dyazide Furosemide (Lasix*)	Atenolol (Tenormin*) Propranolol HCL (Inderal*)	Verapamil HCL (Calan SR*) Diltiazem HCL (Cardizem*) Nifedipine

ACE Inhibitors	Vasodilators	Alpha Blockers
Enalapril (Vasotec*) Captopril (Capoten*) Lisinopril (Prinivil*) (Zestril*)	Prazosin HCL (Minipress*)	Clonidine HCL (Catapres*)

*Trade names listed by participants.

diuretics (35%, n=7), alpha- (5%, n=1) and beta- (40%, n = 8) adrenergic blockers, calcium channel blockers (30%, n = 6), converting enzyme inhibitors (30%, n = 6), and vasodilators (10%, n = 2).

Fifty-five percent (n = 11) of the women took one medication, 35% (n = 7) took two different medications, and 10% (n = 2) took three different medications. No woman reported taking more than one drug per Step-care classification (Joint National Committee, 1988). The frequency that women took their medications ranged from once

a day for each prescribed medication to combinations of one, two, and three times a day for those with more than one medication prescribed.

Eighty-five percent (n = 17) reported taking their medication exactly as it was prescribed. One person indicated that the prescribed frequency of her medication was two to three times a day and she took the medication twice a day. Two women did not answer the prescribed frequency portion correctly so their adherence is not known.

Hypertension-Adherence Survey scores

The Hypertension-Adherence Survey is made up of 33 items. The score for each item was between one and four points: a higher score indicated greater adherence. One question (labeled "Frequency" in Table 6) was scored separately since it asked the participant how often she took her medication. The other items were divided into seven subscales (see Appendix E for item numbers included in each subscale). Those subscales were: side effects, cost, lifestyle, forgetting, worth, knowledge, and risk. The mean scores, ranges, and total possible scores are given in Table 6 for each individual subscale and the total of all the scales of the Hypertension-Adherence Survey.

Side-Effects subscale. The "Side-Effects" subscale contained six items related to effects that drugs may have, for example, headache, nausea, and dizziness. A score

Table 6

Scores from the Hypertension Adherence Survey

Scale Name	Mean Score	Range of Scores	Total Possible Points
Side Effects (6 items)	23 ± 2	18-24	24
Cost (2 items)	7 ± 1	4-8	8
Lifestyle (6 items)	20 ± 2	16-24	24
Forgetting (5 items)	19 ± 2	13-20	20
Worth (6 items)	21 ± 3	15-24	24
Knowledge (3 items)	11 ± 1	9-12	12
At Risk (3 items)	9 ± 1	6-11	12
Frequency (1 item)	4 ± 1	3-4	4
Total All Scales (33 items)	115 ± 9	92-129	132

between six and 24 was possible, with a higher score reflecting that side-effects were either not experienced or did not affect medication adherence. The mean score for this scale was 23 ± 2. Sixty percent (n = 12) of the women had a score of 24 points. Thirty percent (n = 6) had a score of between 20 and 23 points. One woman (5%) had a score of 18. Data from one woman were missing.

Cost subscale. The "Cost" subscale had two items that concerned the cost of medications and the affect this had on adherence. A score of between two and eight was possible. A higher score indicated that cost was not a factor affecting medication adherence. The mean score was 7 ± 1. Fifteen women (75%) had a score of eight; 10% (n = 2) scored 7 points. One woman had a score of five points. Two had a score of four points.

Lifestyle subscale The "Lifestyle" subscale (fashioned after the "Interpersonal Support" scale from the HPLP) contained six items and sought information about family support for taking medication, and the amount of interference that home and work had on medication adherence. Scores of between six and 24 were possible, with a higher score indicating stronger family support and little interference in taking medication related to home or work. The mean score was 20 ± 2. Two women (10%) had a score of 24. Thirty-five percent (n = 5) had a score between 20 and

22. Four women (20%) had a score of 19. Thirty-five percent (n = 5) had a score between 16 and 18.

Forgetting subscale. The "Forgetting" subscale dealt with reasons for forgetting to take medication, for example, forgetting to get the prescription refilled, and when to take the medication. Five items were scored for this subscale. Between five and 20 points were possible. A higher score indicated that forgetting to take medication was not an issue in medication adherence. The mean score for this subscale was 19 ± 2. Forty percent (n = 8) had a score of 20, 40% had a score between 17 and 19, and 10% had a score of 13 (n = 1) or 14 (n = 1). Data were missing from two individuals.

Worth subscale. The "Worth" subscale had six items that dealt with the value the individual placed on medication as an effective treatment for hypertension. Examples of items for this subscale include, "it bothers me when I forget to take my medication" and "my medication controls my blood pressure." Scores between six and 21 were possible. Higher scores implied that the women believed that taking medication was important to them. The mean score was 21 ± 3. Fifteen percent (n = 3) had a score of 21; 45% (n = 9) had a score of 21 to 22. Five women (25%) had a score of 18 or 19. Scores of 15 and 16 were obtained from two women. Data from one woman were missing.

Knowledge subscale. The "Knowledge" subscale contained three items dealing with the purpose of the treatment of high blood pressure. A score of between three and 12 was possible. A higher score implied an understanding of the purpose for medication adherence. The mean score was 11 ± 1. Fifty-five percent (n = 11) had a score of 12, 25% (n = 5) had scores of 11, and 10% (n = 2) had scores of 9. Data were missing from two women.

At Risk subscale. The "At Risk" subscale had three items that asked the amount of concern about having high blood pressure and experiencing other cardiovascular problems in the future. Scores between three and 12 were possible. A higher score indicated that having high blood pressure and being at risk for stroke or heart attack was a concern. The mean score was 9 ± 1. Twenty percent (n = 4) had a score of 11. Ten percent (n = 2) had scores of 10. Fifty percent (n = 10) had scores of 9. Twenty percent (n = 4) had a score of 6 or 8.

Frequency of medication taking. The question on frequency of medication-taking had a mean score of 3.95 ± 1; possible scores were between one and four. By operational definition, a score of three (Often) or four (Routinely) indicated adherence with the prescribed treatment regimen; scores of two (Sometimes) or one (Never) were considered non-adherent. Ninety-five (n = 19) percent had a score of 4; 5% (n = 1) had a score of 3.

Total score. The total score of the Hypertension-Adherence Survey was obtained by totalling the scores of each item of the tool. Higher score indicate greater adherence to the prescribed medication regimen. Scores between 33 and 132 were possible. The mean score was 115 ± 9. A score of 129 was obtained by one (5%) woman. Thirty percent (n = 6) had scores between 120 and 124. Thirty-five percent (n = 7) had scores between 116 and 119. Ten percent had scores of 105 (n = 2) and 112 (n = 2). Five percent scored 99 (n = 1) and 92 (n = 1).

Health Promoting Lifestyle Profile scores

The Health-Promoting Lifestyle Profile is made up 48 items (Pender et al., 1988). Each item was worth between one and four points. The items are divided into six subscales related to health promoting activities (see Appendix E for item numbers included in each subscale). These subscales are: self-actualization, health responsibility, exercise, nutrition, interpersonal support, and stress management. A total score and separate subscale scores were tallied. The mean scores, ranges, and total possible scores are given in Table 7 for total of all scales and each individual subscale of the Health Promoting Lifestyle Profile. Scores were summative, which meant that higher scores (for both the total and each subscale) reflected greater health-promoting behaviors.

Table 7

Scores from the Health-Promoting Lifestyle Profile

Scale Name	Mean Score	Range of Scores	Total Possible Points
Self-Actualization (13 items)	35 ± 9	18-52	52
Health Responsibility (10 items)	23 ± 5	15-31	40
Exercise (5 items)	9 ± 3	5-13	20
Nutrition (6 items)	16 ± 3	13-21	24
Interpersonal Support (7 items)	21 ± 4	15-28	28
Stress Management (7 items)	17 ± 5	11-28	28
Total All Scales (48 items)	121 ± 20	83-171	192

Self-Actualization subscale. The "Self-Actualization" subscale contained 13 items dealing with personal development and experiencing self-worth. Possible scores for this subscale were between 13 and 52. The mean score was 35 ± 9. One woman (5%) had a score of 52: one woman (5%) had a score of 50. Twenty percent (n = 4) had scores of 41 and 44. Thirty-five percent (n = 7) had scores between 30 and 36. Twenty percent (n = 4) had scores between 26 and 28. One woman (5%) had a score of 18. Data were missing on two women (10%).

Health Responsibility subscale. The "Health Responsibility" subscale had 10 items. These items dealt with accepting responsibility for one's health, seeking professional advice, and being educated about health. Possible scores for this subscale were between 10 and 10. The mean score was 23 ± 5. Fifteen percent (n = 3) had scores between 29 and 31. Twenty percent (n = 1) had a score of 26. Thirty percent (n = 6) had scores between 20 and 23. Thirty percent (n = 6) had scores between 17 and 19. Five percent (n = 1) had a score of 15. Data were missing on one woman.

Exercise subscale. The "Exercise" subscale contained five items that dealt with the frequency of participating in various types of exercise activities, including walking, bicycling, soccer, and routine exercise programs. Scores that were possible were between five and 20. The mean score

was 9 ± 3. One woman (5%) had a score of 13, two (10%) had a score of 12. Thirty-five percent (n = 7) had scores of 10 or 11. Thirty percent (n = 6) had scores between six and eight. Ten percent (n = 2) had scores of five. Data were missing on two women (10%).

Nutrition subscale. The "Nutrition" subscale had six items relating to frequency of eating meals, and selecting healthy foods. Possible scores were between six and 24. The mean score on this subscale was 16 ± 3. Fifteen percent (n = 3) had a score of 21 and 10% (n = 2) had a score of 20 or 19. Forty percent (n = 8) had scores between 15 and 17. Fifteen percent (n = 3) had a score of 14; another 15% (n = 3) had scores of 13. Data were missing on one woman.

Interpersonal Support subscale. The "Interpersonal Support" subscale contained seven items concerned with closeness and intimacy. Possible scores were between seven and 28. The mean score was 21 ± 4. One woman (5%) had a score of 28; one (5%) had a score of 27. Forty-five percent (n = 9) had scores between 21 and 25. Twenty percent (n = 1) had scores between 18 and 20; 15% (n = 3) had scores of 16 or 17. Ten percent (n = 2) had a score of 15.

Stress Management subscale. The "Stress Management" subscale was composed of seven items with a possible score of between seven and 28. The items addressed recognizing sources of stress and measures to control stress, such as meditation and relaxation. The mean score was 17 ± 5. One

woman (5%) had a score of 28. Fifteen percent (n = 3) had scores between 22 and 25, 30% (n = 6) had scores between 17 and 20, 35% (n = 7) had scores between 12 and 15. Two women (10%) had scores of 11. Data were missing from one woman.

Total Score. The total score was obtained by adding the score of all 48 items of the Health-Promoting Lifestyle Profile. Scores which were possible were between 48 and 192. One woman obtained the highest score of 171. Twenty percent (n = 4) had scores between 140 and 143. Ten percent (n = 2) had a score of 130 or 133, and 10% had a score of 125. Fifteen percent (n = 3) had scores between 115 and 118, 20% (n = 4) had scores between 107 and 109. Ten percent (n = 2) had a score of 100 or 103. One woman (5%) had a score of 99. The lowest score was 83, obtained by one woman (5%).

Relationship between Health-Promoting Behaviors and medication adherence

A purpose of this study was to describe the relationship between health-promoting behaviors and antihypertensive medication adherence. While ninety-five percent of the women indicated they were routinely adherent, scores on the HPLP ranged from 83 to 171. A Pearson's correlation was computed between demographic factors and each scale of the HPLP tool. The only significant correlation was a negative correlation (r=-.38) between the

number of children in the household and the total score on the HPLP (p=.046).

A Pearson's correlation was done between the subscale and total scores of the Hypertension-Adherence Survey and the subscale and total scores of the HPLP. No significant relationships were found between any of the scores.

The frequency score of taking medications ("I take my medication...", item 28 on the Hypertension-Adherence Survey) was positively correlated with two of the HPLP subscales. Those subscales were Health Responsibility (r=.456, p=.03) and Interpersonal Support (r=.507, p=.01). The phrase, "I take my medication as it is prescribed." (item 35 on the Hypertension-Adherence Survey) had a positive relationship (r=.582) with the Interpersonal Support subscale (p=.004).

The demographic factors on women with the highest (n = 4) and lowest scores (n = 3) on the HPLP were reviewed (Four women were included in the group with the highest scores because two women had the same score: see Table 8 for comparison of these groups). The distinguishing characteristics between those women with lowest scores and those with highest scores were the number of children at home, knowing their last blood pressure, and their history of CVD. Those with the lower scores had one child living at home and did not know their last blood pressure, even though the measurement had been taken within one month of the

survey. Women with the higher scores had no children living at home and did know their last blood pressure. Those women with lower HPLP scores reported "less severe" forms of CVD; women with higher scores had experienced a significant CVD event, utilizing the Veteran's Administration study's definition of significant CVD (Veteran's Administration, 1967). All other demographic information was diverse between the groups. All the women reported taking their medication as it was prescribed.

The mean values for the individual subscale scores were calculated for both groups of women. Women in the "low score" group had the highest mean score on both the Interpersonal Support and the Nutrition subscales (2.42), followed by the Self-Actualization (mean 1.92), Health Responsibility (mean 1.90), Stress Management (mean 1.76), and Exercise (mean 1.13) subscales. For women in the "high score" group, Self-Actualization was the highest mean score (mean 3.58), followed by the Interpersonal Support (mean 3.44), Stress Management (mean 3.33), Nutrition (mean 3.28), Health Responsibility (mean 2.72), and Exercise (mean 1.70) subscales.

Table 8

Comparison of demographic variables from respondents with lowest and highest scores on the Health-Promoting Lifestyle Profile

	HPLP Lowest Scores			HPLP Highest Scores			
Demographics	83	99	100	142	142	143	171
Age	48	39	45	50	50	42	44
Ethnic	C	C	C	C	C	C	C
Marital	D	NM	M	M	M	NM	D
# of children	1	1	1	0	0	0	0
Education	GED	None	HS	---	None	BA	HS
Job Title	None	None	HM	---	HM	Reporter	Bookkeeper
Work Hours per week	---	---	>50	---	20-24	>50	40-44
Income	$5K-9999	<$5000	$20K-29,999	---	$5K-9999	<$55000	$14K-16,999
Yrs HTN	5-6	≥7	≥7	3-4	3-4	1-2	≥7
SBP	---	---	---	128	140	136	120
DBP	---	---	---	82	80	90	90
Mos Last BP	≤1	<1	1	1	<1	<1	
Other CVD	Angina	---	CAD	Heart Surgery	Stroke	---	MI
Medication	Tenormin Cardizem	Tenormin	Diltiazem	HCTZ Calan SR	Vasotec Cardizem	No name Given	Tenormin
Insurance Coverage	100%	100%	80%	Co-pay	100%	None	None

Note. C = caucasian; M = married; D = divorced; NM = never married; HS = high school; BA = bachelors degree; HM = homemaker; K = 1000; Yrs HTN = years diagnosed with hypertension; Mos Last BP = months since last blood pressure taken; HCTZ = hydrochlorothiazide.

CHAPTER V

Discussion

The purpose of this study was to identify and describe factors that influenced medication adherence in hypertensive, middle-aged women. Identifying these variables would serve to assist the health care provider to intervene for enhancement of adherence. This chapter examines the results from the study. Limitations of the study are discussed. Implications for practice and recommendations for future research are presented. The chapter concludes with a summary of the findings.

Interpretation of results

Demographics

The main finding of this study suggests that adherence to an antihypertensive treatment regimen was not a problem for this sample of 20 middle-aged, hypertensive females. Demographic variables were obtained from the sample group to determine their relationship with adherence and health-promoting behaviors. These variables included: age, ethnicity, marital status, level of education, job title, total income for household, the number of children living at home. With the exception of finding a negative relationship between the number of children living in the household and the total score on the HPLP, no demographic factors had any significant relationship with adherence or the scores of any

subscale of either tool. These data do not support Pender's (1987; Walker et al., 1988) theory that demographic variables influence health-promoting behavior.

The mean age for this sample was 44 ± 4 years. It is unknown as to how this mean age was compares with several other sample populations in studies utilizing the HPLP, since data on ages were not included in their reports (Richter et al., 1987; Fleetwood & Packa, 1991). Walker and associates (1988) reported the ages of participants in their study on the health-promoting behaviors of 452 adults (ages 18 to 88 years, with a mean age of 42 years). They found that individuals over 54 years had higher total scores on the HPLP, as well as the subscales of health responsibility, nutrition, and stress management.

Ninety-five (n=19) percent of the women in the study were Caucasian. One woman (5%) was a native American. The fact that this sample group was so homogeneous probably explains the lack of correlations between ethnic background and all of the subscales of both tools. Studies involving minorities have yeilded mixed results on adherence rates (Rocella et al., 1986; Becker, 1976) and tended to report their minority findings in the categories of black and other (National Center for Health Statistics, 1986).

Forty-five percent of the women were married, 25% were divorced, 10% were widowed or separated, and 15% had never been married. Data on head of household was not obtained.

however seven women (35%), reported being a single parent (indicated by reporting divorced, widowed, or never married and listing a child living in the household).

Fifty percent of the sample had at least the equivalent of a high school diploma, while 10% had not earned a diploma. Forty percent had completed post-high school education, with only 15% earning a bachelors degree. The percentage of high school graduates in this study was higher (40% as compared to 26%) and post-high school education was lower (40% as compared to 70%) than in the study by Walker and associates (1988) on health-promoting behaviors. This study found no influence of education on any score of any total or subscale. Walker et al. (1988) did find a significant relationship between education and the nutrition ($p<.001$), interpersonal support ($p=.02$) and stress management ($p=.02$) subscales. In Fleetwood and Packa's (1991) study, all 520 participants (86% male) had earned at least a bachelors degree, although they found no relationship between this level of education and health promoting behavior. Additionally, they reported no relationship between age, marital status and race, and health promoting behavior.

The women were asked to list their job title and the hours they worked each week. Forty-five percent listed a job title (classified using the Hollinghead Index of Social Status Occupational Scale) indicating work outside of the

home. This percentage is less than the 57% national average employment rate for women (U. S. Bureau of the Census, 1990). Reported hours worked weekly ranged from under ten (dog obedience instructor) to over 50 hours (daycare provider and reporter). Twenty percent listed homemaker/housewife as a job title. Reported hours worked weekly by these women ranged from zero ("none outside the home" was written in by one woman) to over 50 hours. Thirty-five percent did not respond with a job title, but answered "none" or left the item blank. It is possible that these women did not have employment outside the home, and did not equate "housewife" as a "legitimate" job title. If that were true, 55% of the sample then would be housewives (not in the work force). Interestingly enough, of the seven women (35%) who did not list a job title, two reported working 40 to over 50 hours a week; five women did not respond to the work hours question. Another interesting finding was that only one woman listed housewife in addition to her outside-the-home job title (dog obedience trainer).

The participants were asked to indicate their level of income to assess if income level was a barrier to obtaining medication. There was no relationship between income and adherence, the Cost subscale of the Hypertension-Adherence Survey, or any subscale from either survey. Income from all sources was reported by 85% of the women. Thirty percent (n=6) had annual incomes of less than $10,000, 25% (n=5) had

incomes of between $10-19,000, and 30% (n=6) had incomes of $20,000 or greater. Results from the 1985 National Health Interview Survey (Rocella et al., 1986), support these findings for individuals with hypertension, although their participants had fewer people with incomes less than $10,000 (25%) and more people with incomes of $20,000 or greater (41%). Their sample group included men (43% of sample), however, which could explain the greater numbers in the higher income bracket.

The amount of insurance coverage for medication costs was not related to adherence, or any subscale on either tool. Fifty-five percent had at least 70% insurance coverage for medication. Twenty-five percent were involved in co-payment plans. Twenty percent either had no insurance, or their insurance did not cover the medication cost. While the expectation would be that lack of or inadequate insurance coverage would act as a barrier to adherence (Haynes, 1979), the amount of insurance could not be used to predict scores on either tool. In fact, the three women with the lowest scores on the HPLP had 80 to 100% insurance coverage; the four women with the highest scores had either no insurance, 100% coverage, or paid a five dollar co-payment.

The number of children living at home had a significant ($p=.05$) although relatively small negative correlation ($r=-.38$) with the total score on the HPLP, implying that health-

promoting behaviors decreased as the number of children living at home increased (none of the women reported having more than two children living at home). Unknown was the total number of children the women had (living both within and outside the home) and whether this factor would have had any influence on current or prospective behaviors. While no information relating the number of children in the household to adherence behaviors of the adult seem to exist, studies do exist on interpersonal support and adherence. Miller and colleagues (1985) investigated the relationships between the perceived attitudes and beliefs of others, and individual intentions to follow a prescribed medical plan with actual adherence to the regimen. Their study included 112 post-myocardial infarction subjects, ages 32 to 70 years, enrolled in cardiac rehabilitation programs. Medication adherence was not associated with the perceived attitudes and beliefs of significant others.

The finding of no relationship between demographic variables and adherence is supported by the literature, although past study results are often conflicting when evaluating these relationships. Hershey, Morton, Davis, and Reichgott (1980) found no relationship between age, gender, education, employment status and income, and reported medication adherence in 132 hypertensive patients. Bartucci, Perez, Pugsley, and Lombardo (1987) found no relationship between demographic variables (sex, age, race,

employment status and income) and medication adherence in a sample of 50 hypertensive patients. However, Vincent (1971) looked at compliance with a prescribed treatment regimen for glaucoma, and found women to be more compliant than men in the same age group (45 to 64 years of age).

Duration of high blood pressure was not associated with any of the subscales. The study by Hershey and colleagues (1980) supports this finding with similar data. In their study of 132 hypertensive men and women, Hershey et al. (1980) found no relationship between duration of the condition and medication adherence. However, only 43% of their sample had had high blood pressure for five or more years, compared to 70% in this study; 53% of their sample indicated having hypertension for less than five years, compared to 20% in this study.

Most women knew their last blood pressure (70%) with 50% and 40% having had it measured within one and two months, respectively, of completing the survey. Interestingly, those individuals having high HPLP scores were able to give their last blood pressure in contrast to those women with low HPLP scores who did not know their last blood pressure. It is possible that those women who documented a blood pressure simply wrote down what they thought it should be. Since their blood pressure was not measured by the investigator, nor was a question asked as to

who performed the measurement, the accuracy of these reports is unknown.

Adherence to medications

Eighty-five percent (n=17) of the women reported taking their medication exactly as it was prescribed. Fifty-five percent (n=11) took one medication, 35% took two different medications, and 10% took three medications. The frequency that the medications were prescribed ranged from once a day for each medication to combinations of one, two, and three times a day for those with more than one medication prescribed. Given the diversity in demographic data for this sample, no associations were found between adherence (from question 14 on the Hypertension-Adherence Survey) and the demographic variables. No relationship was found between adherence and the type of medication or the frequency it was prescribed, except for calcium channel blockers. The prescribed frequency for taking calcium channel blockers was found to be negatively correlated ($r=-.495$, $p=.04$) with the Forgetting subscale on the Hypertension-Adherence Survey. Thirty percent (n=6) of the individuals were taking calcium channel blockers, with half of them reporting a three-times-a-day prescribed and adhered to schedule, which could explain the negative relationship (increasing the frequency decreases forgetting one or more doses). Since this was the only significant relationship

out of five different drug categories, it is highly possible that this relationship occurred by chance.

The adherence rate for this study is high compared to the previous literature on this subject. Caldwell et al. (1970) reported a 50% adherence rate after the first year of an antihypertensive treatment program. Sackett (1976) has reported compliance rates for long-term medication therapy averages 54%.

Questions arise about the reliability of self-reported adherence. Gordis (1979) found in reviewing the methodology of measuring adherence, that variance from the self-reported to actual measure of adherence (based on pill counts or urine levels) ranged from 27% to 58% in those individuals that reported being compliant. However, interviews are considered an adequate, indirect measure to identify many non-compliers (Gordis, 1979; Hershey, 1980).

In the study by Hershey and colleagues (1980), participants were asked if they took their medication always, most of the time, some of the time, seldom or never. Eighty-two (62%) responded that they were always compliant. On a routine clinic visit with their physician, these people were asked how many pills they missed in an average week. Seventeen of the 82 who answered always in the first interview reported missing one or more pills each week. These individuals were subsequently re-classified as not

always compliant resulting in 49% compliant-always subjects and 51% not always compliant subjects.

Hypertension-Adherence Survey

The Hypertension-Adherence Survey was tool designed by the investigator which focused on the subject of hypertension and its control. This tool included questions about the type and frequency of prescribed medications, how often the individual took the medication, barriers to adherence (for example cost, side effects, and knowledge), and demographic information.

Seven subscales were determined from the 33-item survey. The subscales were: side effects, cost, lifestyle, forgetting, worth, knowledge, and risk. One question was scored separately because it dealt with the frequency that the individual took her medication. Ordinal measurements of frequency were used to maintain consistency with the response format of the HPLP.

A test-retest was completed by six study participants to determine this tool's reliability, since it had not been used previously. The correlation coefficients for the total and subscale scores of the Hypertension-Adherence Survey ranged from .478 to .997 (see Table 2). Overall, total scores as well as the subscale scores for this tool were very high.

Side-Effects subscale. Six items made up the "Side-Effects subscale, and were related to effects that could compromise medication adherence. Possible scores could range from 18 to 24. The mean score was very high at 23 ± 2. This mean score, as well as the high range of scores indicates that side-effects were either not experienced or did not interfere with taking medications as they were prescribed. "Not only are side effects infrequent for many medications but patients' complaints may not even be related to the drugs they are taking...Even when side effects are present it cannot be assumed that noncompliance will result" (Haynes, 1979, p. 60).

Cost subscale. The "Cost" subscale had two items related to the cost of medications as being a reason for non-adherence. With a score ranging from 4 to 8, and a mean value of 7 ± 1, cost was not considered to be a barrier to adherence for this group of women. Since most of the participants had insurance coverage, cost may truly not have been a consideration for these women.

Alpert (1964) found that patients who did not have insurance, were twice as likely to miss appointments than those with insurance. Battistella (1971) evaluated delay for initiating health care in 1345 person involved in a larger study on comprehensive pre-pay insurance. Although not statistically significant, those in a lesser income bracket had less delay in seeking health care than those in

a higher economic status. Additionally, those without insurance also delayed less in seeking health care. Delay was found to "occur more often among persons with a negative orientation to health and medical care" (p. 1348). While delay in seeking treatment does not imply less adherence to a treatment regimen, it does suggest a deficit in health-promoting behavior.

It should be stressed that this subscale was addressing only the monetary aspect of medication and was not designed to assess costs related to follow-up appointments, transportation to and from appointments, lost wages, or babysitting costs. If these items had been addressed in this subscale, it is quite possible that the range of scores would be increased (more scores with lower values) and the mean would decrease.

Lifestyle subscale. The "Lifestyle" subscale had the lowest mean score on the Hypertension-Adherence Survey. The mean score was 20 $\pm$ 2, with a range of scores between 16 and 24. This subscale sought information about family support for taking medication and the amount of interference that home and work activities had on medication adherence. The reason for the lower scores seems to be associated with several of the divorced women and one single woman reporting never receiving support from family members to take their medications, indicating that they are living away from their support systems, or that they have no living family members.

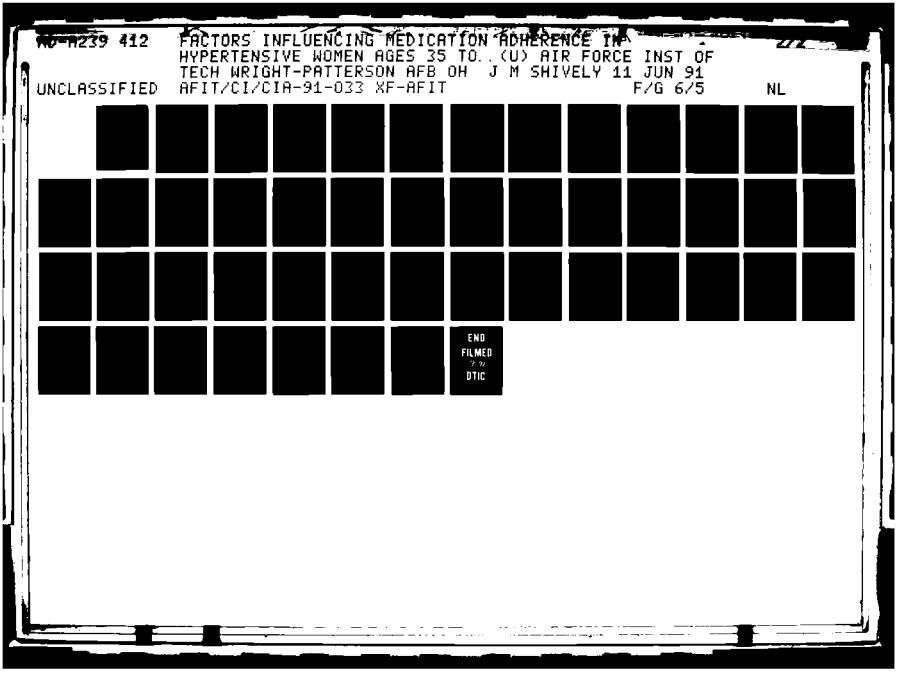
Work and home were not reported as interfering with taking medication.

Forgetting subscale. The "Forgetting" subscale dealt with reasons for forgetting to take medication. The mean score for this subscale was 19 ± 2, with scores ranging from 13 to 20. Getting prescriptions refilled on time was "sometimes" to "often" a problem for two women, although they reported taking their medication as it was prescribed. As a group, forgetting to take medications was not a problem for these women.

Worth subscale. The "Worth" subscale was designed to assess the value the individual placed on medication as an effective treatment for hypertension. The mean score was 21 ± 3, with a range of 15 to 24. These scores indicated that the women perceived taking medication as it was prescribed as important for the control of their blood pressure.

Knowledge subscale. The "Knowledge" subscale was used to assess the understanding of the purpose for medication adherence. The mean score was 11 ± 1, with a range in scores from nine to 12. These high scores indicate a good understanding of the importance of medication adherence.

At Risk subscale. The "At Risk" subscale asked the participants about the amount of worry they had about having high blood pressure and the risk for developing other cardiovascular problems in the future. It was difficult to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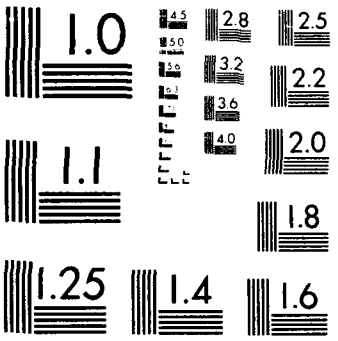

score the items of this subscale (using the ordinal measure) as to whether more worry about being at increased risk for other CVD was positive or negative. The investigator decided that worry (Often and Routinely) should be positively scored since the individuals are, in reality, at increased risk for experiencing further CVD. Subsequently, the mean score of 9 $\pm$ 1 and the range of six to 11 for this subscale were interpreted as the women having a moderate concern about their future health status, which would, according to Pender (1987), positively influence medication adherence (health-promoting behavior).

The Worth, Knowledge, and At Risk subscales complement one another and may be interdependent, although this relationship was not investigated. Haefner and Kirscht (1970) studied the effects of perceived susceptibility and perceived benefits for action on adopting certain health care practices among 166 non-academic, university employees. All the participants completed a questionnaire about their health beliefs, beliefs about illness and past actions taken for treating illness. Two experimental groups then viewed three films in different order on the risks for developing and preventative measures for cancer, heart disease, and tuberculosis. Eight months after viewing the films, all participants were reassessed. Those who saw the films scored higher on perceived susceptibility compared to the control group and the perceived benefits for taking action

was enhanced in the experimental group. The intention for taking preventative action was higher in the experimental groups; 57% of the experimental subjects had obtained a check-up within the first year after viewing the films compared to 39% of the control group. While the investigators were successful in changing the subjects' beliefs about health, simply altering these beliefs was not enough to sufficiently alter lifestyle habits and behaviors, such as stopping smoking or altering diet and exercise habits.

Frequency of medication taking. The question on frequency of medication-taking had a mean score of 3.95 ± 1. Ninety-five percent had a score of 4; 5% had a score of 3. This question had significant but small relationships with the total score on the Hypertension-Adherence Survey ($r=.414$, $p=.04$), and the Lifestyle subscale ($r=.450$, $p=.02$). Since higher total scores reflect greater adherence to the prescribed medication regimen, and higher scores on the Lifestyle subscale represent fewer barriers to medication adherence, these seem to be reasonable relationships.

Total score. Since the individual mean subscale scores were high, the high mean for the total of all the scale was expected. The mean score was 115 ± 9; the range was 92 to 129. Seventy percent of the women had scores of 116 or greater. The reported high adherence rate is supported by this total score, and the subscale scores. The lower

numbers in the range of the total score seems to stem not only from those who answered fewer items with "Routinely", but also from missing data (items left unanswered).

Adherence to a treatment regimen is necessary to attain results. Many factors have been studied in the past in an attempt to identify or predict those individuals most at risk for non-adherence to their regimens. This study was undertaken for just that reason. However, the main finding of this study suggests that adherence to an antihypertensive treatment regimen was not a problem for the middle-aged, hypertensive female. Perhaps being older has an influence on antihypertension medication adherence, even though statistical significance was not obtained. Walker and associates (1988) found that older age was associated with health-promoting behaviors.

Health Promoting Lifestyle Profile

The HPLP is composed of 48 items divided into six subscales related to health promoting activities (Pender et al., 1988). These subscales are: self-actualization, health responsibility, exercise, nutrition, interpersonal support, and stress management. Each item is scored from one to four, depending on the response. Scores were summative, which meant that higher scores (for both the total and each subscale) reflected greater health-promoting behaviors.

While the HPLP had been found to be reliable in the adult population (Walker et al., 1988), it had not been used previously in the hypertensive female population. Therefore, this tool was included in the test-retest packet and was completed by six study participants. The correlation coefficients for the total and subscale scores of the HPLP ranged from -.572 to .910 (see Table 2). The -.572 occurred on the Health Responsibility subscale. The only explanation for the negative correlation on this subscale was that data were missing from one retest individual, thus it may have been appropriate to exclude this retest from the reliability analysis.

In contrast to the high subscale scores on the Hypertension-Adherence survey, the maximum scores were reached on only three of the HPLP subscales (Self-Actualization, Interpersonal Support, and Stress Management).

Self-Actualization subscale. The "Self-Actualization" subscale assesses personal development and the experiencing of self-worth. The mean score on this subscale was 35 $\pm$ 9 (mean score per item was 2.69), with a range of scores between 18 and 52. The mean scores per item for this subscale ranged from 1.38 to 4. Generally speaking, those women with higher Self-Actualization scores, had higher total HPLP scores. Significant correlations with demographic variables were not established. However, the

frequency question ("I take my medication ...") on the Hypertension-Adherence Survey did have a small but significant relationship with the Self-Actualization subscale ($r=.456$, $p=.03$). Therefore, adherence appears to be related to behaviors associated with personal development and growth.

Walker and associates (1988) found a significant correlation ($p<.001$) between Self-Actualization, education, and age. Therefore, a negative relationship with education in the present study would have been expected since the overall education level for these women was less than in the Walker et al. (1988) study. In fact, there was no relationship found between education level and Self-Actualization. The study by Fleetwood and Packa (1991) also found no relationship for this subscale and education in a group whose education level was at least a bachelors degree, even though the mean for the Self-Actualization subscale (mean of 42 with a range of 13 to 52) in their study was higher than the mean for this study, as well as the study by Walker et al. (1988).

Age (over 54 years) was associated with higher scores on the Self-Actualization subscale in the Walker et al. (1988) study. The participants for the present study were not over 50 years of age, which could explain the lack of a relationship.

Health Responsibility subscale. The "Health Responsibility" subscale dealt with accepting responsibility for maintenance of health. Items addressed seeking information about one's health, knowing blood pressure and cholesterol levels, and becoming educated on health issues. The mean score of 23 ± 5 was just over half of the total possible points for this subscale (40 points were possible). The range of scores was between 15 and 31. There was no correlation with demographic variables. The main reason for the low mean score seemed to stem from the women not participating in health care education (reading about or attending programs on health issues). Women tended to know their blood pressures and cholesterol levels. They also reported seeking medical advice as needed.

Exercise subscale. The "Exercise" subscale had the lowest mean score of all the subscales. Twenty points were possible. The mean was 9 ± 3, with a range of 5 to 13. Regardless of the total score on the HPLP, this subscale ranked last among the subscales for all the women in the study. The conclusion from this data was that these women were not involved in any routine form of exercise. Stephens, Jacobs, and White (1985) reviewed eight national surveys conducted in the United States and Canada between 1972 and 1983 for patterns of leisure activity. Twenty percent of the studies' population exercised with an intensity and frequency that is recommended for

cardiovascular benefit; 40% exercised at a moderate intensity with less frequency; at least 40% were considered sedentary. These investigators also found that activity decreases with age, with the largest decline occurring in young adulthood. These findings support the lack of exercise in this sample of middle-aged women.

Nutrition subscale. Items on the "Nutrition" subscale dealt with the frequency of eating meals and selecting healthy foods. The mean score was 16 $\pm$ 3. This subscale ranked fourth in the HPLP subscales for those with highest total HPLP scores; it was one of the two highest subscale scores for those with the lowest total HPLP scores. It should be noted however, that mean score per item was 3.3 for the highest total HPLP score group and was 2.42 for the group with the lowest total HPLP scores. Education level and income were varied in both the high total and low total groups, so that these variables did not appear to have influenced the participant's nutritional practices. Interestingly, those women with higher HPLP scores appeared to have more advanced CVD (history of myocardial infarction, stroke and open heart surgery) compared to those women with lower HPLP scores (history of no other CVD, angina, and CHD). As expected, those women with higher total HPLP scores and advanced CVD, reported paying more attention to dietary practices (eating three meals a day, reading food

labels, and including fiber in diet) than those with lower total HPLP scores.

Interpersonal Support subscale. The "Interpersonal Support" subscale scores ranked second among women with high total HPLP scores and was one of the top subscale scores among women with low total HPLP scores. The highest score possible was 28, achieved by one woman. The mean score was 21 ± 4, with a range of 15 to 28. Since items of this subscale dealt with relationships and social interaction, it was not surprising to find the lowest scores among those women who were single parents (subscale scores of 15 and 17), or did not work outside the home (subscale scores of 15 and 16).

Stress Management. The "Stress Management" subscale items addressed recognizing the sources of stress in one's life as well as utilizing measures to reduce stress. The mean score was 17 ± 5; scores ranged from 11 to 28 (total possible was 28). There was no relationship found between the scores on this subscale and the demographic variables, however, the influence of children was present in the lives of women with lower subscale scores. One woman had a score of 28; she was divorced with no children and worked as a bookkeeper 40-44 hours a week. Three women had scores of 11. All three women were single parents with only one working outside the home. One woman had a score of 12, was

married and had no children, but worked over 50 hours a week as a daycare provider.

Total score. The total score was determined by adding the scores of all 48 items of the HPLP, making scores of 48 to 192 possible. The highest score attained was 171; the lowest was 83. The mean score was 121 ± 20. This mean was slightly lower than other studies which included men in their samples (Fleetwood and Packa, 1991; Walker et. al, 1988). Duffy (1988), in a study of determinants of health promoting behavior in 262 mid-life (35 to 65 years of age) women, did not report the mean for the total score on the HPLP. She found that the only demographic variable that correlated with health-promoting behavior was post-high school education ($p=.03$). The data from this study do not support Duffy's findings (1988).

Summary of findings

The purposes of this study were to describe the health-promoting behaviors of women 35 to 50 years of age, describe the reported adherence to antihypertensive medication, describe the relationship between the health-promoting behaviors and antihypertensive medication adherence, and describe factors that influenced medication-taking. Twenty hypertensive women, ages 35 to 50 years of age, completed two surveys: the Hypertension-Adherence Survey, developed by the investigator, and the Health-Promoting Lifestyle

Profile (HPLP), developed by Pender (1982). These surveys were used to obtain data on medication adherence, assess possible obstacles to adherence, determine health-promoting behaviors, and obtain demographic information.

The Health Promotion Model was the theoretical framework utilized in this study. This model, developed by Pender (1982), has its roots in the Health Belief Model and social learning theory, as well as many other theories (Pender, 1987). In brief, health promotion activities focus on the individual moving toward (positive direction) better health and increased well-being. Knowledge and perceptions influence the likelihood of health-promoting actions. Factors which modify the impact of knowledge and perceptions include demographic and biological characteristics, interpersonal influences, and situational and behavioral variables (Pender et al., 1988).

Adherence to medication was viewed as a health promoting behavior since the individual would be demonstrating actions associated with increasing his level of well-being by incorporating this positive behavior into his lifestyle. As Bartucci and associates (1987) pointed out, "adherence to a therapeutic regimen may also be influenced by the individual's motivation and modifying and enabling factors..." (p. 245).

This descriptive study was undertaken to determine factors that influence antihypertensive medication adherence

in middle-aged women, as well as to describe this sample population's health-promoting behaviors. The only significant correlation found between demographic variables and the scores from the HPLP was a negative correlation (r=-.38) between the number of children in the household and the total score on the HPLP (p=.05). Overall, data from this study supported other studies findings of no significant relationships between demographic variables and the scores from the HPLP (Richter et al., 1987; Duffy, 1988; Fleetwood and Packa, 1991).

Of interest was the finding that those women with the lowest HPLP scores had one child living at home, did not know their last blood pressure, and reported "less severe" forms of CVD. Women with higher scores had no children living at home, knew their last blood pressure, and had experienced a significant CVD event, as defined by the Veteran's Administration (1967).

Since all the women but one reported taking their medications at as prescribed, it could be concluded that either no barriers exist for these women for this behavior (which seems highly unlikely) or that they truly do perceive more benefits from medication adherence, which serve to counteract the barriers. Given the diversity of demographic variables over the range of total HPLP scores, and the fact that no significant relationships were found between medication adherence, demographic variables, and the total

score on the HPLP, the latter conclusion seems the most likely.

The frequency score of taking medications ("I take my medication ...", item 28 on the Hypertension-Adherence Surveh) was positively correlated with two of the HPLP subscales. Those subscales were Health Responsibility (r=.456, p=.03) and Interpersonal Support (r=.507, p= .01). The phrase, "I take my medication as it is prescribed", (item 35 on the Hypertension-Adherence Survey) had a positive relationship (r=.582) with the Interpersonal Support subscale on the HPLP (p=.004).

Cognitive and perceptual factors influence individual health-promoting behaviors (Pender, 1982). To adhere to the prescribed medication regimen, the individual must perceive benefits for engaging in this behavior. According to the Health-Promotion Model, if the perceived benefits outweigh the perceived barriers, the individual should realize the value of controlling their blood pressure and adhere to taking their antihypertensive medication as prescribed. The medication may provide control of their blood pressure, and can decrease morbidity and mortality. The adherence behaviors of this sample demonstrate the incorporation of positive actions associated with increasing one's level of well-being (Pender, 1987). Taking the medication as prescribed is then, a health-promoting behavior.

Limitations

Several compounding factors were identified that could have negatively affected the conclusions from this study. The sample group was very small and homogeneous, all being contacted from inpatient records, and on the cardiology or medicine services of a local Seattle hospital. This factor alone prevents the ability to generalize the findings to other populations. Since they had been inpatients at one time, and for the most part, for some type of cardiovascular-related illness, adherence to a treatment regimen could have been paramount in the minds of these women to ward off progression of further CVD. "The presence of physical symptoms probably exerts an elevating or "realistic" effect on perceived severity, motivating the patient to follow the physician's instructions as long as the organic indications of illness persist (or to avoid their recurrence)" (Becker, 1986, p. 44).

The tools chosen for this study could also have limited the results this study. The Hypertension-Adherence Survey used the same type of ordinal choices and scoring methods as the HPLP for consistency. However, there was difficulty in scoring many items on the Hypertension-Adherence Survey, using this format. For example, an answer of "Routinely" on the item, "I worry that I could hav a heart attack," could be viewed as a positive or negative perception on the part of the individual. A positive view would indicate the

person felt at increased risk, and would therefore participate in promoting their level of health and wellness. If worry was meant as negative for the individual, the person may not have enough knowledge of interventions for reducing his or her risk.

The meanings of "Often" and "Routinely" may have been too similar to accurately discriminate medication adherence. However, the participants had the opportunity to document the "prescribed" and "actually taken" frequencies of their medication schedules. In this study, "Often and "Routinely" did reflect the reported adherence rate.

Perhaps the greatest limitation to the study was utilizing a mailed questionnaire. It is quite possible that only those women who are adherent actually returned the survey. Gordis (1979) points out that non-compliers, even though they are identified as "at-risk," may not utilize screening programs, or if they do, may not adhere to the subsequent medical advice or treatment. There is also the possibility that "reactivity" to being studied ("Hawthorne effect"), the novelty of being in a study, or that exposure to a tool which measures behaviors and thus enhances those behaviors, could have affected the reported adherence results (Woods, 1988).

Adherence for this study was measured indirectly using self-reporting. It was not an aim of this study to identify those who were or were not adherent. Conducting pill counts

or measuring medications levels from laboratory specimens would have provided a direct measure for validating adherence.

Implications for practice

Understanding factors that influence an individual's health-promoting behaviors is important in designing therapeutic regimens that foster adherence. The findings from this study suggest that individualizing regimens may be an important factor for the enhancement of adherence to medication. Children within the household had a negative influence health-promoting behaviors in this sample. Evaluating the impact that children have on the adherence behavior for each individual is indicated. It is quite clear that interventions need to include an assessment of home-life, in particular, the number of children living at home. Also, education on exercise needs to be provided, as well as avenues for accomplishing the establishment of a routine exercise program (for example, considering accessibility and day care).

Implications for future research

Further research on health issues for women is implied from this study. Larger sample sizes with greater heterogeneity are needed in order to generalize findings about health-promoting behaviors in hypertensive women.

Developing the Hypertension-Adherence Survey into a

more qualitative, interviewing tool is suggested; changing the ordinal choices into open-ended questions about the impact of medication adherence on an individual's life-style and placing a limit for how often they take medication (i.e. in the last month, how many times did you miss a dose of medication) could possibly elicit more quantitative information.

Designing a study to compare actual (measured) adherence with reported adherence in relation to HPLP scores would yield accurate adherence results. Furthermore, prospective studies are needed to assess if the impact of modifying factors change over time for women, or if levels of impact are specific for different life stages. Assessing the barriers to obtaining treatment should also be included, for example, the frequency of needing refills, waiting times for appointments, health care provider relationships, lost time from work to keep appointments, and the need for childcare during appointments.

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Appendix A

Study Surveys
Hypertension-Adherence Survey
Health Promoting Lifestyle Profile

DIRECTIONS: Please circle the letter under each item that best describes you. Fill in the blanks when appropriate.

1. Year you were born: _____

2. What is your ethnic group?

   A. Caucasian/White
   B. Black
   C. Hispanic/Mexican American
   D. Asian
   E. Native American Indian
   F. Other: _____

3. What is your present marital status?

   A. Married
   B. Divorced
   C. Separated
   D. Widowed
   E. Never Married
   F. Common-law
   G. Living Together

4. How many children live with you?

   A. 1
   B. 2
   C. 3
   D. 4
   E. 5 or more
   F. None

5. List ages of all the children living with you.

6. What is the highest degree you have earned?

   A. High School Diploma
   B. GED
   C. Associate Arts Degree
   D. Bachelors Degree
   E. Masters Degree
   F. Doctoral Degree
   G. Vocational Training Certificate
   H. No Degree

7. What is your job title?

8. How many hours do you work each week?

A. Under 10 hours
B. 10-14 hours
C. 15-19 hours
D. 25-29 hours
E. 30-34 hours
F. 35-39 hours
G. 40-44 hours
H. 45-49 hours
I. 50 hours or more

9. Counting all sources of income, what was your total family income during 1989?

A. Less than $5000
B. $5,000 to $9,999
C. $10,000 to $13,999
D. $14,000 to 16,999
E. $17,000 to $19,999
F. $20,000 to $29,999
G. $30,000 to $39,999
H. $40,000 to $49,999
I. $ Over $50,000

10. How long ago were you diagnosed with high blood pressure?

A. Under 1 year ago
B. 1-2 years ago
C. 3-4 years ago
D. 5-6 years ago
E. 7 or more years ago

11. What was your last blood pressure? _____

12. How long has it been (in months) since you had your blood pressure taken? _____

13. Have you been diagnosed with other cardiovascular disease? (Circle all that pertain to you or fill in the blank).

A. Heart Attack (Myocardial Infarction)
B. Stroke
C. Sudden Cardiac Arrest
D. Other: _____

14. Please write in the box below the name of each medication you are taking for your blood pressure, how often it is prescribed, and how often you actually take the medication.

Prescribed Medications For Hypertension	How Often Medication Is Prescribed	How Often Medication Is Taken

15. What portion of the cost of your medication is covered by your insurance?

A. 100%
B. 80%
C. 50%
D. None
E. Other _____%
F. I do not have health insurance

The following statements can be reasons why people do and do not take blood pressure medications. Indicate the frequency that each statement pertains to you by circling:

N for Never
S for Sometimes
O for Often
R for Routinely (indicates all of the time)

	Never	Sometimes	Often	Routinely
16. Medications are too expensive	N	S	O	R
17. The medication gives me headaches	N	S	O	R
19. I forget to take my medication	N	S	O	R
20. The medication makes me dizzy	N	S	O	R
21. I get nauseated from my medication	N	S	O	R
2 I forget to get the prescription refilled	N	S	O	R

23.	The medication does not seem to work	N	S	O	R
24.	I worry about having high blood pressure	N	S	O	R
25.	My life-style interferes with taking my medication	N	S	O	R
26.	It bothers me when I forget to take my medication	N	S	O	R
27.	Work interferes with taking my medication	N	S	O	R
28.	I take my medication... (how often)	N	S	O	R
29.	It's alright to skip my medication	N	S	O	R
30.	My family encourages me to take my medication	N	S	O	R
31.	My medication gives me too many side-effects	N	S	O	R
32.	The cost of my medication keeps me from refilling my prescription	N	S	O	R
33.	It is important to me to take my medication	N	S	O	R
34.	I get headaches from my medication	N	S	O	R
35.	I take my medication as it is prescribed	N	S	O	R
36.	My medication controls my blood pressure	N	S	O	R
37.	My medication makes me nauseated	N	S	O	R
38.	Controlling my blood pressure is important to my health	N	S	O	R
39.	Work keeps me too busy to take my medication	N	S	O	R
40.	I get my prescription filled on time	N	S	O	R
41.	I forget to take my medication when I'm at work	N	S	O	R
42.	I have control over my life	N	S	O	R
43.	High blood pressure interferes with my lifestyle	N	S	O	R

44.	I worry that I could have a stroke	N	S	O	R
45.	I'm too busy at home to remember to take my medication	N	S	O	R
46.	I forget when I'm suppose to take my medication	N	S	O	R
47.	I worry that I could have a heart attack	N	S	O	R
48.	I understand why I am taking medication	N	S	O	R

HYPERTENSION ADHERENCE SURVEY/J. SHIVELY, 1990

LIFESTYLE PROFILE

DIRECTIONS: This questionnaire contains statements regarding your present way of life or personal habits. Please respond to each item as accurately as possible, and try not to skip any item. Indicate the regularity with which you engage in each behavior by circling: N for Never, S for Sometimes, O for Often, or R for Routinely.

		Never	Sometimes	Often	Routinely
1.	Eat breakfast	N	S	O	R
2.	Report any unusual signs or symptoms to a physician	N	S	O	R
3.	Like myself	N	S	O	R
4.	Perform stretching exercises at least 3 times per week	N	S	O	R
5.	Choose foods without preservatives or other additives	N	S	O	R
6.	Take some time for relaxation each day	N	S	O	R
7.	Have my cholesterol level checked and know the results	N	S	O	R
8.	Am enthusiastic and optimistic about life	N	S	O	R

9.	Feel I am growing and changing personally in positive directions	N	S	O	R
10.	Discuss personal problems and concerns with persons close to me	N	S	O	R
11.	Am aware of the sources of stress in my life	N	S	O	R
12.	Feel happy and content	N	S	O	R
13.	Exercise vigorously for 20-30 minutes at least 3 times per week	N	S	O	R
14.	Eat 3 regular meals a day	N	S	O	R
15.	Read articles or books about promoting health	N	S	O	R
16.	Am aware of my personal strengths and weaknesses	N	S	O	R
17.	Work toward long-term goals in my life	N	S	O	R
18.	Praise other people easily for their accomplishments	N	S	O	R
19.	Read labels to identify the nutrients in packaged food	N	S	O	R
20.	Question my physician or seek a second opinion when I do not agree with recommendations	N	S	O	R
21.	Look forward to the future	N	S	O	R
22.	Participate in supervised exercise programs or activities	N	S	O	R
23.	Am aware of what is important to me in life	N	S	O	R
24.	Enjoy touching and being touched by people close to me	N	S	O	R
25.	Maintain meaningful and fulfilling interpersonal relationships	N	S	O	R
26.	Include roughage/fiber (whole grains, raw fruits, raw vegetables) in my diet	N	S	O	R

27.	Practice relaxation or meditation for 15-20 minutes daily	N	S	O	R
28.	Discuss my health care concerns with qualified professionals	N	S	O	R
29.	Respect my own accomplishments	N	S	O	R
30.	Check my pulse rate when exercising	N	S	O	R
31.	Spend time with close friends	N	S	O	R
32.	Have my blood pressure checked and know what it is	N	S	O	R
33.	Attend educational programs on improving the environment in which we live	N	S	O	R
34.	Find each day interesting and challenging	N	S	O	R
35.	Plan or select meals to include the "basic four" food groups each day	N	S	O	R
36.	Consciously relax muscles before sleep	N	S	O	R
37.	Find my living environment pleasant and satisfying	N	S	O	R
38.	Engage in recreational physical activities (such as walking, swimming, soccer, bicycling)	N	S	O	R
39.	Find it easy to express concern, love and warmth to others	N	S	O	R
40.	Concentrate on pleasant thoughts at bedtime	N	S	O	R
41.	Find constructive ways to express my feelings	N	S	O	R
42.	Seek information from health professionals about how to take good care of myself	N	S	O	R
43.	Observe my body at least monthly for physical changes/danger signs	N	S	O	R
44.	Am realistic about the goals that I set	N	S	O	R
45.	Use specific methods to control my stress	N	S	O	R

46. Attend educational programs on personal health care	N	S	O	R
47. Touch and am touched people I care about	N	S	O	R
48. Believe that my life has purpose	N	S	O	R

Appendix B

Survey Cover Letter

Dear _____:

My name is Joyce Shively. I am a graduate student in the School of Nursing at the University of Washington. I am conducting a study titled, "Factors Influencing Medication Adherence in Hypertensive Women, Ages 35 to 50 Years." The purpose of this study is to describe the relationship of health-promotion behaviors with blood pressure medication adherence.

Your name was obtained from the medical records of the University of Washington Medical Center. Dr. J. Ward Kennedy, Director of the Division of Cardiology, has granted me permission to contact you for the purposes of describing my study to you in detail, and to invite you to participate in this study.

The information gathered in my research may assist health workers to understand current issues for women with high blood pressure, and may provide valuable assistance in designing programs to reduce problems in the control of high blood pressure.

Enclosed is a survey which will require about 15 minutes of your time to complete. The survey asks some general background questions, your beliefs about health and high blood pressure, and seeks information on some aspects of your lifestyle which may affect the control of your blood pressure. The survey does not seek information about areas of your life generally considered highly sensitive or personal.

You will remain anonymous and at no time will your name ever be attached to any of the information. The sole use of this information is for my research. The information gathered with the survey will be available only to myself and my faculty advisors, and will be retained for a period of three years. Your participation in the study will be kept confidential. A copy of the final research results will be available in the University of Washington Health Sciences Library.

Participation is completely voluntary on you part, and without payment. There is no cost to you. Filling out the survey is the sole extent of your participation. Some participants will be randomly selected to complete a second survey for reliability testing of this survey.

If you are interested in participating in this study, please complete the survey and return it in the enclosed stamped envelope. You may omit any questions which you do not wish to answer. Do not place any identifying information on the survey itself or on the mailing envelope. Completing the survey implies consent to participate in the study. If you do not wish to participate in the study, simply return the unanswered survey in the enclosed stamped envelope.

If I have not heard from you within two weeks, I will telephone you to remind you about the survey.

Your participation in this study is greatly appreciated. Thank you for your time in completing the survey. Should you have any questions regarding the study, please contact me at the phone number listed below.

Sincerely,

Joyce M. Shively, R.N.
Graduate Student
Department of Physiological Nursing
University of Washington
Seattle, WA 98195
(206) 362-4372

Marie Cowan, Ph.D. R.N., FAAN
Professor, Physiological Nursing
School of Nursing
University of Washington
Seattle, WA 98195

Cover letter for second Survey

Dear _____:

Thank you for filling out the survey for my study titled, "Factors Influencing Medication Adherence in Hypertensive Women, Ages 35 to 50 Years". Your participation is this study is greatly appreciated.

I told you in my previous letter that some participants would be sent a second survey to complete, in order to test the reliability of the survey. Your name was randomly selected from the list of participants to do just that.

I have enclosed a copy of the same survey which you filled out previously. After completing the survey, return it in the enclosed stamped, addressed envelope. Please, do not try to remember how you answered the previous survey items; answer the survey questions as if this were the first time you had seen the survey. This is a test of the survey, and not a test of your ability to remember how you responded previously.

Again, let me reiterate that you will remain anonymous and at no time will your name ever be attached to any of the information. Participation is completely voluntary on your part, and without payment. There is no cost to you. Completing the survey implies consent to participate in the study. You may omit any questions which your do not wish to answer. Do not place any identifying information on the survey itself or on the mailing envelope.

Let me express my thanks again to you for taking the time to participate in this study, not just once but twice. Should you have any questions regarding the study, please contact me at the phone number listed below.

Sincerely,

Joyce Shively, R.N.
Graduate Student
Department of Physiological Nursing
University of Washington
Seattle, WA 98195
(206) 362-4372

Appendix C

Oath of confidentiality

UNIVERSITY OF WASHINGTON

Confidentiality Agreement

on study entitled "Factors Influencing Medication Adherence in Hypertensive Women, Ages 35 to 50"

Date: June 18, 1990

This is an agreement between:

Joyce M. Shively, Graduate Student, Department of Physiological Nursing

Marie Cowan, Professor, Department of Physiological Nursing

and the: University of Washington Human Subjects Review Committee

for use of records maintained by: University of Washington Medical Center.

A. The above-named investigators and associates have submitted an application identified by the above title and assigned application no. 20-641-E by the reviewing committee (copy appended). The application describes the study, including its purpose and the information to be collected. It also describes the provisions for confidentiality and for the security of individually-identifiable records and record information as approved by the above-named committee on 7-3-90.

B. The above-named investigators and associates will report and publish research findings and conclusions in a manner that does not permit identification of subjects of the records. Research reports and publications will not include photographs or visual representations contained in the personal records.

C. The above-named investigators and associates will destroy the individual identifiers associated with the records or record information as soon as the purposes of the research project have been accomplished and will notify the agency to this effect in writing. These actions will be taken no later than 21 June 1993.

D. The above-named investigators and associates will not disclose the records or record information in individually-identifiable form except (1) to the research professionals indicated on page one of this confidentiality agreement; (2) under the terms of the provisions indicated in Section 4 of Chapter 334, Laws of the 1985 Regular Session; (3) to representatives of the review committee that has the responsibility for monitoring, auditing, and reviewing the activities and methods of the research professionals engaged in this study. It is also understood that the Attorney General's Division and the Human Subjects Division will be notified of all requests for disclosure of information.

E. A violation of any disclosure restrictions is a gross misdemeanor and may result in a civil penalty of not more than ten thousand dollars ($10,000) for each violation, under the provisions of Section 5 of Chapter 334, Laws of the 1985 Regular Session.

F. This study design shall not be altered in any form without the written approval of the review committee and the negotiation of a new, legally-binding confidentiality agreement.

G. In the event the investigators or associates fail to comply with any terms of the agreement, the review committee has the right to take such action as it deems appropriate, including termination of this agreement. If the agreement is terminated, the investigators and/or associates will immediately relinquish all information to the review committee, including materials derived from this information.

The commitments made in the foregoing statements are hereby acknowledged and accepted:

Investigators' and Associates' names	Investigators' and Associates' signatures	Date
Joyce M. Shively	Joyce M. Shively	June 21, 1990
Marie J. Cowan	Marie J. Cowan	June 21, 1990

Accepted on behalf of the University of Washington:

Helen McGough | 7-3-90

Helen McGough, Program Manager — Date
Human Subjects Division, Grant and Contract Services

Appendix D

Frequency of answers per Survey Question

Section A. Items in this section were scored as follows:
Never (N)=4 Sometimes (S)=3 Often (O)=2 Routinely (R)=1
M=Missing data

		Number of responses in each category:				
		N	S	O	R	M
(From Hypertension-Adherence Survey)						
16.	Medications are too expensive.	15	3	2	0	
17.	The medication gives me headaches.	17	1	1	0	1
19.	I forget to take my medication.	12	6	2	0	
20.	The medication makes me dizzy.	17	2	0	0	1
21.	I get nauseated from my medication	18	1	1	0	
22.	I forget to get the prescription refilled	17	2	1	0	
23.	The medication does not seem to work	14	5	0	0	1
24.	I worry about having high blood pressure	5	12	2	1	
25.	My life-style interferes with taking my medication	16	3	1	0	
27.	Work interferes with taking my medication	17	2	1	0	
29.	It's alright to skip my medication	17	2	1	0	
31.	My medication gives me too many side-effects	15	4	1	0	
32.	The cost of my medication keeps me from refilling my prescription	17	3	0	0	
34.	I get headaches from my medication	18	1	0	0	
37.	My medication makes me nauseated	18	1	1	0	
39.	Work keeps me too busy to take my medication	16	4	0	0	
41.	I forget to take my medication when I'm at work	13	4	1	0	2

	Number of responses in each category: N	S	O	R	M
43. High blood pressure interferes with my lifestyle	11	9	0	0	
44. I worry that I could have a stroke	2	16	1	1	
45. I'm too busy at home to remember to take my medication	16	3	1	0	
46. I forget when I'm suppose to take my medication	18	2	0	0	
47. I worry that I could have a heart attack	5	12	3	0	

Section B. Items in this section were scored as follows:
Never (N)=4 Sometimes (S)=3 Often (O)=2 Routinely (R)=1
M=Missing data

(From Hypertension-Adherence Survey)	Number of responses in each category: N	S	O	R	M
18. Medications are too expensive	1	2	5	12	
26. It bothers me when I forget to take my medication	3	12	2	3	
28. I take my medication... (how often)	2	0	1	17	
30. My family encourages me to take my medication	9	4	2	5	
33. It is important to me to take my medication	0	0	3	17	
35. I take my medication as it is prescribed	0	1	2	17	
36. My medication controls my blood pressure	0	3	3	13	1
38. Controlling my blood pressure is important to my health	1	0	2	16	1
40. I get my prescription filled on time	1	1	4	13	1
42. I have control over my life	3	8	3	6	
48. I understand why I am taking medication	0	0	3	16	1

(From Health-Promoting Lifestyle Profile)	Number of responses in each category: N	S	O	R	M
1. Eat breakfast	2	7	1	9	1
2. Report any unusual signs or symptoms to a physician	0	5	4	10	1
3. Like myself	1	10	3	5	1
4. Perform stretching exercises at least 3 times per week	9	5	3	2	1
5. Choose foods without preservatives or other additives	2	9	6	2	1
6. Take some time for relaxation each day	3	6	4	6	1
7. Have my cholesterol level checked and know the results	5	7	2	5	1
8. Am enthusiastic and optimistic about life	1	9	5	4	1
9. Feel I am growing and changing personally in positive directions	3	10	4	3	
10. Discuss personal problems and concerns with persons close to me	1	7	8	4	
11. Am aware of the sources of stress in my life	0	4	9	7	
12. Feel happy and content	0	9	8	3	
13. Exercise vigorously for 20-30 minutes at least 3 times per week	6	9	3	2	
14. Eat 3 regular meals a day	4	6	5	5	
15. Read articles or books about promoting health	3	12	5	0	
16. Am aware of my personal strengths and weaknesses	0	2	7	7	
17. Work toward long-term goals in my life	3	9	4	1	
18. Praise other people easily for their accomplishments	0	2	10	9	

		Number of responses in each category: N	S	O	R	M
19.	Read labels to identify the nutrients in packaged food	3	9	5	3	
20.	Question my physician or seek a second opinion when I do not agree with recommendations	2	14	4	2	
21.	Look forward to the future	0	9	6	5	
22.	Participate in supervised exercise programs or activities	15	5	0	0	
23.	Am aware of what is important to me in life	1	4	8	7	
24.	Enjoy touching and being touched by people close to me	1	5	7	7	
25.	Maintain meaningful and fulfilling interpersonal relationships	1	7	7	5	
26.	Include roughage/fiber (whole grains, raw fruits, raw vegetables) in my diet	0	1	11	8	
27.	Practice relaxation or meditation for 15-20 minutes daily	6	6	4	4	
28.	Discuss my health care concerns with qualified professionals	1	9	6	4	
29.	Respect my own accomplishments	1	7	8	4	
30.	Check my pulse rate when exercising	11	5	13	2	
31.	Spend time with close friends	0	5	13	2	
32.	Have my blood pressure checked and know what it is	0	6	4	10	
33.	Attend educational programs on improving the environment in which we live	15	4	1	0	
34.	Find each day interesting and challenging	1	9	6	4	
35.	Plan or select meals to include the "basic four" food groups each day	0	6	11	3	
36.	Consciously relax muscles before sleep	5	9	3	3	

		Number of responses in each category: N	S	O	R	M
37.	Find my living environment pleasant and satisfying	1	6	8	5	
38.	Engage in recreational physical activities (such as walking, swimming, soccer, bicycling)	3	9	5	3	
39.	Find it easy to express concern, love and warmth to others	0	5	10	5	
40.	Concentrate on pleasant thoughts at bedtime	1	12	3	1	
41.	Find constructive ways to express my feelings	0	15	3	2	
42.	Seek information from health professionals about how to take good care of myself	4	12	3	1	
43.	Observe my body at least monthly for physical changes/danger signs	3	10	3	1	
44.	Am realistic about the goals that I set	1	9	8	2	
45.	Use specific methods to control my stress	4	10	1	2	
46.	Attend educational programs on personal health care	15	5	0	0	
47.	Touch and am touched people I care about	1	6	7	6	
48.	Believe that my life has purpose	1	9	3	7	

Appendix E

Hypertension-Adherence Survey

Scoring Instructions

Subscale	Items
Part A. Side Effects	17, 20, 21, 31, 34, 37
Part B. Cost	16, 32
Part C. Lifestyle	25, 27, 30, 39, 42, 43
Part D. Forget	19, 22, 41, 45, 46
Part E. Worth	18, 23, 26, 33, 35, 36, 40
Part F. Knowledge	29, 38, 48
Part G. At risk	24, 44, 47
Part H. Frequency	28

Scoring

Never (N) = 1
Sometimes (S) = 2
Often (O) = 3
Routinely (R) = 4

Health-Promoting Lifestyle Profile

Scoring Instructions

Total Scale	Items
Health-Promoting Lifestyle	1 to 48

Subscale	Items in Subscale
Part A. Self-actualization	3, 8, 9, 12, 16, 17, 21, 23, 29, 34, 37, 44, 48
Part B. Health Responsibility	2, 7, 15, 20, 28, 32, 33, 42, 43, 46
Part C. Exercise	4, 13, 22, 30, 38
Part D. Nutrition	1, 5, 14, 19, 26, 35
Part E. Interpersonal Support	10, 18, 24, 25, 31, 39, 47
Part F. Stress Management	6, 11, 27, 36, 40, 41, 45

Scoring

Never (N) = 1
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Appendix F

Permission letters for use of copyright material

Joyce M. Shively

April 24, 1991

Edward J. Roccella, PhD
Coordinator
National Heart, Lung and Blood Institute
Box 120/80
Bethesda, MD 20892

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Author: 1988 Joint National Committee
Title: The 1988 Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure.
Journal: Archives of Internal Medicine, 148(5), (pp. 1024, 1028), 1988.

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Sincerely,

Joyce M. Shively

Joyce M. Shively, RN, CCRN
Graduate Student
University of Washington

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Ambulatory Cancer Clients Project
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February 26, 1990

Joyce M. Shively, B.S.N., R.N.

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Best wishes with your study.

Sincerely,

Susan N. Walker

Susan Noble Walker, Ed.D., R.N.
Associate Professor and
Co-Director, Health Promotion Research Program

Encl.