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High Blood Pressure and Interpersonal "Disengagement": A Study of Maladaptive Coping Styles and Ameliorative Treatments

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HIGH BLOOD PRESSURE AND INTERPERSONAL "DISENGAGEMENT":
A STUDY OF MALADAPTIVE COPING STYLES
AND AMELIORATIVE TREATMENTS

by

Paul J. Minsky

A Dissertation Submitted to the Faculty of the Graduate School
of Loyola University of Chicago in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy

February

1978

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VITA

The author, Paul J. Minsky, is the second son of Harry R. Minsky and Elizabeth-Sylvia Edals. He was born on the twentieth of February, 1949, in Boston, Massachusetts.

His elementary education was obtained in the public schools of Boston, and secondary education at the Boston Latin School.

In June, 1968, he received the degree of Bachelor of Science, cum laude, from Brandeis University. His double major in Physics and Psychology was the first in the University's history. Attending Brandeis University as a Commonwealth of Massachusetts Scholar, he was elected a member of Phi Beta Kappa in 1968.

Following a Public Health Service appointment at the National Institute of Mental Health, he was granted an assistantship in Psychology at the Walter S. Hunter Laboratory, Brown University, in September, 1968. Upon being awarded the degree of Master of Science in Psychology in June, 1971, he was elected a member of Sigma Xi, and became a student member of the American Psychological Association.

In September, 1972, he was awarded an assistantship in Psychology at Loyola University of Chicago, and received subsequent training awards through the U.S. Veterans Administration in Illinois and California. In 1977, he was elected a member of the San Francisco Academy of Hypnosis and the American Society of Clinical Hypnosis.

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For there is nothing either good or bad,
but thinking makes it so.

Hamlet, II, ii

INTRODUCTION

Plan of the Literature Review

The present investigation is an exploration of some of the psychological factors and non-drug treatments of essential hypertension. One of these important factors is thought to be how hypertensives deal with stress. Thus, the study investigates the defensive coping dispositions of hypertensive patients, and compares their coping styles with those of normotensive patients. An attempt is then made to reduce high blood pressures by application of a new adjunctive treatment utilizing specific cognitive imagery. The effectiveness of this treatment is compared with that of more traditional muscle relaxation approaches. Such treatment approaches are gaining increased attention in contemporary society as the trend grows away from exclusive reliance on pharmacological agents. In the final part of the study, individual response differences to the treatment approaches are explored based on several personality variables.

An enormous literature exists which deals with numerous aspects of the complex problem of essential hypertension, or high blood pressure. This review will present some of the major areas of research, with a primary focus on those areas most relevant to the present study.

The review is organized into several sections. First, an overview of the extent and seriousness of the problem is presented. Next, some important theoretical issues and problems are reviewed, as follows: problems of definition; non-organic factors; psychosocial

factors; psychological factors. Finally, the last section briefly considers the important applied problem of hypertension treatment.

Several general investigative areas stemming from the review are then discussed. These issues are presented along with their associated experimental hypotheses to be tested in the present investigation.

Overview of the disorder. Hypertension, or high blood pressure, is a problem of major proportion in the United States. It is considered by some medical researchers to be the most important affliction producing disability and death among adults in our country (Stamler, 1974). Kannel and Dawber (1973) note that hypertension is one of the most potent precursors of coronary heart disease, stroke, and congestive heart failure. These cardiovascular diseases constitute the major underlying cause of death in the United States. Hypertension also may be the most chronic disease in the world (Mendlowitz, 1973).

Estimates from the National Health Survey of 1962 and local surveys put the number of Americans with hypertension at between twenty million and twenty-six million, or about one in every ten (Freis, 1973). In a comprehensive overview of the epidemiological problems of hypertension, Stamler (1973) has pointed out that at any given time, the majority of persons with hypertension are non-symptomatic. Yet, they have markedly greater risks than normotensives (persons without hypertension) of experiencing major cardiovascular events with resultant chronic illness and disability. Economic costs associated with this illness and disability have been estimated to be on the order of billions of dollars.

Defining hypertension. The above discussion referred primarily to primary or essential hypertension, which is without specific known cause. Secondary hypertension, which can be attributed to known organ system dysfunction, constitutes a small minority of cases, some five to ten percent (Doyle, 1960). The present study will consider only the more prevalent and poorly understood cases of essential hypertension.

In addition to the important clinical question of distinguishing primary from secondary hypertension (Kim, 1973), perhaps an even more basic issue exists. This is the question of whether or not essential hypertension really is a distinct entity and should be treated as such. Pickering believes that blood pressure level is determined by a multiplicity of environmental and genetic factors, all fundamentally of equal importance and all basically operating independently (Thomas, 1973).

Pickering (1973) has concluded that there is no evidence for a dividing line between normotensive and hypertensive blood pressure levels. Thus, essential hypertension represents not a disease entity, but rather that section of one general population with pressures higher than an arbitrarily selected value. Hence, Pickering believes that the relationship between blood pressure level and morbidity is quantitative---the higher the pressure, the worse the prognosis.

Contrarily, as discussed by Thomas (1973), Platt thinks that heredity is the main cause of essential hypertension. Thus, blood pressure levels are not distributed over one general population, but over three distinct sub-populations. These three sub-populations are determined by a hypertensive gene which exhibits incomplete dominance

thusly, according to Platt (1963): One sub-population is composed of persons who do not inherit the gene from either parent. These persons are homozygous for normotension, and their blood pressure rises little or not at all with age. The second sub-population is composed of persons who inherit the gene from one parent and have the heterozygous form of hypertension. In these persons, blood pressures rise moderately with age. The third sub-population is composed of persons who inherit the hypertensive gene from both parents. Such persons have the homozygous form of hypertension, and their pressures rise markedly with age.

Hence there has been a great deal of controversy over the meaning of the shapes of the distribution curves of blood pressure levels found in different studies. There is only general agreement that blood pressure levels are skewed toward high levels, and that this skewing increases with age (Thomas, 1973).

Geiger and Scotch (1963) have reviewed the numerous approaches attempting to establish the limits of normal and abnormal blood pressure levels. The authors have noted such problems as differences in measurement techniques. An historical review of the methods of blood pressure recording has been presented by Benson (1973). Labarthe, Hawkins, and Remington (1973) also have evaluated recently developed devices for blood pressure measurement.

Some specific blood pressure levels in millimeters of mercury (mm Hg) have been established by several committees to define abnormal limits clinically (Geiger & Scotch, 1963). The limits usually include both the systolic and diastolic blood pressure values. These values refer to the maximum and minimum values of blood pressure which can be recorded at any point in the arterial system (Pickering, 1968).

More recently, however, somewhat more attention has been given to the diastolic pressure alone in specifying clinical treatment criteria. Freis (1973) has recommended criteria for hypertension treatment based on a weighted point system. This approach considers the average diastolic pressure over three successive clinic visits, with 90 mm Hg being the cut-off value. In addition, the patient's age, sex, race, organ damage, and possible parental hypertensive complications, all are considered as well. For example, since it has been found that hypertension is more prevalent and more severe in Black Americans than White Americans, this factor of race would be weighted in the decision to implement long-term treatment.

Non-Organic factors. The inclusion by Freis (1973) of such weighting or risk factors to determine treatment criteria for hypertension reflects the fact that no single biochemical defect has yet been found to cause hypertension. Thus, while the search for this organic cause continues (e.g., Onesti, Kim, & Moyer, 1973), much research has been generated concerning other possible variables involved in the etiology of hypertension.

Results of the research on such variables as genetic, socio-cultural, and psychological factors often have been controversial and inconclusive (Dollery, 1973; Geiger & Scotch, 1963). For example, as noted above, one dispute concerns whether or not hypertension exists as a distinct inherited disease, and thus is determined by a small number of specific genes (e.g., Platt, 1967), or whether hypertension is not clinically distinct from high normal ranges of blood pressure, and thus is determined by a multiplicity of environmental and genetic

factors (e.g., Pickering, 1968). The basic issue of the genetic patterns in hypertension thus remains unresolved despite generally strong evidence for familial factors (Schweitzer, Clark, Gearing, & Perera, 1962; Thomas, 1973). A review of the other two non-organic factors to be considered, sociocultural and psychological, follows, in separate sections below.

Socio-Cultural factors: Perception of the environment. Numerous studies have been carried out attempting to examine the sociocultural and psychosocial aspects of hypertension. In a major review of the literature, Scotch and Geiger (1963) noted that numerous unresolved issues of methodology and definition surrounding the epidemiological study of hypertension prevented definite conclusions from being drawn. The authors concluded that the data concerning such variables as geography, race, age, sex, urban vs. rural residence, diet, occupation, etc., did not support a crucial role for these social factors. Yet, at the same time, the authors noted that the data could not easily rule out such factors. In fact, the studies were viewed as having yielded consistent suggestions of the important involvement of social factors in disease etiology.

Henry and Cassel (1969) reviewed additional epidemiological data. The authors placed great emphasis on the etiological role of psychosocial stimulation and adaptive early experiences for hypertension development. From their analysis of age-related blood pressure data from 18 world-wide studies, the reviewers concluded that pressure is lower where cultures are stable, traditions maintained, and group members secure in established, adapted roles. Thus, the analysis related

the incidence of hypertension to social disruption where difficulties of organism adaptation occurred.

The authors also concluded that repetitions of emotionally stressful situations were very important causal factors in essential hypertension (Henry & Cassel, 1969). The proposed mechanism for this process was thought to involve repeated arousal of the defense alarm response. This response entails interrelated autonomic, vascular, and hormonal functioning (Folkow & Rubinstein, 1966; Mason, 1974).

Following Henry and Cassel's review (1969), MacCulloch (1972) elaborated on the mechanisms involved. Based on the research of Lacey and Lacey (1970), MacCulloch suggested neurophysiological mechanisms of blood pressure control. The work of Lacey and Lacey, while not without controversy (e.g., Hahn, 1973), has shown that blood pressure rises under environmental conditions in which an organism desires to insulate itself from noxious and unwanted social stimuli.

The perception of environmental stimuli as noxious or threatening must entail appraisals of the stimuli. A reactive attempt at insulation from the appraised threat, and associated cardiovascular response, might be considered the organism's attempt to cope with the threat. This process of coping with threats and ensuing stress will be discussed within the next section of the review, which deals with general psychological factors in hypertension.

Psychological factors. In one of the early appraisals of the literature, Glock and Lennard (1957) considered psychological factors related to hypertension to fall within three areas: characteristics making up a hypertensive personality, specific conflicts in hypertensives, and conditions of stress. The authors concluded that

psychological factors did play a role in the onset or development of hypertension. However, the evidence was too weak to permit definite and specific conclusions.

Wolf's (1961) review emphasized that strikingly similar personality patterns of hypertensives could be gleaned from literature reports. These patterns, which concern ways hypertensives seem to view life and cope with problems, have long and consistent histories in the literature (Scotch & Geiger, 1963; Wolf, 1961). A tendency to inhibit and suppress strong emotions, particularly aggressive feelings, is one of the most persistently emerging features of the "hypertensive personality" (Alexander, 1939; Davies, 1971; Wolf, 1961).

Most recent reviewers, however, have concluded with justification that serious issues can be raised concerning the often non-objective methods employed, and the serious methodological weaknesses found in studies supporting the suppressed hostility hypotheses (Davies, 1971; McGinn, Harburg, Julius, & McLeod, 1964). Cochrane (1972, 1973) thus concluded that there was insufficient evidence of specific personality traits which are causally related with hypertension. The author pointed out that hypotheses relating personality correlates to hypertension remains a confused area of concern.

Cochrane's (1971) review of the literature led him to believe that there is an important link between perceived environmental stress and essential hypertension. However, the author later noted in passing that hypotheses investigating the relationships between stress and hypertension had received little direct support (Cochrane, 1972).

Treatment for hypertension. Major advances have been made in the

treatment of hypertension through the application of a variety of drugs (Finnerty, 1973; Freis, 1973). However, available anti-hypertensive medications are far from ideal, and may contribute to patient non-compliance (Bullpit & Dollery, 1973; Freis, 1973; Grenfell, Briggs & Holland, 1963; Jacobson, 1964). It is estimated that less than half of the hypertensives in this country are being treated. Moreover, less than half of those treated patients are being treated with any degree of success (Stamler, 1973).

GENERAL INVESTIGATIVE AREAS

Integration of Psychosocial and Psychological Factors

Background. Part of the confusion and lack of support for psychological factors in hypertension may stem not only from experimental methodological weaknesses but from other problems. Attempts to examine hypertension from either the personality-correlate-conflict viewpoint, or the stress experience viewpoint, also may contribute to the confusion. These separate approaches historically have been taken in hypertension research (Cochrane, 1972; Glock & Lennard, 1957; Harris & Forsyth, 1973). Scotch and Geiger (1963) warned of the limited clinical usefulness in distinguishing between such factors as personality correlates and experienced stress.

The interrelatedness of the factors of personality, perception of the environment, and stress, is reflected in the transactionally-oriented approach of Singer (1974). Her recently espoused approach to psychophysiological problems emphasizes the levels of engagement-involvement in which an organism interacts with his environment and their concomitant physiological costs.

Based upon her years of work in interdisciplinary research, Singer (1974) speculates that each person appears to have at any given moment an estimable level of engagement to non-engagement with his fellow man, his surroundings, and his inner self. In addition, everyone has a preferred level of engagement on a longer term basis. Attention, alertness, activation, arousal, affect, and changes in responsiveness are

all mentioned as integral components of the engagement-involvement or transactional phenomenon. However, the phenomenon is difficult to define precisely because engagement-involvement always occurs in a multidimensional context. Thus, engagement-involvement varies in intensity, direction, and duration. According to Singer, engagement-involvement is that central phenomenon which suggests a person is locking into, actually investing in a transaction, in its internal and external aspects.

Short-term changes in these levels of engagement-involvement seem to be detectable and ratable with regard to outward behavior with other persons, events, and surroundings, as well as with regard to levels of responsiveness to inner states, memories, and ideas (Singer, 1974). It is these short-term features which can be rated in particular settings and at specific time periods for attempted correlations with physiological indices. These more rapidly changing levels of engagement-involvement might be termed the current "responses", whereas the longer-term qualities, a person's average range, might be termed his preferred "style" of engagement-involvement.

Singer (1974) suggests that each day most persons informally note their own levels of engagement-involvement at various points, noting perhaps the changes in levels more than the levels per se. Thus persons detect their becoming "turned on" and invested in inner or outer transactions, or notice that such a period has subsided with subsequent return to the regular level of being. For example, involvement can entail pleasure in creative thinking, newly alerted anguish, acute intense worry, feelings of being pressured by time limits and outside

demands; or, it can be an equally turned on but pleasurable engagement-involvement with others in a social affair or watching a football game.

Persons rise above and fall below their average levels of engagement, but each person establishes his own range of expectable engagement-involvement which can be said to be characteristic of him most of the time (his style, as noted above). In various research settings, attempts are made to rate both this seeming characteristic level as well as transient changes to more or less invested levels, and the physiological impact which these levels have. Thus, Singer (1974) reviews the work of several research groups who studied cardiovascular responses during continuous physiological monitoring (e.g., Hardyck, Singer, & Harris, 1962; Innes, Millar, & Valentine, 1959; Weiner, Singer, & Reiser, 1962; Williams, Kimball, & Williard, 1972). She concludes that the efforts to match specific affect qualities in portions of interviews with specific physiological patternings were futile, "as theory would predict from a transactional viewpoint which would say that the amount of engagement-involvement and not the content of the communication per se would be the crucial variable" (Singer, 1974, p. 5).

In addition, Singer notes the work of Friedman, Rosenman, and Jenkins with the Type A and Type B behavior patterns (Friedman & Rosenman, 1974; Jenkins, 1971). These are two enduring but contrasting "styles of personality". Type A persons are said to be characterized by their involvement in a chronic, incessant struggle to achieve more and more in less and less time, whereas Type B persons may be said to be more "mellow". These contrasting styles can be studied eventually in terms of following their levels of engagement-involvement in the

persons so labeled, and following associated bodily costs (Singer, 1974). Thus, Singer aptly points out that, from the work of Greene (Greene, Conron, Schalsh, & Schreiner, 1970; Greene, Goldstein, & Moss, 1973; Greene, Moss, Goldstein, Levey, & Klein, 1972) and Engel (1967, 1968, 1971), detecting periods of marked disengagement in the Type A individual might help to predict critical episodes in body functioning (or malfunctioning) in such persons.

The behavioral descriptions of the Type A and Type B persons (Friedman & Rosenman, 1974), in relation to patterns of their cardiovascular functioning (Jenkins, 1971; Jenkins, Hames, & Zyzanski, 1969; Jenkins, Zyzanski, Rosenman, & Cleveland, 1971; Zyzanski & Jenkins, 1970), appear to deal with what Singer considers the extent and intensity of engagement-involvement which these persons typically or stylistically display (Singer, 1974). And thus certain personality styles may be more physiologically costly to given persons than other styles might be:

In the absence of Type A Behavior Pattern, coronary heart disease almost never occurs before seventy years of age, regardless of the fatty foods eaten, the cigarettes smoked, or lack of exercise. But when this behavior pattern is present, coronary heart disease can easily erupt in one's thirties or forties. (Friedman & Rosenman, 1974, p. 9)

Singer (1974) expresses it thusly:

For instance, given certain genetic propensities, the particular vicissitudes of one person's life, plus the way his personality unfolds and is molded by experiences, that person may develop habitual personal styles of transacting which are very costly given his physiological propensities whereas certain other personality features might have helped him weather life changes with more equanimity and less personal cost. (p. 13)

Citing Mason (1968), Singer suggests that "patterns of cost" may also be detected on a psychoendocrine level in relation to different

behavioral patterns over extended time periods (cf. MacCulloch, 1972); and that it might be useful to think of personality patterns as chronic adaptations. Such adaptations, or habitual personal styles of transacting may in fact be maladaptive.

Singer's transactional approach is not inconsistent with the psychosocial hypotheses emphasized by such authors as Henry and Cassel (1969) and MacCulloch (1972). The transactional contexts of Singer (1974), and the perceived environmental threat notions of the psychosocial theorists, both pertain to how hypertensives perceive and respond to potentially threatening environmental events. This process of appraising and reacting to stress refers to a psychology of coping.

Research on the psychology of coping has been one of the primary concerns of Lazarus and his co-workers (Lazarus, Averill, & Opton, 1974). Their theoretical framework stresses the importance of cognitive appraisals of environmental situations in determining coping behaviors. In recognizing the breadth of the concept of coping, they regard it as an individual's problem solving efforts when the demands he faces are highly relevant to his welfare, and when these demands tax his adaptive resources. The situations faced by the individual may be of considerable jeopardy or promise to him (Lazarus et al., 1974).

At present, there is no adequate system for classifying and describing varieties of coping processes. They may comprise primarily overt behavioral acts such as avoiding and escaping danger, attacking, seeking allies, or taking alternative paths to a goal. Other forms of coping process may emphasize cognitive activities such as seeking knowledge; or coping may be largely intrapsychic, e.g., Freudian defense

mechanisms (Freud, 1937/1966; Lazarus et al., 1974).

A central theme which Lazarus and his co-workers stress is that coping represents a transaction between the individual and his environment. The authors note that the coping behaviors and/or intrapsychic processes that take place certainly depend on the nature of the environmental threat, challenge, frustration, or potential for gratification. Coping responses thus are attempts to actualize some promise, remove the organisms from jeopardy, and/or reduce unpleasant emotions, which themselves may be threatening (Lazarus et al., 1974). Thus Lazarus and his co-workers also emphasize the mediating cognitive process of appraisal and the importance of environmental perceptions which distinguish the potentially harmful from the potentially beneficial or irrelevant. The coping processes which ensue are the responses to these perceptions of threatening conditions and of potential solutions or means of mastery.

The authors distinguish between two main modes of coping, those which fundamentally entail direct action on the self or the environment, and those which function primarily through intrapsychic processes (though they are not mutually exclusive). This distinction is made as it might be important in investigating the conditions determining the choice of coping process. The determining conditions should vary not only among the forms of coping within the two major modes, but also between the modes themselves both for individuals or for groups of individuals. The appraisal processes, by means of which the potential outcomes of situations and related coping efforts are judged, depend on several important factors. These include the environmental situations,

the belief systems, cognitive styles, and other personal dispositions of the individual which have developed over his lifetime.

As one example in the discussion of the psychology of coping, the authors note that in the case of severe injury, the individual may be relatively helpless to cope directly with the harm, and thus direct action on the environment has little value. However, the possibility of direct action on the self may remain, as when the inevitable harm can somehow be mitigated by learning new skills to counteract a disability. When avenues leading to direct action on the self and the environment are closed (or perceived/appraised as closed), the individual relies on intrapsychic coping processes (Lazarus et al., 1974).

Attempts have been made to investigate the cognitive processes of transactional-coping appraisal through many research strategies (Lazarus et al., 1974). One of these approaches entails the manipulation of coping appraisal by election of research subjects based on differences in personality or predispositions to cope in particular ways. Thus, in a study by Speisman, Lazarus, Mordkoff, and Davison (1964), subjects viewed a disturbing film, called Subincision, portraying primitive manhood initiation rituals. Three experimental sound tracks were used to manipulate perception/appraisal: The "trauma" sound track emphasized emotionally disturbing elements of the ritual; "denial" asserted that no significant pain or distress resulted; and "intellectualization" encouraged a detached and intellectualized view of the film events. Two kinds of subjects were contrasted, those disposed to employ repressive-denial forms of defense, and those likely to use intellectualizing defenses. Results based on autonomic measures and self-

reports indicated more stress reduction for "deniers" as a result of the denial sound track than as a result of the intellectual one. "Intellectualizers" demonstrated more stress reduction as a result of the intellectualization sound track than they did in response to the denial one. Thus, there was an interaction between the effects of the prophylactic treatment (sound track) and the personality disposition to utilize one or the other defense (Lazarus et al., 1974).

Andrew (1970) utilized this same principle in her investigation of patients undergoing minor surgery. The effects of detailed information about the patient's illness and the strategy of surgery on his recovery depended on the patient's defensive personality disposition. Recovery from surgery was more rapid or impaired depending on personality variables.

Dispositional-personality variables are thus conceptualized as one major source of variance contributing to the variability of any set of coping responses (Lazarus et al., 1974). The other variables are the varieties of coping responses themselves, and the environmental situations. In sum, like the psychosocial theorists discussed previously, Lazarus and his fellow researchers embrace a theoretical framework stressing the importance of appraisal in determining coping behaviors. Appraisal is a function of both situational and personality variables, and expresses the transaction between the individual and the environment. However, despite its theoretical importance, there has been very little empirical research done directly to investigate the problem of hypertension from a psychology of coping, transactional perspective.

Problem. The first major purpose of the present study was to

examine the coping processes of hypertensives from an environmental appraisal viewpoint. In so doing, the examination attempted to integrate the theoretical positions of Henry and Cassel (1969), Lacey and Lacey (1970), MacCulloch (1972), Singer (1974), and Lazarus et al. (1974). From a consideration of their positions, it is proposed that essential hypertension stems to a large extent from an organism's habitual attempts to disengage from environmental transactions. These transactions are perceived and appraised by the organism as noxious and stressful, and disengagement ensues. Such disengagement is viewed as a "passive" coping process. Consequently, it may be characterized by global defenses like denial and repression. These defenses, for purposes of the present analysis, are considered to contrast with more "active" defenses like projection and displacement (Caine, 1960; Lesser, 1958; Peak, Muney & Clay, 1960). These mechanisms are believed to entail more affective energy expression.

The division of defenses into two (or more) contrasting types or "defensive polarities" often has been utilized in personality research (e.g., Byrne, 1964; Rapaport, 1967; Welsh, 1956). And as noted above, this approach also has been recently used in coping-process research (Andrew, 1970; Cohen & Lazarus, 1973; Goldstein, 1973; Speisman, et al., 1964). Lazarus et al. (1974) point out that the research on defensive polarities utilizes personality assessment instruments. As such, the approach emphasizes the dispositional attributes which lead to a defensive coping response, rather than the in vivo response per se.

This approach, utilizing personality assessment measures to reflect contrasting coping dispositional defenses, was employed in the

present study. Global defenses, denial and repression, and contrasting defenses, projection and displacement, thus were operationally defined by their scores as measured on the Defense Mechanism Inventory (Gleser & Ihilevich, 1969). The DMI consists of 10 short stories presenting typical problem situations in everyday life. These potential conflict situations are considered representative of environmental demands. Hence, the DMI itself operationally defines the environmental situations. Response alternatives also are presented by the Inventory, and thus the environmental transactions were also operationally defined by the DMI itself. In addition, a more general measure of "active-passive" coping style was assessed. This stylistic disposition was assessed by and hence operationally defined by scores on a Coping-Avoider Sentence Completion Test (SCT). This technique has been utilized in recent coping process research (Andrew, 1970; Goldstein, 1973). Details of the assessment instruments are discussed in the Methodology chapter of this study. However, in sum, higher scores on the DMI scales TAO (Turning Against Object) and PRO (Projection), operationally defined greater "active" coping defenses; while higher scores on DMI scales REV (Reversal), TAS (Turning Against Self) and PRN (Principalization), operationally defined greater contrasting "passive" coping defenses. These "passive" defenses reflect such mechanisms as denial and repression, while the "active" defenses reflect mechanisms like displacement and projection (Gleser & Ihilevich, 1969). Similarly, higher scores on the SCT operationally defined greater "active" coping style, while lower scores defined more "passive" coping style. Therefore, the following hypotheses tested whether or not hypertensives may indeed utilize more

denial and repression than normotensives in their environmental transactions, less projection and displacement than normotensives in environmental transactions, and are generally more passive copers than normotensives in environmental transactions:

Experimental hypotheses.

1. Hypertensives score significantly higher than normotensives on DMI scales REV, TAS, and PRN.
2. Hypertensives score significantly lower than normotensives on DMI scales TAO and PRO.
3. Hypertensives score significantly lower than normotensives on the SCT.

Adjunctive Treatments

Background. As discussed previously, anti-hypertensive medication has not completely resolved treatment problems. The utilization of muscular relaxation, yogic, and meditative techniques in treating hypertension along with drugs has been gaining recent attention in the literature (Benson & Wallace, 1972; Datey, Deskmukh, Dalvi, & Vinekar, 1969; Patel, 1973). However, application of muscular relaxation is not really a new treatment approach (Jacobson, 1939). The renewed and increased interest may stem from the findings of researchers utilizing biofeedback techniques (e.g., Miller, 1974) for hypertension treatment. These researchers have recognized the importance of cognitive and personality variables as affecting the biofeedback process (Miller, 1974; Schwartz & Shapiro, 1973). The development of alternative modes of achieving better control of cardiac functions has thus been urged (Blanchard & Young, 1973).

One such alternative approach has been developed by Simonton (1972; Note 1) in the treatment of cancer. Simonton's method utilizes direct cognitive imagery and bodily relaxation adjunctive to traditional radiation therapy. This approach is reported to be significantly more effective than radiation-chemotherapy used alone in the treatment of cancer (Simonton, 1972; Note 1).

Problem. Simonton's approach may contribute to an important adjunctive treatment in the case of hypertension. Consequently, his treatment techniques warrant careful application and comparison with more traditional adjunctive relaxation methods. These more usual general procedures utilize suggested images referring to pleasant scenes,

while Simonton's directed images refer to specific processes as cancer cells being attacked in the body.

Because hypertensives may utilize "passive" coping methods as hypothesized, general relaxation techniques may serve especially well as psychologically acceptable "passive" coping behavior. However, because hypertensives are required to "engage" in the relaxation process itself, it may be construed as an adaptive, "active" coping mechanism. The more "active" this process is, e.g., with specific directed images, the more engaging and adaptive it might be. These considerations lead to the experimental hypotheses below.

Experimental hypotheses.

4. Hypertensives on medication treated adjunctively with either directed or general images and relaxation lower their diastolic blood pressures significantly more than a control group of hypertensives on medication not so treated adjunctively.
5. Hypertensives on medication treated adjunctively with directed images and relaxation lower their diastolic blood pressures significantly more than hypertensives on medication treated adjunctively with general images and relaxation.

Individual Differences in Response to Treatment

Background. It has been noted above that biofeedback researchers have recognized the importance of personality variables in affecting the efficacy of biofeedback treatment processes. Simonton also has found individual response differences in his treated cases as well. Hence it is important to delineate some of the possible personality dimensions that might account for individual responsiveness or success with adjunctive treatments. Such investigation might contribute to the development of useful predictive measures for recommending adjunctive treatment.

Problem. The ability to actually utilize relaxation instructions and specified imagery is expected to vary among hypertensives. An attempt to account for differences in ability to "actively engage" in adaptive coping mechanisms was made based on some relevant personality dispositions. The dispositions which were explored were degree of active-passive coping style itself, absorption, locus of control, and trait anxiety. Investigation of these traits was exploratory as their application to coping styles has received very little attention in the literature.

The more "active" a hypertensive's coping style was, the more he was expected to utilize successfully the adjunctive treatments. Some indications in the literature suggest that the other three traits may modulate or be related to the development of coping styles. Hence, they also were expected to be related to the successful utilization of adjunctive treatments.

Absorption is a trait which recently has been proposed and

explored by Tellegen and Atkinson (1974). The authors interpret absorption as a disposition for having experiences of "total" attention that fully engage one's cognitive representational resources. Imaginal processes are subsumed under this interpretation. Consequently, the absorption trait may be an important factor in the utilization of the relaxation-images treatments.

Fiske and Pearson (1970) have summarized Rotter's (1966) reports on the internal-external locus of control variable. Their review indicated that "high Internals" took steps to improve their environmental conditions. High Internals also have been reported to have more active commerce with their environments (Lefcourt & Wine, 1969), and to employ more task-oriented coping mechanisms (Locke, 1975). Hence, those hypertensives who are characterized by high internal control might be more active copers and so better utilize adjunctive treatments.

State and trait anxiety measures (Spielberger, 1966) were examined to follow up some relevant literature reports. Forrest and Kroth (1971) found that low trait anxiety subjects had predispositions to respond to stress with increased diastolic blood pressures. This finding suggested to the authors that low trait anxiety subjects had not developed adequate coping mechanisms. Hence, one might expect that low trait anxiety characterizes hypertensives, especially those hypertensives least able to utilize adjunctive treatments. In addition, Johnson and Spielberger (1968) have reported that anxiety state measures declined significantly in response to relaxation training procedures with psychiatric patients. Similar changes in anxiety state measures might be expected in hypertensives. Those hypertensives who are the most active copers might show

the most significant declines in state anxiety over the course of adjunctive treatment.

The personality variables discussed above were operationally defined by their assessed scores on associated psychometric indices, as follows: (a) "Active" coping style was scored by the previously discussed Coper-Avoider Sentence Completion Test (SCT). The higher the score on this scale, the more active coping disposition was indicated, and the lower the score, the more passive coping disposition was indicated. (b) Absorption was scored by a scale developed by Tellegen and Atkinson (1974) for their Differential Personality Questionnaire. The higher the score, the more of the absorption trait was indicated. (c) Internal-external control was scored by Rotter's I-E Locus of Control Scale (Rotter, 1966). The higher the score, the more external control and the less internal control was indicated. (d) Trait anxiety and state anxiety measures were scored by two separate scales on the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970). The higher the scores on the two scales, the more state and the more trait anxiety were indicated.

These psychometric measures and instruments are discussed in greater detail in the Methods section of this study. The experimental hypotheses associated with these personality measures follow below, while the associated blood pressure measures are discussed in the Methods section.

Experimental hypotheses.

6. Active coping style scores on the SCT are positively correlated with hypertensives' diastolic blood pressure

reduction.

7. Absorption scores are positively correlated with hypertensives' diastolic blood pressure reduction.
8. External control scores are negatively correlated with hypertensives' diastolic blood pressure reduction.
9. Initial trait anxiety scores are positively correlated with hypertensives' diastolic blood pressure reduction.
10. Decline in state anxiety scores are positively correlated with hypertensives' diastolic blood pressure reduction.

Summary

The study investigates the defensive coping dispositions of hypertensive patients. An attempt is made to apply a new directed-imagery treatment modality, and to compare its effectiveness against more traditional adjunctive treatment techniques. In addition, individual response differences to the treatment approaches are explored based on personality variables.

METHOD

Subjects

Subjects were adult male outpatients at the Veterans Administration Hospital in Martinez, California. Located some 20 miles northeast of Oakland, this facility is a 500 bed general medical and surgical complex serving veterans of the Northern San Francisco Bay area. English speaking and reading patients whose current medical records indicate a primary or secondary diagnosis of essential hypertension participated in the study. Excluded from consideration were patients whose records indicated known physiological pathology associated with hypertension, e.g., organic damage to the kidneys, brain, or cardiovascular system (i.e., the malignant stage of hypertension). Also excluded from consideration were patients whose records were coded for any of the "mental disorders", i.e., neuroses, psychoses, or substance abuses (e.g., alcoholism).

Prospective subjects were asked by questionnaire or telephone to participate in an investigation seeking to improve the understanding of the hypertensive patient, and ways to alleviate the disorder. They were informed of the length of the study, and its general procedures, which included completing personality questionnaires, having blood pressures measured, and listening to tape recordings.

A normotensive comparison group was similarly solicited from randomly chosen hospital outpatient records. As with the hypertensives, normotensive patients whose records indicated known pathology to the

cardiovascular system or mental disorders were excluded from consideration. This normotensive comparison group was asked to fill out only the personality questionnaires for experimental hypotheses one through three. Evidence of normotensiveness was obtained from medical records and patients' self-reports. In addition, diastolic blood pressures were measured on seven randomly selected normotensives as a rough spot-check.

A total of 41 hypertensives volunteered to take part in the study and all appeared for the first of 10 sessions (see Procedure section). Of these subjects, 34 returned for the second session. These remaining subjects were divided into three hypertensive treatment subgroups A, B, and C, matched to obtain equivalent group means and standard deviations for age, years of education, number of white and non-white subjects, socioeconomic-class rating, and current level of diastolic blood pressure. This hypertension level was determined by blood pressure measurements recorded during the pre-treatment baseline phase of the study (cf. Freis, 1973), and was compared with diastolic levels during the post-treatment phase of the study (Varady & Maxwell, 1972). These levels appear to be especially important in the investigation of treatments for essential hypertension as noted recently by Shoemaker and Tasto (1975), especially perhaps in a transactional context (e.g., Williams et al., 1972).

A measure of socioeconomic class was obtained by rating subjects' occupations using Warner's scale (Warner, 1960). This measure was used because it was the strongest component of socioeconomic status that Warner and his researchers found. The ratings range from 1 to 7, with

1 indicating the highest class level.

Twenty-seven hypertensives, nine per subgroup, participated consistently throughout the remaining eight sessions, and it is their data which is reported. All blood pressure data is reported in standard millimeters of mercury (mm Hg) pressure units.

Appendix A presents the hypertensive subgroup matching data for the 27 hypertensives noted above. The Appendix lists subjects for each subgroup by subject code number (S), and indicates for each subject his race and sex (R/S), age, years of education (Edu), socioeconomic rating (Job), and mean ($\bar{n} = 4$) diastolic blood pressure for the baseline week 1 (Dbp-wk 1). It can be noted from the Appendix that 17 white males (W/M), 1 white female (W/F), 7 black males (B/M), and 2 Asian males (A/M) comprise the 3 hypertensive subgroups. The means and standard deviations of the matching variables data are presented for each subgroup in Table 1. Ages of the hypertensives range from 47 to 83, years of education from 4 to 21, job ratings from 2 (junior college teacher) to 7 (unskilled laborer). Thus the hypertensives themselves form a rather heterogeneous group of veterans.

Because the three subgroups originally were matched on the basis of 34 hypertensives, the subgroup matching data of the 27 consistently participating subjects (Table 1) was subjected to a one-way analysis of variance for each variable. Results of these analyses are presented in Table 2. As can be seen from this table, the final three hypertensive subgroups do not differ significantly on any of the four group-matching variables (age, years of education, socioeconomic rating, and baseline diastolic blood pressure), and thus form three equivalent groups upon

Table 1

Means and Standard Deviations of the Hypertensive
Subgroups' Matching Variables

Subgroup ^a	Age (yrs)	Edu (yrs)	Job (rating)	Dbp-wk I (mm Hg) ^b
A	62.0 ± 11.4	13.1 ± 3.1	4.7 ± 1.6	89.9 ± 9.3
B	59.1 ± 6.0	11.9 ± 4.2	4.2 ± 1.5	89.4 ± 9.0
C	58.3 ± 8.5	10.3 ± 1.6	4.6 ± 1.6	90.1 ± 7.4

^a \underline{n} = 9 for each subgroup.

^b \underline{n} = 4 for each subject.

Table 2

Analyses of Variance for Matching Variables of
the Hypertensive Subgroups

Variable	Source	Sum sq	<u>df</u>	Var Est	<u>F</u>
Age	BG	67.18	2	33.59	.42*
	WG	1912.88	24	79.70	
	TOT	1980.07	26	76.15	
Edu	BG	40.51	2	20.25	2.04*
	WG	238.88	24	9.95	
	TOT	279.40	26	10.74	
Job	BG	.96	2	.48	.19*
	WG	59.77	24	2.49	
	TOT	60.74	26	2.33	
Dbp	BG	2.32	2	1.16	.02*
	WG	1786.18	24	74.42	
	TOT	1788.50	26	68.78	

*ns.

whom the three treatment conditions could be compared.

A total of 29 normotensives also volunteered to take part in the investigation. Unfortunately, none of these volunteers were non-white. Consequently, 17 of these white male normotensives were selected to form a comparison group for the 17 white male hypertensives drawn from the three hypertensive subgroups noted in Appendix A. The group-matching data (age, years of education, and socioeconomic rating) of the 17 normotensives and 17 hypertensives, are presented in Appendix B. Group means (M) and standard deviations (SD) for the variables are compared for the two samples and shown in Table 3. As indicated by the t-test (two-tail, independent samples), the normotensive and hypertensive samples do not differ significantly on any of the matching variables and thus could be compared on the DMI and SCT as reported below.

Interestingly, as noted above, diastolic blood pressures were measured on seven randomly chosen normotensives as a rough spot-check on normotensives' medical records and self-reports. A single casual reading was taken for each of the seven men (and thus it is conservatively higher than a single resting measurement). This group's mean was compared with that of the baseline readings of seven hypertensives who formed an approximately matched group (mean ages of normotensives and hypertensives: normotensives = 57.6 years, hypertensives = 58.1 years; years of education: normotensives = 14.4, hypertensives = 13.2; socioeconomic ratings: normotensives = 4.0, hypertensives = 3.1). The seven subjects of each of these mini-groups are indicated by their diastolic blood pressure measurements in Table 3. As predicted, the t-test (one-tail, independent samples) indicated that the mean diastolic blood

Table 3

T-test Comparisons of Hypertensive and Normotensive

Matching Variables

Variable	Hypertensives		Normotensives		df	t
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Age (yrs) ^a	62.9	7.8	62.1	8.8	32	.29*
Edu (yrs) ^a	13.1	3.0	12.1	3.3	32	.98*
Job (rating) ^a	4.1	1.3	4.0	1.3	32	.13*
Dbp (mm Hg) ^b	94.6	8.1	79.9	11.0	12	2.85**

^an = 17 per group.

^bn = 7 per group.

*ns.

**p < .01.

pressure of the seven normotensives was significantly lower at 79.9 than that of the seven hypertensives at 94.6 ($t(12) = 2.85, p < .01$). The matched samples of 17 white male hypertensives and 17 white male normotensives thus could be compared on the DMI and SCT to test experimental hypotheses one through three.

All subjects received their normally prescribed medications during the course of the study, with any changes being noted. An outpatient physician provided consultative medical supervision for patients in the study. It was recognized that possible treatments for hypertension optimally should be tested with patients not on medications, or persons who are "borderline" hypertensives also not on medications. However, because of the marked difficulty in obtaining adequate samples of such persons, procedures utilizing them were not used in the present study. Difficulties in obtaining adequate samples of such persons are often experienced because of several major factors. Once persons have been diagnosed as "hypertense", medications usually are begun; and once on medications, patients' physicians are quite disinclined for ethical reasons to discontinue the drugs. More importantly, perhaps, borderline hypertension usually does not have any known symptoms associated with it (nor does post-borderline hypertension). Consequently, borderline hypertense persons do not present themselves to medical facilities until hypertension worsens or other problems develop (Stamler, 1973), usually in middle age or later. Nonetheless, such persons certainly should be researched to test the power of possible treatments, perhaps in a large community-oriented blood pressure screening program.

Measures

Physiological. Blood pressure recordings were taken on standard mercury sphygmomanometers (Baumanometers). In accord with the findings of Labarthe, Hawkins, and Remington (1973), no currently available standardized instruments have been found adequate to replace the Baumanometer for studies like the current investigation. Three male paraprofessionals, previously experienced as Armed Forces paramedics in taking vital signs, measured blood pressures. These staff each had received an additional several weeks training with the Martinez VA Outpatient Service with nurse-practitioners to insure standardization of performance and criteria in measuring blood pressures. These staff were not informed about the groups of patients whose blood pressures they recorded, nor about the details of the investigation. Blood pressures were recorded with subjects in a seated position, following standard recording procedures (Kirkendall, Burton, Epstein, & Freis, 1967).

Psychological.

1. Defense Mechanism Inventory (DMI). The DMI is an objective paper and pencil test recently developed by Gleser and Thilevich (1969). It is a research instrument which purports to measure the relative intensity of usage of five major groups of defenses: hostility out or turning against object (TAO), the class of defenses which deals with conflict through attacking a real or presumed external object of frustration, e.g., displacement; projection (PRO), defenses which justify the expression of aggression toward an external object through first attributing to it, without unequivocal evidence, negative intent, or characteristics; principalization (PRN), the class of defenses which

scales with conflict through invoking a general principle that "splits off" affect from content, e.g., intellectualization, rationalization; turning against self (TAS), the class of defenses that handle conflict through directing aggressive behavior toward the subject himself, e.g., masochism; reversal (REV), the defenses that handle conflict by responding in a positive or neutral fashion to a frustrating object which might be expected to evoke a negative reaction, e.g., denial, repression, reaction formation.

Defense mechanisms TAO (turning against object) and PRO (projection) both entail processes of expression of aggression, and scores on these scales are positively correlated to a moderate degree, .29 to .63, on DMI normative samples (Gleser & Ihilevich, 1969). Scores on these scales thus were considered operationally as measures of "active" coping defense mechanisms. "Passive" coping defense mechanisms were operationally measured by DMI scores on the PRN (rationalization) and reversal (REV), as well as the TAS (turning against self) scales. The defenses of rationalization and reversal both particularly entail processes of repression of affect, and scores on their scales also are positively correlated in normative samples, .33 to .68. Thus, active-passive coping defenses, or defensive coping dispositions, were operationally defined by DMI scales measuring intrapsychic defense processes. As discussed previously in the Introduction, the higher the scores on the DMI scales, the more of the defensive tendency was indicated.

The DMI consists of 10 brief stories, two per conflict area, followed by four questions regarding the respondent's actual behavior, fantasy behavior, thoughts, and feelings in the story situations. Five

responses typifying the five defenses are provided for each question. The respondent selects the one response most representative and the one least representative of his reaction. Responses are summed to determine defense scores. The stories of the DMI can be construed as representative environmental situations, as discussed previously. Hence, DMI scores operationally were considered measures of coping tendencies in the representative environmental transactions. Another more general method of assessing active-passive coping style, the SCT, also was utilized, and is discussed in the next section.

Reported stability coefficients (product-moment correlations) for the DMI scales range from .69 (PRN) to .87 (TAO) with an average of .76 over a 3 month interval for graduate students; and .85 (PRO) to .93 (TAO) over a week T-group interval for 12 counselors (Gleser & Ihilevich, 1969). More recent findings (Weissman, Ritter, & Gordon, 1971) indicate test-retest reliabilities approximating the ranges reported earlier, e.g., .61 (PRO) to .84 (TAO) for a sample of 94 college men and women over 17 days. Walsh (1972) also has noted in his review of the DMI that internal-consistency-based estimates of its reliability compare well with most personality scales of similar length, i.e., an average of about .75. Thus, the authors consider reliability results encouraging, but note the need for additional studies with their research inventory (Gleser & Ihilevich, 1969).

The authors cite several studies in support of the construct validity of their scales. The correlations among the scales portray a remarkably stable patterning across three male and female norm groups of college students, unselected normal adults, and psychiatric outpatients,

indicating considerable stability in the relationship of defenses from sample to sample. The relationships themselves among the correlations, e.g., TAO and PRO positively correlated to a moderate degree (.29 to .63), and PRN and REV (.33 to .68), are in agreement with related research findings (Caine, 1960; Peak, Muney, & Clay, 1960; Lesser, 1958). Chodoff, Friedman, and Hamburg (1964), for example, also reported that parents of leukemia patients tended to employ denial and isolation of affect as their major defenses. Repression of affect is theoretically common to both types of defenses PRN and REV, while expression of aggressive affect is common to TAO and PRO. Hence, the authors would expect these positive relationships (Gleser & Ihilevich, 1969). In addition, they report that both TAO and PRO were substantially negatively correlated with PRN and with REV (-.44 to -.79); and note that similar negative correlations of hostility or projection with some of the specific defenses subsumed under reversal have been reported in the literature (e.g., Shipman & Marquette, 1963).

Other supporting validity studies cited by the authors report that predictions from psychoanalytic theory about the use of defense mechanisms by male alcoholics (high on TAS and REV, and low on TAO and PRN relative to normals) were substantiated by empirical findings (Aldridge, Baxter, Nopziger, Roggenbuck, Shimaasky, & Wolthuis, 1967); as were the predictions of the relationships of the scales to measures of field dependency (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962) in a study by Ihilevich (1968). He predicted and found that psychiatric patients who relied mainly on "global" defenses (TAS and REV) were more field dependent relative to subjects who relied on "differentiated" defenses (TAO

and PRO).

Numerous other studies also are presented as validating data by the authors (Gleser & Ihilevich, 1969). More recent use of the DMI includes studies of the relationships between preferred defenses and anxiety expression (Viney & Manton, 1974), and of ego defenses and reactions to stress (Gleser & Sachs, 1973). In the latter validation study of the DMI, the relationships between scores on the DMI and reaction to an experimental conflict situation were investigated. Undergraduate subjects were led to believe that their performance was deficient on a new test of scholastic ability. The pattern of defenses predicted residual post-test subjects' estimates of ability. In general, low estimates, reported decrease in self-appraisal, anxiety, and depression were associated with a high TAS defense score. For males, especially, a low residual estimate of ability with no reported decrease in self-appraisal and low negative affect scores was associated with high REV and low TAO defenses. In sum, results of the study gave support to the thesis that persons who reported similar patterns of defense in coping, thus obtaining high scores on particular DMI scales, tended to behave predictably in an actual conflict situation (Gleser & Sachs, 1973).

Walsh (1972) in reviewing the DMI concluded that, although some problems remain with the DMI, its validity data is promising; and that compared to other tests of defense mechanisms, the DMI rates well. Walsh's review concludes that the DMI is sounder than any other research instrument of similar breadth. It was given to all subjects in the present study to test experimental hypotheses one and two.

2. Coper-Avoider Sentence Completion Test (SCT). As recently

discussed by Cohen (1975) and by Goldstein (1973), coping response patterns may be divided into two major classes: those based primarily on avoidance of threatening stimulation, and those based on vigilance for the threatening stimulation. Goldstein (1973) notes that a defense such as projection might be classified as a coping style which would result in greater vigilance. Contrarily, denial might represent an attempt to avoid awareness of threat. Cohen (1975), in her analysis of the literature, similarly concludes that repression-sensitization, and related personality dimension concepts, appear to deal with general dichotomous types of coping activity, most notably avoidance-vigilance. The approach of dividing defensive personality dispositions into contrasting types or polarities to investigate coping processes has been discussed previously in the Introduction. As noted there, much of the recent research investigating these coping dispositions has utilized the Coper-Avoider Sentence Completion Test (SCT). This scale was originally developed by Mainord (1956) and Goldstein (1959), and more recently slightly modified by DeLong (1971).

Twenty-five stem items pertaining to illness, injury, aggressive, sexual or neutral filler themes comprise the SCT. Responses to the completed stems are scored on a three point scale depending on the degree of approach or avoidance expressed, according to a scoring manual. The higher the score, the more active coping or vigilance is indicated; the lower the score, the more passive coping or avoidance is indicated.

Because subjective evaluation of the completed items is required by scorers, a detailed scoring manual is used (DeLong, 1971). Inter-judge scoring reliabilities, as well as test reliabilities, were

reported in the .80 to .89 range by Pollack (1966). Similar test reliabilities, .83 to .89, were also noted by Andrew (1967). More recently, Cohen and Lazarus (1973) reported a high interjudge scoring reliability of .926.

Use of the SCT has not been extensive and hence validating data are somewhat limited. Much of the scale's construct validity is suggested by the test's successful utilization for preselecting research subjects into oppositely disposed coping-style groups, whose responses or reactions to stress are then compared. Goldstein (1973) reported that individuals classified on the basis of the coping style measure varied markedly in their psychophysiological and behavioral reactions to a stressful film. Andrew (1970) and DeLong (1971), investigating the adaptation to and recovery from surgery in hospitalized patients, noted that individuals classified on the basis of SCT coping style showed patterns of arousal and adaptation to real-life threats (impending surgery) that were similar to the patterns found in the laboratory studies reported by Goldstein (1973).

In similar research involving coping dispositions and recovery from surgery, Cohen and Lazarus (1973) recently reported that the amount of pain medication, utilized as a recovery index, showed a significant relationship with patient groups varying in the SCT measure of coping disposition. In addition, one study also has been reported which used the SCT as a dependent variable to compare two groups. Pollack (1966), while investigating the coping processes in inebriated and sober alcoholics, matched 20 alcoholics and 20 normals for age, sex, education, and race. He found that the SCT significantly differentiated the groups.

The normals obtained higher scores when both they and the alcoholics were inebriated, but interestingly, obtained lower scores when both groups were sober.

Thus, the SCT was used heuristically as a general measure of active-passive coping style to test experimental hypothesis three. As discussed in the Introduction, higher scores on the SCT operationally defined greater active coping style, while lower scores defined more passive coping style. Two judges, a staff psychologist and advanced clinical psychology graduate student, each scored the SCTs for all the hypertensives and normotensives. The judges were blind as to which groups' tests they scored. An average score from the two raters was then obtained for each subject and the inter-rater reliability calculated for all scores.

3. State-Trait Anxiety Inventory (STAI). The STAI is a widely used measure of both state and trait anxiety. The Inventory consists of two 20-item self-evaluation questionnaires (Spielberger, Gorsuch, & Lushene, 1970). One questionnaire evaluates transitory, situationally determined level of anxiety (A-state), while the other evaluates the relatively stable disposition toward anxiety proneness (A-trait). Items consist of statements which are rated on a 4-point scale. A-state items specify how the respondent feels at the moment, e.g., "I feel rested": not at all (1)...very much so (4). A-trait items specify how the respondent generally feels, e.g., "I feel secure": almost never (1)...almost always (4). Scores ranging from 20 - 80 are possible on each scale. The higher the score on each scale, the more anxiety state or trait is indicated.

Spielberger, Gorsuch, and Lushene (1970) summarize their development of the scales in a published STAI Test Manual. They report that the test-retest reliability (stability) of the A-trait scale is relatively high (.73 to .86), while the stability coefficients for the A-state scale tend to be low (.16 to .54, median .32 for six groups of male and female undergraduate students). However, these findings for the A-state scale are expected for a measure designed to be influenced by situational factors. The authors report that both scales have a high degree of internal consistency with alpha reliability coefficients ranging from .83 to .92.

Moderately high correlations (.41 to .85) with other anxiety scales, e.g., Taylor (1953) Manifest Anxiety Scale, are reported both for college students and patient samples as indication of concurrent validity for the A-trait scale. Many studies bearing evidence on the construct validity of the scales for both student and patient samples also are reported and summarized by the authors. Much work has compared scale scores following application of contrasting experimental situations. For example, A-state scale scores were lowest for 197 undergraduates following 10 minutes of relaxation as compared with scores after a stressful film or examination experience. In general, research in a large number of studies with the Inventory indicates that the A-trait scale is highly correlated with other measures of trait-anxiety, and that the A-state scale is particularly useful in situations that require measurements of state anxiety (Spielberger, Gorsuch, & Lushene, 1970). However, while extensive research has been performed using the STAI (Spielberger et al., 1970; Spielberger, Note 2), there has been

very little work reported with hypertensives. Thus, experimental hypotheses nine and ten were tested with the STAI, which was administered to all subjects in the present investigation.

4. Internal-External Locus of Control (I-E). The I-E Scale is a 20-item, forced choice test whose items deal with the respondent's belief about the nature of the world; for example, a respondent would have to decide which of the following statements he believed more strongly: "It is hard to know whether or not a person really likes you," or "How many friends you have depends upon how nice a person you are." Rotter (1966) has reported his development of the scale as a test of individual differences in generalized beliefs in internal-external control of reinforcement; that is, whether rewards are perceived as contingent on self-behavior or control, or independent of it. The scale is keyed so that high scores indicate a more external orientation. Twenty-three is the maximum score as six items are fillers.

Rotter (1966) reports relatively stable estimates of the scale's internal consistency (range is .69 to .79), while test-retest reliabilities over a 1 month period appear quite consistent for quite different samples (Ohio State University elementary psychology students and prisoners at the Colorado Reformatory), ranging from .78 to .83. Other test-retest reliabilities as reported by Hersch and Scheibe (1967) for college student samples were consistent with Rotter's findings, .43 to .84, with a .72 reliability for one student group over a 1 year interval. Hersch and Scheibe (1967) summarize the reviews of the I-E scale by Rotter (1966) and Lefcourt (1966) in noting that the reliability of the scale is consistent and acceptable, (varying between .49 and .83) for

varying samples and intervening time periods.

The scale's relationships with other test variables such as intelligence and social desirability were low for the samples reported (mostly college students), and good discriminant validity was indicated (Rotter, 1966). As described by Rotter (1966), most significant evidence of the construct validity of the scale comes from predicted differences in behavior for individuals above and below the median of the scale or from correlations with behavioral criteria. Rotter summarizes a series of studies, e.g., Seeman (1963), James, Woodruff, and Werner (1965), which provided strong support for the hypotheses that the person who has a strong belief that he can control his own destiny (i.e., a strong internal orientation) is likely to be more alert to those aspects of the environment which provide useful information for his future behavior and to take steps to improve his environmental condition. In addition, persons of high internal orientation of control have been found to place greater value on skill or achievement reinforcements, and to be generally more concerned with their ability and sensitive to failures (Rotter & Mulry, 1965). Such persons are also resistive to attempts to influence them (Crowne & Liverant, 1963).

Fiske and Pearson (1970) and others (e.g., Lefcourt, 1966; Sarason & Smith, 1971) have also reviewed the research on the I-E scale and have concluded that the results look quite promising in terms of construct validation. Since then the research on perceived internal versus external control of reinforcement as a personality variable has expanded at a rapid rate. By Rotter's recent estimate there are well over 600 published studies on this variable, the vast majority of which utilize the

I-E scale. Because of this expanding body of research, Rotter also has recently discussed some misconceptions related to the construct of internal versus external control of reinforcement (Rotter, 1975). In particular, Rotter notes the importance of recognizing that the scale was developed as a broad-gauge instrument -- not as an instrument to allow for very high prediction in some specific situation, but rather to allow for a low degree of prediction of behavior across a wide range of potential situations. Particularly, Rotter warns against assuming that expectancy regarding control of reinforcement is a typological behavioral trait, and that the prediction of behavior can ignore the value of the reinforcement that is the expected outcome of the behavior being studied. Rotter notes that more unobtrusive behavioral measures may be more appropriate than his questionnaire for many studies. With these caveats duly in mind, the I-E scale was applied in a most heuristic manner to test experimental hypothesis eight, primarily as there is a dearth of reported research investigating hypertension from the locus of control perspective.

5. Absorption Scale. As noted earlier in the Introduction, it may be of interest to measure subjects' dispositions toward engaging in or involving themselves in the kinds of cognitive-kinesthetic exercises presented on the relaxation-imagery tapes. Tellegen and Atkinson (1974) describe such a disposition in their trait "absorption", a disposition for having episodes of total attention that fully engage one's representational resources and thus involves a commitment of available perceptual, motoric, imaginative, and ideational resources. Absorption is believed to involve primarily a capacity for episodes of absorbed and

"self-altering" attention that are sustained by imaginative and enactive representations. Interestingly, and not surprisingly then, interest in this personality trait developed from Tellegen's studies of individual characteristics related to hypnotizability (Tellegen & Atkinson, 1974).

The authors describe in some detail the development of their scale to measure the absorption trait. The scale is part of the Differential Personality Questionnaire (DPQ), a new paper-and-pencil personality inventory now being developed by Tellegen (Note 3, Note 4). Because the DPQ is still in process of being developed, data on its Absorption scale are relatively scarce. The scale itself currently consists of 37 items, statements to be answered true or false. The higher the "true" score, the more absorption trait is indicated. The statements generally refer to one's personal experiences and beliefs, e.g., "When I listen to music, I can get so caught up in it that I don't notice anything else"; or, "Different colors have distinctive and special meanings for me." Reliability data reported for the scale by Tellegen range from .82 correlations (test-retest, 1 week interval, 35 adult alcoholic patients) to .90 (internal consistency, 436 college students). Much of the scale's validity data stem from the author's work which has consistently found a correlation of about .40 between the absorption trait measure and those of hypnotic susceptibility (Tellegen & Atkinson, 1974; Tellegen, Note 3). However, as noted by Tellegen, these correlation data suggest an affinity but not an equivalence between the two characteristics.

Another recent approach also attempts to elucidate the absorption trait further. Murray (Note 5) reported a study on the construct validity of the trait which emphasized the construct's involvement with an

absorbed, imaginative kind of cognitive functioning. Murray made a direct study of imaginative responses as a potential indicator of the absorption construct using the Holtzman Inkblot Technique (HIT) and the Absorption scale. Using cross-validated methods with an undergraduate sample, she developed eight HIT scoring "rules" which correctly identified 86% of the subjects as being high or low on the absorption trait. These rules implied characteristics of high absorption persons that corresponded well to several aspects of the construct, e.g., high absorption persons appeared to possess the role flexibility to become absorbed in situations, to be highly imaginative, and to be open to new experiences. Consequently, the Absorption scale may have proved of heuristic interest in the present study. It was administered with at least an equal number of filler items (Tellegen, Note 4) to all subjects in the present investigation, particularly to examine experimental hypothesis seven. .

Treatments

Group A: placebo-control. The treatment for this group of hypertensives consisted of a sequential series of six medical information-type tape recordings discussing hypertension. Material for these tapes was read verbatim (with appropriate editing and adjustment for illustrations and graphs, etc.) from the reports of Freis (1973) and Stamler (1973). Approximately mid-way through the tape, and at its conclusion, subjects were afforded a 5 minute period of silence where they were requested simply to relax and think about the presented material. This procedure was followed to balance similar periods on the other groups' treatment tapes where listeners were requested to think about the general or specified imagery, as explained in the sections to follow. Similarly, each tape concluded with instructions for listeners to remain relaxed, with eyes closed and in silence while blood pressures were measured. The average playing time of the six Group A tapes was 42 minutes. Appendix C presents the first of the tapes in its entirety as representative of the series. The voice of Albert Kostlan, PhD, Chief, Psychology Service, Martinez VAH, appears on all of the tapes in the present investigation.

Group B: relaxation and general imagery. The treatment tape for this group consisted of instructions for deep muscle relaxation. Included on the tape were suggestions about the muscles feeling heavy, loose, limp, etc. This first section of the tape is presented in its entirety in Appendix D, part 1. Following the general relaxation instructions, the tape proceeds to present suggested general images of relaxing scenes, such as a person reclining in a hammock; and also affords

the listener an opportunity to imagine his own scenes. Appendix D, part 2 presents this second section of the tape. The 43 minute treatment tape was developed from Jacobson's (1938) relaxation procedures as modified by Albert Kostlan, PhD.

Group C: relaxation and specific imagery. The treatment tape for this group consisted of the identical general instructions for deep muscle relaxation as for Group B (Appendix D, part 1). However, after these general instructions, the tape consisted of instructions to visualize and relax the body's system of arteries and arterioles, including dilation of the arterioles, easier flow of the blood, etc. In addition to these specific images, instructions were also given to the patients listening to visualize themselves and feel themselves being perfectly well. See Appendix E. This 43 minute treatment tape was developed from the general procedures of Simonton as used with cancer patients (Bolen, 1973; Simonton, Note 1, Note 6).

Procedures

Overview. The study consisted of ten 90-minute sessions per subject group, two sessions per week for 5 weeks. Hypertensive subjects were required to participate during the same days and times each week, Monday and Wednesday or Tuesday and Thursday. Normotensive subjects participated separately only for two sessions when they were administered the same psychological test instruments as the hypertensives.

Session one included a brief introduction to the study. During sessions one and two the first week, baseline diastolic blood pressure readings were taken from hypertensives and psychological tests administered to all subjects. Sessions three through eight comprised six treatment sessions for all hypertensive treatment condition subgroups. The last two sessions, nine and ten, comprised a post-treatment phase during which hypertensive subjects were asked to replicate what they had learned without benefit of taped instructions. Placebo-control subgroup subjects were asked to relax and recall the material heard on their tapes. Pre- and post-treatment blood pressure readings were taken before and after each session three through ten. Average readings for sessions nine and ten during the post-treatment phase comprised the comparative baseline for the study. In addition, session ten included a closing debriefing period. A schematic overview of the procedures is presented in Appendix F.

Sessions 1-2: pre-treatment. Hypertensive patients who responded to the solicitation request were asked to report to a hospital conference room at the first of two preferred days indicated by their response, i.e., Monday or Tuesday. A brief introduction and orientation talk

about hypertension and about the general purpose and procedures of the study was presented to the subjects. Subjects were told that they would be listening to tape recordings, and that by doing so they might be able to lower their blood pressure. Any biographical data not obtained from hospital records was requested from the subjects and standard hospital research consent forms also were completed during session one.

After the introduction the STAI was administered to all subjects. Then subjects were randomly divided into small groups of about six, and each group was taken into an experimental room. There, subjects were asked to make themselves comfortable, remove their shoes, loosen collars, roll up sleeves, etc. Subjects were seated in comfortable chairs and asked to relax with eyes closed in silence for 15 minutes. After this resting period, a paramedic took the first of two blood pressure readings from each subject. After this first reading was taken from each subject, the paramedic returned to each subject in a different predetermined random order to take the second reading. This procedure was utilized to avoid ordering effects in measurement as well as patients' expectancy effect for the measurements. A different staff person measured the blood pressures in each experimental room such that all measurements were taken at the same time.

Following the baseline blood pressure recordings, hypertensive subjects were reconvened in the conference room where the DMI was administered. Subjects were then asked to return for the second pre-treatment baseline session at the same time Wednesday or Thursday. During the second session, subjects arrived at the conference room, were briefly re-oriented to the procedures, and administered the I-E scale. There-

after, they were divided randomly into small groups for baseline blood pressure measurements following the procedures of session one. After these measurements, subjects were reconvened in the conference room and were administered the Absorption scale and the SCT. Then, subjects were told to return the following week at the same time for sessions three and four.

As discussed previously in the section on "Subjects", the Monday-Wednesday and Tuesday-Thursday group subjects were each subdivided into three treatment subgroups matched for equivalent group means and standard deviations on baseline diastolic blood pressures, age, years of education, and occupational ratings. Numbers of white and non-white subjects in the subgroups also were matched as closely as possible. Monday-Wednesday and Tuesday-Thursday subgroups all were matched with each other such that regardless of the days there were three matched treatment (combined) subgroups: A--placebo-control, B--relaxation and general imagery, and C--relaxation and specific imagery.

Normotensive subjects were asked to report for two sessions at times of their choice. These comparison subjects were convened in a hospital conference room, briefly oriented as to the purpose of their participation, and administered the STAI and DMI. Then, they were asked to return for the second session to complete the I-E scale, Absorption scale, and SCT. Thus, normotensive comparison subjects were administered the same personality tests as the hypertensive subjects during the first two sessions of the study.

Sessions 3-8: treatment. Hypertensive subjects were convened in the conference room, divided into their assigned treatment subgroups,

and taken to their respective treatment rooms. Following the procedure of session one, two pre-treatment tape blood pressure readings were taken from each subject in random order. After these readings, each subgroup was played its treatment tape. Following the tape, two post-treatment tape blood pressure readings were taken for each subject, with all subjects remaining in the seated position. Staff persons changed rooms for the post-tape readings such that no subgroups' pre- and post-tape blood pressures were taken by the same person on the same day. After all the readings were taken, subjects were asked to open their eyes (see Appendix G for the common instructions read to all subjects) and asked to return for the next session.

Sessions 9-10: post-treatment. The final two sessions were conducted similarly to sessions three through eight, except that no tapes were played. Treatment subjects were asked to utilize what they had learned from the taped instructions: to review for tension their muscle groups and relax them, induce their relaxation scenes, or to relax arteries and feel well, etc. Placebo-control subjects were asked to relax and recall the information they had heard on their tapes. All subjects were asked to spend 15 minutes at these assignments following which the post-treatment readings were taken. Before the first readings of session ten, the STAI was readministered. After session ten, all subjects were reconvened in the conference room for debriefing and given the opportunity to ask questions, etc. Post-treatment readings of sessions nine and ten were averaged and compared with baseline readings from sessions one and two.

RESULTS

Hypertensive and Normotensive Coping Styles

Table 4 presents the means (M) and standard deviations (SD) of the scores on the five defense mechanism scales of the DMI (TAO, PRO, PRN, REV, TAS) for the hypertensives and normotensives. The means of the five scales are compared between hypertensives and normotensives to test experimental hypotheses one and two in Table 5. The hypothesized direction of difference (H - Dir Dif) between hypertensives' and normotensives' means on each of the scales is indicated in the table's t-test summary as follows: minus (-) indicates that the hypertensives were predicted to score lower than normotensives, plus (+) indicates that hypertensives were predicted to score higher than normotensives.

Results of the t-tests (one-tail, independent samples), as shown in Table 5, indicate that hypotheses one and two were substantially confirmed. In accord with hypothesis one, hypertensives scored significantly higher than normotensives on scale REV, t (32) = 4.09, p < .0005, and TAS, t (32) = 1.73, p < .05, and thus achieved significantly greater scores on these "passive" defensive coping scales, particularly on REV (reversal). Scores on passive scale PRN did not differ significantly between the groups, but some trend for the predicted direction of difference did occur (hypertensives higher, as indicated by the + in Table 4). In addition, hypertensives scored quite significantly lower than normotensives on the "active" defense coping scale turning against object or TAO, t (32) = -4.15, p < .0005, in accord with hypothesis two.

Table 4

Means and Standard Deviations of Subjects'
Scores on the DMI Scales

DMI Scale	Hypertensives ^a	Normotensives
TAO	28.2 ± 8.7	39.7 ± 7.4
PRO	35.4 ± 5.6	38.2 ± 6.7
PRN	45.4 ± 8.4	43.9 ± 6.1
REV	52.9 ± 6.0	43.2 ± 7.8
TAS	38.2 ± 5.0	35.0 ± 5.7

^an = 17 per group.

Table 5

Predicted Differences Between Hypertensives' and Normotensives'

DMI Scores and T-test Comparisons

DMI Scale	H - Dir Dif	<u>df</u>	<u>t</u>
TAO	-	32	-4.15***
PRO	-	32	-1.35*
PRN	+	32	.58*
REV	+	32	4.09***
TAS	+	32	1.73**

*ns.

** $p < .05$.

*** $p < .0005$.

There was a strong tendency for the hypertensives to also score lower on the remaining active defense scale PRO, although score differences did not quite reach the .05 significance level, $t(32) = -1.35$, $p < .10 > .05$.

Hypertensives and normotensives also were compared on their more general coping dispositions as measured by the SCT to test hypothesis three. Interestingly, the interjudge correlation for the normotensives' scores, $r = .68$, was somewhat lower than that for the hypertensives' scores, $r = .89$, suggesting perhaps that the hypertensives as a group indicated more homogeneously interpretable or ratable coping responses on the SCT than the normotensives. When the average scores of the hypertensives and the normotensives on the SCT were compared (t -test, one-tail, independent samples), hypothesis three was confirmed. The hypertensives scored significantly lower than the normotensives on the SCT, $t(32) = 2.03$, $p \leq .025$, again indicating significantly more "passive" coping dispositions for the hypertensives.

Comparison of Treatments

The mean pre-treatment diastolic pressures (Week I baseline) for all hypertensives in matched subgroups A, B, and C were presented in Table 1. These pre-treatment baselines were compared with post-treatment baselines similarly obtained during the final phase of the study (Week V baseline). These comparisons are presented in Table 6. The table shows the pre- and post-treatment means and standard deviations of diastolic pressure for each treatment subgroup. Appendix H lists the weekly individual pressure readings of all subjects in the three subgroups.

As can be seen from the t -tests presented in Table 6, neither subgroup A (placebo-control) nor subgroup B (relaxation and general imagery) was able to significantly lower its diastolic pressure. In contrast to this finding, subgroup C (relaxation and specific directed imagery) did lower its diastolic pressure to a significant degree, $t(8) = 7.69$, $p < .001$ (t -test, one tail, non-independent samples), from pre-treatment baseline 90.14 to post-treatment 81.74, a reduction of about 9%. In addition, not unexpectedly then, the subgroup C post-treatment baseline was significantly lower than either of the other two subgroups' post-treatment baselines, $F(2, 23) = 16.00$, $p < .005$.

This latter finding was indicated by an analysis of covariance for post-treatment means of week V. This statistical test was used as a control to reduce possible experimental error (Kirk, 1972) due to pre-trial fluctuations or shifts in individuals' basal blood pressures during week V. Such fluctuations could serve as sources of bias in measured treatment effects, effecting subsequent post-treatment (trial)

Table 6

Comparison of Pre- and Post-Treatment Mean Diastolic
Blood Pressures for Three Hypertensive Subgroups

Subgroup ^a	Pre-Treatment ^b	Post-Treatment ^b	<u>t</u> ^c
A	89.93 ± 9.34	88.59 ± 12.04	.44*
B	89.44 ± 8.99	89.51 ± 8.69	.03*
C	90.14 ± 7.40	81.74 ± 5.67	7.69**

^an = 9 per subgroup.

^bn = 4 per subject.

^cdf = 8.

*ns.

**p < .001.

blood pressures. McCanne and Sandman (1975) in their recent systematic investigation of statistical problems encountered in cardiovascular research, warned of the confounding effects of such pre-trial baseline shifts. The analysis of covariance statistically controlled for such confounding fluctuations. As can be noted in Table 6, subgroups A, B, and C had equivalent baselines during the initial pre-treatment phase, $F(2, 23) = .02$, ns, but had significantly different baselines during the post-treatment phase. By inspection, subgroup C can be seen to be significantly lower than either subgroup A or subgroup B. These latter two subgroups did not significantly lower their pressures. In sum, the analysis of covariance indicated that subgroup C was significantly lower than subgroup A and/or subgroup B in post-treatment pressure, and the t -test indicated that subgroup C also was significantly lower than its initial pre-treatment pressure. Appendix G lists the pre-baseline diastolic pressures taken from each subject during the early (pre-trial) part of each session (see Methods) used to compute the analyses of covariance.

Thus, experimental hypothesis five was confirmed, as the subgroup C hypertensives, treated adjunctively with relaxation and specific directed imagery, lowered their diastolic pressures significantly more than the subgroup B hypertensives treated with the more general traditional relaxation and imagery. However, experimental hypothesis four was only partially confirmed as the subgroup B subjects were unable to lower their pressures significantly more than the placebo-control subgroup A subjects, who, unfortunately did not lower their pressures to any significant degree. Subgroup C of course was able to lower its

pressure significantly more than subgroup A, thus partially confirming hypothesis four.

Treatment Effects and Personality Variables

Four personality measures were hypothesized to be related to hypertensives' reductions in diastolic pressure (hypotheses six to nine). Subjects' scores on these four measures, coping style (SCT), absorption (Ab), locus of control (I-E), and trait anxiety (Tr), are listed in Appendix J. Scores on one additional measure, change in state anxiety, were accidentally lost and cannot be reported. Appendix J also lists subjects' pre-treatment to post-treatment declines in blood pressure. This data is listed both in units of decline in millimeters of mercury (-BP) and in decline in percent (-%); and was calculated from the data presented in Appendix H.

Table 7 presents the correlations (\underline{r}) between the four personality variables and the percent decline in pressure. Correlations are shown for each of the three hypertensive subgroups, as well as for the entire group of hypertensives combined (Comb). The symbols plus (+) or minus (-) which appear above each variable column represent the predicted positive (+) or negative (-) direction of correlation. Each correlation coefficient was tested for statistical significance against the hypothesis that its actual population correlation was zero (\underline{t} -test, one-tail, $\underline{df} = 7$ for subgroups and 25 for combined groups, $\alpha = .05$). One of the correlations, for subgroup A and SCT, $\underline{r} = .62$, achieved significance at the .05 level.

The largest correlations for each subgroup are as follows: A and SCT, $\underline{r} = .62$; B and Ab, $\underline{r} = .28$; C and Ab, $\underline{r} = -.53$. For the combined group, the correlations on each measure were SCT, $\underline{r} = .22$; Ab, $\underline{r} = .17$; I-E, $\underline{r} = .09$; Tr, $\underline{r} = .21$. The largest three of these group cor-

Table 7

Correlation Coefficients between Decline in Diastolic
Pressure and Personality Measures

Subgroup	+SCT	+Ab	-I-E	+Tr
A	.62*	.35	.59	.50
B	.02	.28	-.04	-.08
C	.05	-.53	.05	-.02
Comb	.22	.17	.09	.21

* $p < .05$.

relations, for SCT (.22), Ab (.17), and Tr (.21) all are in the predicted positive directions although they are small, and did not achieve statistical significance. The only consistent pattern among the directions of correlations appears for the coping style variable SCT. For this variable, each of the three subgroups A, B, and C, as well as the combined group, manifested positive correlations with blood pressure decline. As noted above, the correlation for subgroup A was the largest and did account for the only significant coefficient. However, it should be noted that given the array of 16 coefficients presented in Table 7, as they were tested at the .05 level of significance, it is possible that one of the correlations might appear significant by the chance factor itself. Another interesting finding appears to be that the correlations, in terms of absolute magnitude, were consistently higher for the variable Ab than for the other measures: for subgroup A, $\underline{r} = .35$, for subgroup B, $\underline{r} = .28$, and for subgroup C, $\underline{r} = -.53$. The results for subgroup A and subgroup B were similar on this variable (.28 and .35), while that for subgroup C was a bit larger and in the opposite direction (-.53). Interestingly, subgroup C was the only group whose pressures declined significantly while those for subgroup A and subgroup B were similar and unchanged.

In sum, inspection of Table 7 indicates that none of the four personality variables appear to be significantly related to decline in pressure in the combined groups or individual subgroups, with one possible exception. Thus, hypotheses six through nine cannot be confirmed. Nonetheless, as noted above, there do appear to be some small but interesting trends in the correlation data.

DISCUSSION

Coping Dispositions

The present research indicates that hypertensive outpatients can be significantly differentiated from normotensive outpatients on the basis of their coping styles or coping dispositions. Hypertensives' coping styles can be characterized as being significantly more "passive" or "avoiding" than normotensives' in terms of dealing with environmental demands or conflict situations. More specifically, hypertensives' coping dispositions could be characterized by the relative prevalence of certain major groups of "passive" defenses, and by the relative non-prevalence of certain other more "active" defenses as compared to normotensives' defenses. The passive defenses can be construed as involving more affect repression, while the more active defenses entail affect expression.

The most prevalent passive defenses found for the hypertensives on the Defense Mechanism Inventory (DMI) were those classified as "reversal". These include such classical defense mechanisms as denial, reaction formation, and repression. The most non-prevalent active defenses found for the hypertensives were those classified as "turning against object", and include such classical defense mechanisms as displacement.

Interestingly, the Coping-Avoider Sentence Completion Test (SCT) also specifically characterized the hypertensives as being significantly more passive copers (avoiders) than the normotensives. The SCT is a projective-type (sentence completion) test. Thus, its confirmation of

the DMI findings suggests that it may indeed reflect the operation of a more global or general coping disposition. No subjects were found in either the hypertensive or normotensive group who did not use every defense in their DMI test responses. Nor did hypertensive and normotensive subjects differ significantly on every DMI scale. No significant differences were found on "projection" and "principalization" (e.g., intellectualization or rationalization). In addition, only relatively small and non-significant correlations were found between SCT scores and the scores on the five DMI scales (TAO, $-.01$; PRO, $-.19$; PRN, $+.36$; REV, $-.29$; TAS, $+.15$). Thus, it appears possible that this general coping disposition may result from or reflect the overall integrated use, more or less, of all of the specific groups of defenses. Interestingly, however, it appears that all of these small correlations, except that of REV, are in the predicted directions, i.e., positive or negative. Thus, there actually may be suggested some degree of selectivity of defenses underlying the "integrated" defenses measured on the SCT.

The important result which follows from the above is that whether the general coping-avoiding dimension or the specific defense mechanism scales are considered, the conclusion was the same. Hypertensives could be characterized as having significantly more passive coping styles or dispositions than the normotensives. Thus, one might use Singer's (1974) transactionally-oriented terminology and state that the hypertensives' preferred style of engagement-involvement with their environments--their preferred style of interpersonal transaction--is one of "disengagement".

It is worthwhile to reiterate at this point that this finding refers to hypertensives' measured coping dispositions, and not, of course, to their actual in vivo coping behaviors. This distinction represents one of the limitations which can be placed on the conclusions derived from the present study. It is a distinction which has been applied toward discussion of coping research in general (Lazarus, et al., 1974) as noted earlier in the Introduction. Consequently, it points out the need for future research to examine the relationships between individual's and groups' psychometric coping dispositions and their actual environmental coping behaviors. One suggestive study in this regard, indicating some predictable correspondence between coping dispositions and environmental behavior, has been reported. As discussed in the Introduction, Gleser and Sachs (1973) investigated the relationships between DMI scores and reaction to an experimental conflict situation. The authors found that undergraduates who reported similar patterns of coping defenses on the DMI did tend to behave predictably in the actual conflict situation.

In discussing the hypertensive "disengagement" finding, it is also worthwhile to keep in mind the characteristics of the hypertensive sample on which it is based. This also tends to limit somewhat the conclusions which should be drawn. The hypertensive sample consisted of a fairly heterogeneous group of 17 "lower-middle" class white male veteran outpatients whose average age was 63 years and whose average education was 13 years. These features suggest the possibility that the passive "disengagement" coping style may be fairly well established or "entrenched" by such an age in this group of men; and as compared with

normotensive outpatients, less striking differences in measured coping dispositions might well appear in younger adult male hypertensive outpatients, in females at either age level, or in non-Caucasians of either sex at either age level.

In addition to the possibility of finding less striking differences, alternatively, of course, other subgroups of hypertensives may be found who utilize another coping style. Such hypertensives may not have appeared predominantly in the present investigation as a group in the sample averaging 63 years of age because of sheer attrition. This possibility suggests that if some other coping style is characteristic of some hypertensives, it indeed may be even more maladaptive or lethal for them, or less likely, that they become normotensive with medications and/or advancing age.

Some evidence bearing on the possibility of more maladaptive coping styles being related to younger adult hypertensive subgroups did in fact appear in the literature. In 1967, Singer briefly discussed a study involving some 82 hypertensives. Descriptive characteristics of these subjects were not given, though their average age was about 38. Ratings were made of interview notes concerning the subjects taken many years earlier by two psychiatrists and a psychologist. Hypertensives were rated as being of one of two types: "defended" if the subject had seemed to deny anger, had indicated a deliberate choice to stop expressing anger at some point in his life, and/or had seemed to bottle up most feelings; "pressured" if the subjects had openly expressed anger, had felt or appeared anxious, and/or had sounded as if they viewed their lives as filled with pressure and turmoil with time

pushing them. Five years post-interview, a follow-up study revealed that 62% of those hypertensives rated as "pressured" were dead, while 70% of those rated as "defended" were alive, a statistically significant difference. It is of interest to note that the middle-aged "pressured" group of hypertensives seems to resemble the coronary-prone Type A personality group later described by Friedman and Rosenman (1974); while the "defended" group, whose survival rate was significantly greater, might indeed correspond with those older hypertensives currently described as "disengaged".

Such "disengaged" hypertensives of the present study all were white males, and this sample characteristic also represents a limiting factor on current conclusions, especially those regarding black males' coping dispositions. However, a report of an epidemiological survey project which specifically addressed this issue of black-white male blood pressure differences has recently appeared in the literature (Harburg, Erfurt, Hauenstein, Chape, Schull, & Schork, 1973). This project is of special interest because it attempted to relate racial differences in blood pressures to coping responses measured in ways similar to those used in the present study. Thus in the Harburg, et al., study, coping responses were those chosen by subjects from alternatives supplied in reaction to two hypothetical conflict situations posed by the investigators: confrontation with an angry policeman, and with a homeowner refusing to rent or sell because of bias. Hypothetical coping responses reflected expression or suppression of anger and/or guilt. (The authors did not discuss the distinction between indicated coping responses and actual in vivo responses and the word

"hypothetical" is the present author's term.)

A summary of the Harburg, et al., study and its results is as follows: Four racially segregated areas in Detroit were selected by factor analysis of census tracts data as varying widely in socio-ecological stressor conditions (black-white, high-low stress). High stress areas were characterized by low socio-economic status (e.g., low income), high crime, high density, high residential mobility, and high rates of marital breakup, while low stress areas were marked by converse conditions. Samples in each of the four urban areas consisted of about 125 married males aged 25 to 60. (Although other sample characteristics were provided, there was no mention of the use of anti-hypertensive medications or identifiable cardiovascular patients. Presumably, the investigators controlled for these factors in some way.) It was found that diastolic blood pressure levels were the highest among black high-stress-area males. No differences were found in blood pressure levels between black low-stress-area males and white males. In addition, suppressed hostility responses, as defined by keeping anger in when attacked and feeling guilt if anger is displayed when attacked, was significantly related to the higher blood pressure levels for black high-stress-area males. Black low-stress-area males with high blood pressures were associated with responses of anger-in but denial of guilt. In general, the study indicated that suppressed hostility (anger-in plus guilt) in both black high-stress-area males and white males was related to (averaged) above normal diastolic pressures, in ranges indicative of higher mortality and morbidity risks.

Harburg, et al., speculated that such suppressed hostility coping

responses might be induced largely through early familial or adult sociopsychological processes (e.g., early social learning or conditioning), and cite the work of Henry and Cassel (1969) as providing additional psychosocial and psychophysiological bases for the related mechanisms in hypertension. From the Introduction, it may be recalled that Henry and Cassel concluded that the development of hypertension is related to the interactions between individuals and their environments (transactions, in Singer's, 1974, terms). Their epidemiological data suggested that an individual's inability to adapt effectively to changing psychosocial stimulation, i.e., disruption and change in socio-cultural roles and ensuing repetition of emotionally stressful situations (which effect the defense alarm response), were the important causal factors.

Suppression of hostility noted in the Harburg, et al., project might be construed as one specific instance or type of coping response within a larger framework of coping style or coping disposition. Harburg et al. (1973) noted, in fact, that suppressed hostility could be conceived as both a role-situational and a consistent personal response across role situations (i.e., a coping style, in current terms); but criteria are lacking as to how many and what types of role situations must be tested before defining degree of personal consistency. Thus, results of the present study do tend to expand tested role situations and to confirm that notion that suppression of hostility may be part of a more consistent general style. However, that general style may encompass more than personal consistency in suppressed hostility. Rather, it is proposed as a style characterized by "disengagement".

Such a conceptualization embraces not only both the suppression of anger and the denial of guilt factors noted in some of Harburg, et al's, high blood pressure subjects, but also the anger suppression and expression of guilt in the other high blood pressure subjects. This latter factor could be subsumed by one of the important "disengagement" dimensions "turning against self" (TAS) which differentiated the hypertensives from the normotensives; while the former factors could be subsumed by the other "disengagement" dimension "reversal" (REV), which also significantly differentiated the hypertensive and normotensive groups. As noted previously, the hypertensive group had significantly greater dispositions than the normotensive group to use both the REV and TAS scale defenses. It may be recalled that the REV dimension encompasses such defenses as denial, negation and repression, while the TAS dimension embraces defenses which direct aggressive behavior internally toward the individual himself. Thus, Gleser and Ihilevich (1969) reported in this regard that TAS scale scores were found to be negatively correlated with Barron's (1953) ego-strength scale, and positively correlated with the MMPI Depression scale (D). Consequently, it does not appear unreasonable that the expression of guilt factor could be subsumed within the TAS dimension of "disengagement", while the suppression of anger and the denial of guilt factors be subsumed within the REV dimension of "disengagement".

Results of the Harburg, et al. (1973) study and the present study both were derived from similar procedures involving environmental conflict situations described in questionnaire-type format. One study has been reported which presented hypertensives with filmed environmental

situations. Although the study did not set out to directly investigate coping styles, some of its results are of interest here. Sapira, Scheib, Moriarty, and Shapiro (1971) had a group of 19 hospitalized hypertensives and a matched group of 15 controls (descriptive characteristics not given) view two movies. One depicted a rude and disinterested doctor, and the other depicted a relaxed and warm doctor. The authors reported that the most striking finding, based on post-viewing interviews, was that the hypertensives tended to deny seeing any differences between the doctors depicted in the two films. A second experiment with other groups of hospitalized patients used a post-film questionnaire rather than an interview. It also significantly differentiated between the hypertensive and normotensive groups. The data were interpreted as being compatible with the hypothesis that hypertensives may perceptually screen out potentially noxious stimuli. This interpretation is consistent with current findings of hypertensives' disposition to utilize denial and repression in environmental transactions, and thus it may be subsumed within the current study's conceptualization of hypertensive "disengagement".

Results of the present study thus can now also lend empirical support to and help to clarify the confusion surrounding the often criticized literature reports on the "hypertensive personality". As discussed in the Introduction, these anecdotal or case studies have a long history in the literature describing the hypertensive's tendency to inhibit strong emotions, particularly aggressive feelings. Current findings would confirm these reports, but place the hypertensive's disposition to repress aggression within a broader conceptualization of

"disengagement" style. This style embraces not only such characteristic suppressed anger, but also the negation and denial of other strong engaging affects. In addition, the style may also include the disposition to direct aggressive affect internally and thus dispose some individuals toward guilt. The "disengagement" conceptualization also provides the transactionally oriented environmental framework to lend support to Cochrane's (1971) belief that there was an important link between environmental stress and essential hypertension, although hypotheses investigating this relationship had received little support. Thus, in sum, results of the present study, which suggest a "disengagement" coping style in hypertension, provides an integrating framework for the often disparate psychological factors thought to relate to hypertension, namely, the personality characteristics or correlates making up the hypertensive personality, and the role of environmental stress.

In addition, more generally, the results tend to support the positions of Singer (1974) and Friedman and Rosenman (1974), suggesting that characteristic styles of interacting within the environment might be considered in terms of their chronic adaptations (or maladaptations) of physiological patterns having associated bodily "costs". As discussed in the Introduction, such costly physiological patterns may involve bodily reactions associated with the defense alarm reaction which exists both in animals and in man. Animal research, as reviewed by Henry and Cassel (1969) and more recently by Friedman and Dahl (1975) indicates that persistent hypertension can be experimentally induced in animals by repeated exposure to stressful environmental events. In

man, disengagement could become part of his preferred style of behavior as well. Thus, current findings also tend to lend some support to the positions of such theorists as Henry and Cassel (1969) and MacCulloch (1972); whose work contributed to the current general proposal that essential hypertension stems to an important extent from an individual's chronic attempts to "disengage" from stressfully perceived environmental transactions. And consequently, in the most general framework, the results lend additional support to the belief that psychosocial factors do play an important etiological role in the development of essential hypertension (Scotch & Geiger, 1963).

Treatment and Personality Variables

The confirmation of hypothesis five indicates that the utilization of specific directed "blood pressure" imagery was more effective than other general scenic imagery in lowering blood pressures via relaxation techniques. The potency of this technique appears to reside in its overall effectiveness. Thus, not only did each subject in subgroup C learn to lower his blood pressure, but in toto, subgroup C achieved the largest average decline in pressure. In contrast with these results, only about half of the subjects in subgroup B and a few in subgroup A, learned to lower their blood pressures. And overall, neither subgroup B nor subgroup A was able to achieve a significant decline in its pressure.

It is of interest to compare these findings with those reported recently by Shoemaker and Tasto (1975). These authors utilized procedures generally similar to those of the present investigation. They compared the effects of three techniques, before and after six treatment sessions, on the blood pressures of essential hypertensive subjects. Volunteer subjects drawn from the faculty and state employees at Colorado State University were divided into three matched groups of five subjects each: a muscle relaxation group, non-continuous biofeedback group, and waiting-list control group. Taped muscle relaxation instructions adapted from Jacobson (1938) were utilized, but without any type of added cognitive imagery. Neither descriptive characteristics nor medical information was reported for the 15 subjects in the study. A comparison of pre-treatment and post-treatment blood pressure measures indicated that after the six-treatment sessions, muscle relaxation instructions had a significant effect upon diastolic blood pressure, a mean reduction of 7.6 mm Hg for the group. Biofeedback also

was shown to significantly lower diastolic blood pressure, but a much smaller average reduction was found, 1.2 mm Hg. In addition, this reduction was based on the pressure declines of only two subjects in the biofeedback group.

Nonetheless, of particular interest is the fact that not only did one of the successful biofeedback subjects report that she envisioned "serene scenes" as she lowered her blood pressure, but the other successful subject reported that he had concentrated on "relaxing his 'inner organs'". This approach sounds very much like the successful technique used in subgroup C, while the use of "serene scenes" is akin to the subgroup B method. Shoemaker and Tasto (1975) do not report on whether or not the successful subjects in their muscle relaxation group also may have used such cognitive imagery while lowering their pressures, despite not being specifically instructed to do so. The authors incorporated these "idiosyncratic" findings which were based on the use of scenic and inner organ imagery in suggesting that relaxation was an important "common denominator" in the results. They further suggested that a viable treatment program for essential hypertension ought to directly encourage "mental relaxation" (i.e., presumably, the use of cognitive imagery).

The "idiosyncratic" findings of Shoemaker and Tasto thus might also be interpreted as supporting a general conclusion that cognitive imagery enhances muscle relaxation techniques used to help lower blood pressures. Current results also tend to support this consideration. Jacobson himself, in fact, who developed the principal muscle relaxation techniques (Jacobson, 1938), later discussed the role of imagery in helping to lower muscle tensions associated with high blood pressure

(Jacobson, 1964). However, he did not develop or suggest specific ameliorative imagery, but rather was concerned with patients' learning first to observe their tension-image patterns, and then to use associated muscle relaxation to relieve the muscle tensions (not unlike a desensitization approach).

However, because both muscle relaxation subgroups B and C in the present study received imagery instructions, it cannot be definitely concluded that imagery enhanced the relaxation effects; and that a relaxation group without imagery would not have done as well as subgroup C in lowering pressures. Shoemaker and Tasto's (1975) findings in fact might be interpreted in this direction as well, since the average decline in diastolic pressure in their no-image (presumably) muscle relaxation group, 7.6 mm Hg, compares well with the average decline for the directed imagery (presumably) group C, 8.4 mm Hg. But it is important to keep in mind that of course such a comparison is not appropriate. Subject characteristics, treatments, and actual procedures differ in important respects between the studies, and the actual numbers of subjects involved is quite small. These considerations thus suggest the need for additional research which might more specifically compare placebo, no-image, general image, and specific directed image muscle relaxation techniques on blood pressures, especially with long term follow-up. Ideally, as discussed previously, such additional research should utilize patients not on medications to optimally test the effects of these treatment techniques. It is recognized that the results of the current study are less definitive because subjects were taking medications during the study.

Nonetheless, the fact that there was a significant difference found between muscle relaxation subgroups B and C, whose treatment instructions differed only in the nature of their imagery, does again suggest that, not only does use of imagery probably have a role in treatment effects, but moreso, the particular nature of the imagery may itself have an important enhancing effect. This finding, that the particular nature of the imagery is significant, was also noted by Simonton (Note 6) in his work with cancer patients, and will be discussed below.

The question is thus raised for the present findings as to why the specific directed blood pressure imagery proved more effective than the general scenic imagery in lowering blood pressures. At the most general level of possible explanation may be the fact that the specific imagery might have been easier for the subjects to learn and recall. In a sense, with less detail to think about, the subjects might have found the specific imagery easier to "use" in enhancing general skeletal muscle relaxation. Jacobson's (1939) findings suggested that blood pressure did tend to fall with declines in skeletal muscle tensions. Thus, subgroup C subjects may have actually utilized "blood pressure" internal imagery instructions to relax even further the skeletal muscles discussed on the first part of their taped instructions. The subgroup B patients' general scenic instructions thus may not have enhanced general muscle relaxation as much, because it tended to have patients focus their attention to scenes outside of the body (while subgroup C's attention continued inside the body). In some future study, the specific focal aspect of this "internal versus external focus of instructions" explanation could be parcelled out by utilizing an external pleasant

scene with a highly specific focal aspect for subjects to concentrate on, e.g., a stream of water running slowly beside a dirt bank.

The above explanations might be verified by additional research which also measured muscle tension activity with the electromyogram (EMG), as in Jacobson's (1939) early work. Shoemaker and Tasto (1975) suggested that decreases in blood pressure are due to the fact that muscular relaxation may change the equilibrium of the vasodilation and vasoconstriction in the circulatory system, so that the imbalance favors vasodilation. This decreases peripheral resistance in the arterial system which effects a lowering of blood pressure.

Of course, this proposed vasodilation mechanism is the one which subgroup C patients were instructed to image directly. An interesting alternative explanation to Shoemaker and Tasto's is that the subgroup C subjects directly effected vasodilation changes through cognitive imagery, rather than indirectly just through enhanced skeletal muscle relaxation. Such an explanation is somewhat more speculative and "radical" in that it suggests the possibility of direct cognitive neural control over autonomic nervous system processes. That persons, e.g., yogis, may learn to alter their physiological functions without biofeedback has been demonstrated, and discussed by such researchers as Wallace, Benson and Wilson (1971). Thus, in so doing, the above alternative explanation goes perhaps one step further than the biofeedback research, which was revolutionary in first demonstrating that control of autonomic functions could be learned in animals and man. But as discussed in a recent review of the clinical applications of biofeedback (Shapiro & Schwartz, 1972), the relationship of cognitive processes to biofeedback

results has not been determined. In fact, the actual mechanisms involved through which biofeedback does help some patients to lower their blood pressures, or effect other changes in bodily processes, are not known. As noted earlier, cognitive imagery was utilized by the two biofeedback patients in the Shoemaker and Tasto (1975) study who were successful in lowering their blood pressures. And it was demonstrated in the present study, that subjects who utilized directed blood pressure imagery, learned to lower their blood pressures directly without biofeedback, suggesting a more direct cognitive control.

Present findings can only suggest the possibility of direct neural control of autonomic functions, and merely speculate on the existence of appropriate mechanisms involved. Green (1968) however has discussed the fact that the part of the brain most likely to effect the vasomotor center (which controls arteriolar vasoconstriction, vasodilation, and hence blood pressure) is the cerebral cortex, presumably the "seat" of cognitive imagery. More specifically, at the most simple level of speculation, since there is some evidence to suggest that cognitive mediating processes (perceptions and appraisals) can adversely effect autonomic blood pressure mechanisms (via the defense alarm response), then perhaps appropriate cognitive mediation might also reverse or positively effect such autonomic blood pressure mechanisms. It can be recalled that the provocative work of Simonton (1972; Note 1; Note 6), which utilized adjunctive relaxation and mental imagery techniques with cancer patients, suggested the present study's subgroup C technique. It did appear to be a useful application in the treatment of essential hypertension. And with regard to the above suggested direct cognitive

control mechanisms, Simonton (Note 1) quotes from the 1959 presidential address of Dr. Eugene P. Pendergrass, cancer specialist, to the American Cancer Society:

'As we go forward...searching for new means of controlling growth both within the cell and through systemic influences it is my sincere hope that we can widen the quest to include the distinct possibility that within one's mind is a power capable of exerting forces which can either enhance or inhibit the progress of this disease.' (p. 1)

Simonton's treatment plan emphasizes not only the use of relaxation and cognitive imagery, but also the examination (and if necessary the change) of his patients' attitudes and belief systems about their disease, their roles in it, and even about the desired medical outcomes. Simonton believes that the nature of the patient's imagery reflects such attitudes. Thus, a patient who visualizes his white blood cells as polar bears attacking his cancer (active, positive attitude) differs from the patient who imagines his white blood cells as snowflakes (passive, negative attitude). Such differences in attitudes did seem to effect actual treatment results. Based on a sample of 152 consecutive cases, Simonton (Note 1) reported a significant correlation between response to his treatment and independent staff ratings of patients' attitudes. For example, 20 out of the 152 cases had "excellent" treatment responses and "positive" attitudes despite the fact that 14 of the 20 had been given less than a 50% chance of recovery.

Consequently, the nature of the imagery itself, utilized in the present study, may have played an important role, and might help to explain the significant blood pressure difference found between subgroup B and subgroup C. Thus, an additional explanation for this finding may be related to how the subjects reacted to the imagery. Considering that

the treatment was to help lower blood pressures, the subgroup C blood pressure imagery may have seemed more reasonable or made more sense as part of a treatment approach to the subgroup C patients than the scenic imagery did to the subgroup B patients. Hence, the nature of the blood pressure imagery may have engendered a more positive attitude, expectation, or belief in the subgroup C subjects than the scenic imagery did in the subgroup B subjects.

Of course, there were subjects in each group who lowered their blood pressures; and these results, especially for the placebo subgroup A, thus also might be explained by this attitude or expectancy effect. For the subgroup A patients who did lower their pressures, this explanation may be considered as reasonable as the one suggesting that decline in pressure resulted solely from their sitting quietly while listening to the informational tapes. The work of Jacobson (1939) indicated that simply reclining or sitting, in and of itself, did not result in blood pressure decline unless there was actual muscle relaxation; i.e., persons may not be relaxing even when they appear to be sitting or reclining comfortably. Hence, the placebo subgroup A subjects who did lower their pressures may indeed have relaxed themselves; and this state of relaxation may have been engendered by the subjects' own positive beliefs or attitudes toward their treatment.

The importance of the patient's attitude, belief, or motivation in effecting treatment outcomes (or on the outcomes of any experimental procedures) has recently been re-emphasized by Benson and Epstein (1975) in their commentary on the placebo effect in medical practise. The authors suggest that this effect is a neglected asset in the care of

patients; and that rather than disdaining it, practitioners should cultivate it. Benson and Epstein view the placebo effect as deriving from a combination of factors involving the patient, the physician, and the relationship between the two, including the physician's own attitudes and expectations regarding treatment. The authors also note that the physiology of the placebo effects remains an unexplored area.

As noted earlier, the biofeedback researchers also have discussed the need to research the role of such patient variables as motivation and attitude in effecting biofeedback response differences (Schwartz & Shapiro, 1973); and have recognized the possible corruption of results due to such "placebo" effects (Shapiro & Schwartz, 1972). Miller (1974) thus has recently urged further study of variables, including whether the subject takes an "active or passive" attitude, which may form the basis for the large individual differences in visceral learning most often encountered.

Unfortunately, the four personality variables examined in the present investigation do not appear to help to clarify such individual differences. The variables of coping style, absorption, locus of control, and trait anxiety were measured in an exploratory way, as they were believed to possibly correlate with an individual subject's ability to "actively engage" in the treatment process. There may not be a simple association between such an ability and a patient's attitude or expectation. In any event, there were no straightforward associations found between these measured variables and declines in blood pressure.

It must be noted that the numbers of subjects in each treatment subgroup was rather small (nine), and hence any analysis of individual

subgroup correlations might prove spurious at best. With one possible exception, no significant results were obtained regardless. It is possible that the heterogeneity of the subjects themselves within the subgroups contributed to the non-significant findings with the personality variable correlations. In addition, as discussed above, individual differences in subjects' motivations and attitudes may have interacted complexly with the effects of treatment conditions, thus resulting in the unclear correlational data. Or, alternatively, the measured variables themselves, examined in a heuristic way, may not in fact be related to the "ability to actively engage" in the treatment process as originally postulated. This also appears to be a reasonable possibility based on the negative findings.

Nonetheless, one might consider that the overall correlations for the combined groups do suggest some small trends for personality variable-pressure decline associations. There were small positive correlations found for the coping style (.22), trait anxiety (.21), and absorption (.17) variables. Such findings hint that there may be some association between patients' abilities to lower blood pressure and their disposition to cope actively, and to become involved in self-altering states. With regard to trait anxiety, the finding does suggest, as hypothesized, some tendency for low trait anxiety to characterize those patients less likely to lower their pressures. As there were no significant correlations found between trait anxiety measures and initial baseline pressures, this trend cannot be explained simply on the basis of pressure ceiling effects; i.e., if low anxiety subjects had lower initial pressures there would be less tendency for pressure decline anyway.

Thus, the tendency might be explained on the basis of the expectancy-placebo effect, if patients whose trait anxiety were at higher levels had correspondingly higher "hopes" or expectations or motivations. The placebo subgroup A in fact did have a rather moderate correlation (.50) between trait anxiety and pressure decline. The other two subgroups, however, had only very small negative correlations.

Thus, in sum, as discussed above, there may be a complex interaction between the expectancy effects, motivation, placebo, the measured personality variables, and actual subgroup tasks, to account for the non-significant results. These findings of course suggest the need for additional research with larger and more homogeneous samples, to help to more clearly delineate the role of patient attitudes in self-help treatment procedures. Such attitudes may be more useful measures than the individual personality variables utilized in the present study. These scales may not be sufficiently discriminating on an individual basis (cf. Rotter, 1975) to predict individual treatment outcomes. In addition, it may be unlikely for volunteer patients to openly verbalize possible negative expectations in self-help situations. Thus, a more projective type assessment tool might be devised, perhaps not unlike the SCT.

SUMMARY

It is proposed that essential hypertension stems to a large extent from one's habitual attempts at "disengagement" from environmental transactions perceived and appraised as noxious and stressful. Such "disengagement" is considered "passive" coping or "avoiding", and as such may be characterized by defenses more like denial and repression than projection and displacement. Thus, a volunteer group of 17 white male hypertensive VA outpatients, mean age 62.9 years, mean education 13.1 years, was compared with a matched group of normotensive outpatients on the Defense Mechanism Inventory (DMI) and Coper-Avoidance Sentence Completion Test (SCT). As hypothesized, hypertensives scored significantly higher on DMI "passive" defense scales REV ($p < .0005$) and TAS ($p < .05$), and significantly lower on the DMI "active" defense scale TAO ($p < .0005$). Hypertensives also obtained significantly greater "avoidance" scores on the SCT ($p < .025$). These findings of contrasting coping dispositions were discussed as providing an important conceptualizing framework for clarifying the literature reports on the "hypertensive personality", and as supporting current psychosomatic theories linking personal styles of environmental interaction with associated bodily "costs".

An attempt was then made to reduce high blood pressures by application of a new adjunctive treatment technique. Because hypertensives were believed to utilize "passive" coping processes, relaxation techniques might serve especially well as psychologically acceptable "passive" coping behavior. However, the more "active" this process is, e.g., with specific directed blood pressure imagery, the more engaging and

effective it might be. Thus, 27 essential hypertensive outpatients on medications were divided into three treatment groups (A, B, C) matched for age (59.8 years), education (11.8 years), socioeconomic level, race, sex, and diastolic blood pressure (DBP, week 1 baseline, 89.8 mm Hg). Each group heard one of three treatment tapes for six hourly sessions over 3 weeks: A--medical information (placebo), B--progressive muscle relaxation with general imagery, e.g., a hammock scene, C--progressive muscle relaxation with directed imagery, e.g., arteries expanding. During week 5 when no tapes were played, only Group C significantly lowered its DBP from week 1 baseline (9% reduction, $p < .001$).

These findings were discussed in terms of the importance of cognitive processes in effecting and controlling bodily functions and thus in developing self-healing programs. In addition, no significant correlations were found between treatment groups' changes in blood pressure and scores on several personality scales. A complex interaction between expectancy effects, motivation, placebo, and task was discussed in accounting for the results, and emphasized the importance of individual personality variables for treatment outcome research.

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APPENDIX A

Individual Matching Variable Data
for 27 Hypertensives

S ^a	R/S ^b	Age (yrs.)	Edu (yrs.)	Job (rating)	DBP-wkI (mm Hg) ^c
A1	W/M	72	12	4	76.8
A2	B/M	49	10	6	86.0
A4	W/M	63	12	5	86.4
A6	W/M	55	14	2	105.0
A7	W/M	83	12	5	82.0
A9	W/M	56	14	6	85.5
A10	W/M	57	13	6	88.5
A11	B/M	51	12	6	100.0
A12	W/M	72	21	2	99.2
B1	W/M	61	09	5	77.6
B3	W/M	63	15	4	91.3
B4	B/M	65	08	5	87.0
B6	W/M	52	15	3	103.8
B7	W/M	66	16	4	77.0
B8	W/M	62	16	2	83.5
B9	W/M	59	12	5	92.5
B10	W/F	48	12	3	97.3
B11	B/M	56	04	7	95.0
C1	B/M	47	12	2	81.0
C3	W/M	58	12	3	87.2
C4	A/M	52	10	5	90.8
C5	B/M	64	08	6	96.2
C6	W/M	70	12	3	99.4
C7	W/M	56	09	5	85.5
C9	B/M	47	12	5	101.0
C10	W/M	64	09	5	89.2
C11	A/M	67	09	7	81.0

^asubjects coded according to subgroup, $\underline{n} = 9$ for each subgroup A, B, and C.

^brace and sex of subject.

^c $\underline{n} = 4$ for each subject.

APPENDIX B

Matching Variable Data of the White Male Hypertensives and Normotensives

Hypertensives					Normotensives				
S ^a	Age (yrs.)	Edu (yrs.)	Job (rating)	Dbp (mm Hg) ^b	S ^c	Age (yrs.)	Edu (yrs.)	Job (rating)	Dbp (mm Hg) ^d
B6	52	15	3	103.8	D6	52	13	5	
A6	55	14	2	105.0	D7	52	20	1	80.0
A9	56	14	6	85.5	D9	54	15	2	92.0
C7	56	09	5		D10	54	09	6	
A10	57	13	6	88.5	D11	55	16	2	95.0
C3	58	12	3	87.5	D13	57	14	3	82.0
B9	59	12	5	92.5	D14	57	08	4	
B1	61	09	5		D16	58	12	4	75.0
B8	62	16	2		D18	58	12	5	65.0
A4	63	12	5		D19	60	12	3	
B3	63	15	4		D20	62	12	5	
C10	64	09	5		D23	69	12	5	70.0
B7	66	16	4		D24	69	12	5	
C6	70	12	3	99.4	D26	71	08	5	
A1	72	12	4		D27	72	14	3	
A12	72	21	2		D28	74	08	5	
A7	83	12	5		D29	81	08	3	

^a_n = 17 for hypertensives, coded according to subgroup A, B, and C.

^b_n = 4 for each subject.

^c_n = 17 for normotensives, coded as group D.

^d_n = 1 for each subject.

APPENDIX C

Tape A

This tape is the first of a series we would like you to listen to. Research has recently suggested that the more understanding that a patient has about his disorder, the better his treatments may work. In addition, some research has also suggested that receiving the facts about the problem while in a pleasant and calm atmosphere may even by itself have beneficial treatment effects over a period of time. We are not yet sure about how this process works, but it may prove beneficial for you and your blood pressure over the course of this program. So, I'd like you to simply settle back and relax. Close your eyes and make yourself comfortable. Just relax and listen. Listen to the information. You do not have to remember all of it, nor should you try to. Think about the facts of high blood pressure. Or, just let the information pass through. As long as you do two things, listen and relax...

High blood pressure, or as it is also known, hypertensive disease, is a mass public health problem in the United States, one of the most important, if not the most important, afflictions producing premature sickness, disability, and even death in our adult population. The data collected 10 years ago by the National Health Examination Survey of the Public Health Service, data on a random sample of the United States population between the ages of 18 and 79, indicate that about 15% of whites and about 28% of blacks have high blood pressure. The disease widely occurs among all levels of the adult population. Low, middle, and upper incomes, North, East, South, and West, less and more educated, people who live in large cities and their suburbs, small cities and people who live in rural areas. Data consistent with these national health examination surveys have been repeatedly recorded by local surveys. The recent findings of the Chicago Heart Association detection project in industry, which collected information between 1967 and 1972 on over 35,000 employees of almost 100 companies, show a highly similar rate of occurrence of the disease as did the national survey. A sound estimate is that from 20 to 25 million Americans have high blood pressure...

High blood pressure afflicts not only the elderly, but also young and middle-aged adults, people in the prime of life, in their most productive years. The national health survey estimates that at ages 25 through 34, almost 4% of white men and 12.5% of black men have high blood pressure. Over 2% of white women and 8.5% of black women are hypertensives. This prevalence, or rate of occurrence rises steadily with age. At all ages, up to the age of 80, they are conspicuously higher for blacks. Overall, the ratio is about two to one. That is, about twice as many blacks as whites have diastolic pressures of 90 millimeters of mercury and greater. But for severe hypertension, that is, with diastolic levels of 115 and above, the

relative rate is over three times as high for black men compared to white men; and more than five and a half times for black women compared to white women. For young, middle-aged, and elderly adults, men and women, black and white, a high proportion with hypertension have evidence of heart involvement. This is called hypertensive heart disease. That is, not only is their blood pressure abnormally high, but also, medical examination reveals evidence of cardiac abnormality, that is, heart problems. These are found on electrocardiograms, sometimes called EEG's, and sometimes on chest x-rays, even though the person is frequently still free of symptoms. When high blood pressure has gone this far, risks of serious sickness, disability, and death are even greater than when elevated blood pressure alone is present without the evidence of heart disease. Among people with high blood pressure, definite hypertensive heart disease ranges from 48%, which occurs in white men, to 80%, which occurs in black women. In keeping with the tendency of hypertension to be not only more prevalent, but also more severe in blacks than in whites, hypertensive heart disease is present in rates of three, four, seven, and even nine times greater for blacks of a given age-sex group than for whites of the same age-sex group.

Hypertensive disease is a serious public health problem, despite the fact that at any given time a majority of persons with it are symptom free. This is so because they are nonetheless at a markedly increased risk of experiencing major cardiovascular events. This is the term used to deal with heart failure, heart attack, stroke, and some kinds of kidney failure. And these diseases result, of course, in chronic illness and disability. Moreover, young and middle-aged adults with high blood pressure are at a markedly increased risk of dying prematurely from these cardiovascular complications. This is true even for persons with even slight elevations of blood pressure. I deliberately avoid the term mild and benign hypertension because they are disarmingly misleading and have blocked proper understanding of the seriousness of the problem, among both the general public and health professionals, even including physicians. For many years a loud and clear message on this matter has been forthcoming from the insurance industry, information from the Society of Actuaries most recent study. An actuary is a statistician who gathers health information in large groups of people. The Actuaries' most recent information clearly demonstrates the increased risk of premature death for persons of even lesser degrees of hypertension. They show, for example, that men aged 35, with a blood pressure reading of 142 over 90, without any other impairments, experience a survival rate of 80.6% over the next 20 years compared to 89% for people with normal blood pressure. That is, even this so-called modest elevation of blood pressure, all too frequently treated as insignificant and ignored by some doctors, was associated with a 76% higher death rate in these middle-aged people. Similar findings have been recorded by the perspective epidemiological research studies carried out in various parts of the country over the past 20 years.

At this time, I'd like you simply to think about the material you have heard while you relax for about 5 minutes. This may seem like a long time, but it will only be about 5 minutes. Just remain comfortable and relaxed for the next 5 minutes. Keep your eyes closed. Do not speak. Just relax for this time, until the tape resumes... (5 minute pause)...Now we shall continue this tape.

More and more information is being gathered very consistently pointing out the importance of treating high blood pressure. The National Cooperative Pooling Project, which some of you might have heard about, included the Albany, New York public employees, employees from the Chicago People's Gas Company, employees from the Chicago Western Electric Company, the entire community of Framingham, Massachusetts, and studies made by Minneapolis and St. Paul business and professional groups. It covered over seven and a half thousand white men between the ages of 30 and 59. After excluding those men who had definite heart disease, the remaining group were classified according to their diastolic blood pressure level at this time. Levels in the range between 95 to 104 were recorded for 940 of these men. This is over 12%. Another 493, or about 6.5%, had levels of 105 and greater. The really interesting information was based on the followup studies. Over the next 10 years the death rate, including sudden death, was twice as high in the group with so-called mild hypertension, that is, diastolic levels of 95 to 104. It was twice as high compared to those with normal diastolic levels. And the increase in risks of coronary death, including sudden death, was more than three times as high for the group of 493 men with pressures of 105 and greater. The most straightforward and crucial index, that is, death from all causes, showed that the 10 year rate was 60% higher for men with diastolic pressures of 95 to 104, compared to people with normal blood pressure, and it was 200% higher for those with hypertension in the range of 105 and greater. There was a 60% greater mortality rate from all causes even for the men with diastolic pressures of 85 to 94. The data from this pooling project also demonstrates one other very important point. When hypertension coexists with other major risk factors, for example, cigarette smoking and high blood levels of cholesterol, the risks are additive. Thus, men originally aged 30 to 59 with hypertension as the only risk factor experienced twice as high a death rate over the next 10 years as men with no risk factors. But when the hypertension coexisted with cigarette smoking or high blood cholesterol, the risk of dying was more than three times that of the normals. When hypertension was present along with cigarette smoking and high blood cholesterol, the death rate was five times.

These data practically speak for themselves in terms of their implications for public health and for medical practice. Similar data are available indicating that a single blood pressure reading in a routine school examination of college students, that is, young men in their late teens, is already very meaningful as a predictor of the future. Even that early in life, slight blood pressure elevation identifies people at greater risks. These are data from a study done by Dr. Ralph Paffenbarger, of University of Pennsylvania and Harvard

University students of 20, 30, 40 or more years ago. He went to their records to pick up data from their college entrance physical examinations. He then traced those people 20, 30, 40, or more years later and determined who was currently living and the cause of the deaths of those who were no longer living, and he related these findings to the college entrance physical examinations. Systolic blood pressure at college entry is one of the variables he studied. This was evaluated in a very simple way, whether it was above or below 130. Consider the limitations of this information. This was a single measurement, the time of the day was unknown, who took the blood pressures was unknown, whether it was done lying or standing. These are very crude measures. However, even then, the teenage young men with levels of 140 and above had a 1.6 times higher mortality from heart disease over the next many years compared to those that were under 130. That is, they had a 60% higher mortality...

And now, again, I'd like you simply to think about the material while you relax for another 5 minutes. This may seem like a long time, but it is only 5 minutes. During this time, just remain comfortable and relaxed, with your eyes closed, do not speak. Just relax for this time, until the tape resumes...(5 minute pause)... This brings us to the close of this tape. In a moment, while you are still relaxing and thinking about the tape, someone will be by to take two separate blood pressure readings from you. Simply enjoy your relaxation while you think about the material. So, do not open your eyes, nor speak. Just try to remain relaxed while all the readings have been taken and you are told what to do next. So now, just maintain your relaxation...

APPENDIX D

Tape B

Part 1

This tape is going to teach you how to become completely relaxed. It will help you to review all your muscles, check them out for tension, and then relieve that tension and relax it. This is important, because the more relaxed your body is, the more naturally lower your blood pressure is. You can teach your muscles to become relaxed hour to hour and day to day. You can teach your blood pressure system to be more naturally lower in time...I'd like you all to begin by giving yourselves a simple example of what muscle tension can feel like, so that you will be able to recognize it even in very small muscles...and also you will be able to feel the difference between minor muscle tension and relaxed muscles. So begin by tiring your eyes...by looking upward...by looking upward as far as possible, almost as if you were trying to see your own eyebrows. As you do this you might pick out a spot on the ceiling and focus your attention on this spot. Holding your eyes in this position is unnatural and it's going to get your eyes very very tired. This is causing tension in the eye muscles and you may experience this as a feeling of getting sleepy, though you actually will not fall asleep. You may get the impression that your eyelids are getting heavier as your muscles become more and more tense and more tired. In a few moments this is also going to help you close your eyes so that you can focus your attention on the rest of these instructions...

So look at the spot and notice the tension in your eye muscles. You are finding that it is getting a little more difficult to keep your eyes fixated on the spot. Your eyelids are getting tired...the eye muscles are getting tired...it's harder and harder to keep your eyes open...Now I am going to count to 5, and I'd like each number to serve you as a signal to pay more and more attention to this increasing tiredness and fatigue of your eye muscles...and to pay attention to a sensation similar to sleepiness and heaviness. And at the number 5, if your eyelids have not closed almost by themselves, close them voluntarily. And then pay attention to the soothing relaxed feelings in your eye muscles as you relax them and relieve the tension...1...heavier and heavier...more and more...2...feeling this tension and fatigue increasing, harder to keep your eyes open...3...very tired, heavy...4...more and more...heavier and heavier...5...o.k., close your eyes. Now squeeze them very tightly shut. And then relax them completely, but keep your eyes closed. You'll find that you will be able to keep your eyes closed without any effort. You will be alert and able to listen to these instructions. Note the relaxation in your eye muscles. Note the calmness of them as you have relaxed them...

And now, because exhaling is a relaxation reflex, you can prepare your body for total relaxation by taking a deep, deep breath. Go ahead, fill up your lungs now...deep deep breath. Now, just let all the air go. Don't force it out, just let the air come out and feel that wave of soothing relaxation pass through your entire body. Take another deep, deep breath, and then just let it go. Again, feel the wave of relaxation spread throughout your body. Think of this relaxation spreading to all your muscles...very, very relaxed, even the tips of your fingers and toes. Notice how our muscles tend to follow our thoughts, and as you think of the relaxation spreading through the muscles, notice how you feel the relaxation also spreading through the muscles. Once more, deep, deep breath... and then just let it go...Feel the relaxation spreading to the tips of your fingers and to the ends of your toes. And now focus your attention on your toes, just the muscles of your toes. Make these muscles loose and limp. Let go of the tension and then continue to let go...beyond where you normally stop...getting an extra degree of relaxation from these muscles. As you do this, you may experience hardly any feelings to tell you where your toes are, because you've made these muscles so relaxed and so limp...very free of tension. Like your eye muscles, you've gotten rid of muscle tension in the very small muscles. You've made them feel loose and relaxed. This is very, very pleasant...

Now concentrate on your ankles...Make your ankles loose and limp, so that your feet are very very limp and completely free from all tension...All the muscles in your feet...so loose, so very very limp. As you do this you can hardly tell where your feet are. They may feel hollow, or that they've almost disappeared at the ankles. And this is because muscles that are completely relaxed do not send any signals back to our brains to let us know where they are...limp and loose, very, very relaxed...

Now concentrate on the muscles between your ankles and your knees... the large calf muscles, the other muscles along the shin bone. Again, get rid of all the tension in these muscles by relaxing them and then forcing out all the remaining tension. Keep on going beyond the time you normally would stop relaxing...Get that extra degree of relaxation, forcing out the tension...making these muscles very, very loose...very limp, deeply, deeply relaxed...

Think about your knees...Make your knees very loose, limp, relaxed, free of all tension...floppy, sloppy, loose and limp...You can hardly feel your lower legs they are so relaxed...Now focus your attention on your thigh, the large muscle between your knees and your hip joints. Think about these muscles, focus on them. Again, let go and force out the tension...Relax...loose, getting rid of that extra bit of tension, making the muscles so limp, so loose, that you can hardly feel them...beyond normal relaxation to the point of complete freedom from tension, so they feel heavy, hollow, loose, limp... And as you deeply relax your muscles, you may or may not notice some tingling sensations or perhaps experience a muscle twitching...This

is perfectly normal as we relax our muscles, forcing out all the tension...Make yourself free from all tension...

Now concentrate on about the lower third of your trunk, focus on the small muscles of your back, your abdominal muscles, the muscles on each side of the spine. The muscles in the back are postural muscles and they tend to resist being relaxed...think about them, focus your attention on them, then let go and force out the tension. Make these muscles limp, and just let your abdominal muscles go, just let your guts spill. If you should have to happen to cough, you can always tighten them temporarily so you don't have any discomfort, then you can relax them again. Let everything go, every muscle you have control over...Make these muscles limp and loose, free from tension, feel yourself sort of sinking, heavy, very relaxed.

And concentrate on about the middle third of your trunk, the upper abdominal muscles, the lower rib cage...Breathing is entirely automatic, you can get maximum relaxation from all the muscles and still breathe very, very comfortably...Focus your attention again on the back muscles. As we go up the spinal column the muscles get a little larger, they may tend to resist deep relaxation, so think about them, feel yourself sinking...Let go the tension, and then force out the tension...limp, loose, heavy, very, very relaxed, very free from all tension...

Now focus on the top third of your trunk, the large chest muscles, the muscles under your arms, the muscles in the back around the shoulder blades, the collar bone, the shoulder muscles themselves. Limp and loose, very, very relaxed. Think about the large group of muscles in your upper torso...Force out all the tension, and go beyond that, making them extra limp and extra loose, very, very relaxed, free from all tension...Think of your shoulder joints...Make these limp and loose...Concentrate on the muscles between your shoulders and your elbows, the biceps and triceps. Again, let go and force out all tension, making them very, very loose, very relaxed, free from all tension, very pleasantly relaxed, free, loose, limp. Focus on your elbows...Make these joints feel floppy, sloppy loose, loose and limp...Think about the long muscles between your elbows and your wrists, the muscles in your forearms...Focus on your wrists...Let your hands go limp...Think of the muscles in your palms, your fingers, even your finger tips, letting go, forcing out...deeply deeply relaxing, tension draining, leaving you, just as if it was melting away...

And concentrate on the muscles of your neck...Make these neck muscles very loose and very relaxed...Pay special attention to the muscles in the back of your neck. We use these almost constantly for postural purposes. Think of your head as being free, as being very very loose, resting very loosely, limp, free from all tension. Now focus on the muscles of your face. Concentrate on your jaw muscles, just let your mouth hang open. If you prefer to keep your lips

loosely together, make sure your teeth are not clenched. Make your facial muscles very, very free from tension, very loose, very limp... the muscles around your lips, the muscles in your nose, your cheeks... Think of the little muscles around your eyebrows...your forehead... the muscles around your ears, even in the scalp...every muscle in your face and scalp, jaw, might get an extra degree of relaxation by feeling as if you are in a stupor, which is a relaxation of all facial muscles...you get very very loose so that if you were asked to speak, it would be quite an effort and your speech would be sort of thick and mushy because all the muscles are so limp and so very very loose, free, free from all tension...

And now I'm going to count to 5 and I would like each number to serve as a signal to put yourself into an even deeper state of relaxation, total relaxation, and as a signal to check out your body, reviewing the muscles to make sure no old habits of tension have returned. Make use of any special feelings that helped you get an extra degree of control over your body, feelings of getting heavy, and dull, hollow, or light and floating, a feeling of numbness... whatever helped you to relax...Make use of such feelings, get an extra degree of control in this way...1...more and more, deeper and deeper, very, very relaxed, very limp...2...more and more, down, limp, very, very relaxed, heavy...Check out the muscles in your feet, your legs, your trunk, back, your arms and hands, your neck, your face and scalp...limp and loose, very, very relaxed...3...deeper, deeper, state of complete muscle relaxation, very limp...4...more and more, deeper, deeper, very, very relaxed, heavy...5...completely free from all tension, a deep state of muscular relaxation...

Part 2

Now that you're in a very deep state of complete relaxation, we can go on to the second part of the relaxation exercises. Here, you can use your powers of imagination to help yourself relax even more. So, I'd like you to imagine yourself in a time and place when you're very, very relaxed, feeling perhaps just as you are now. Use your imagination to transport yourself while you are in this completely relaxed state into a favorite relaxation scene. I'd like you to picture yourself there vividly, just as if you actually were there. Perhaps, you might imagine yourself just waking up in the morning... picture yourself in your bed, the bedroom is very very comfortable, your bedclothes are very soft and warm, and it is very very pleasant... your entire body is so relaxed, so peaceful, and you can picture the details of this scene clearly, while you bask in complete relaxation...Picture the blanket, the soft bed...You can see the room, the fluffy pillows...Include whatever your scene consists of while you're completely relaxed...Or you might imagine yourself lying on a comfortable air mattress which is floating in a swimming pool and it's very very comfortable, as you continue to maintain a state of complete relaxation...There's just enough light and breeze to be very,

very comfortable...Or you might prefer to imagine yourself stretched out on some comfortable cushions on the deck of a boat. It's a very lazy day and you're on the boat...you're floating and you can see a cloud overhead in a blue sky and it's very very comfortable...and you can continue your state of complete muscle relaxation. Select the scene that you prefer. Choose whatever fits your preference, whatever you like to picture yourself in, but make it vivid...Try to be there, actually see it in your mind, picture the details, the setting, the things around you and the feelings you have as you are in that relaxing scene...

To help those of you who may want to pay attention to another scene, I'll give you an example by having you picture yourself in a hammock. If you prefer to stay in one of the earlier scenes, or in your own scene, just ignore these instructions, except to follow some of the suggestions to make it very, very vivid. So picture yourself lying in a very comfortable hammock which is tied between two beautiful trees...And as you lie in this hammock, you can feel yourself very very relaxed and you look up and you can see the light of the sun and the leaves of the tree above you...There is just a little breeze, so the leaves are moving...As you look up, you see what is almost a cloud of beautifully moving leaves...and around the leaves and in between the branches, you can feel the hammock swaying...You can picture yourself very gently swaying to and fro as you maintain yourself in a state of complete, deep, very very comfortable relaxation...

You can picture the surroundings, perhaps a glimpse of another piece of lawn furniture, or a house in the background...bushes to soften the scene...You might try to imagine a breeze gently blowing across your face...you're very very comfortable, it's a pleasant day, the temperature is just perfect. You're lying in the hammock, you're stretched out, perhaps gently swaying, your body is relaxed, you can actually see the cords at the end of the hammock and how they're fastened to the tree trunk. Then as you lie there comfortably, you can picture the bark on the tree...And, perhaps, because it's so quiet, a woodpecker is hopping, hopping, climbing up, up on the tree trunk. And you watch him quietly as you lie there, very, very relaxed, very very limp, your body completely free from tension... a comfortable pillow at the back of your head...And your eyes go up as you watch the woodpecker going higher and higher, becoming invisible as he goes behind some of the branches of the tree, but you might hear a little rapping as he fades into the distance...Your eyes again go up as you see these lovely clouds of shimmering leaves, shaking in the slight breeze, and you're so very, very relaxed, so very content and comfortable...pleasantly relaxed and loose and limp... And you see the hammock swaying ever so slightly...There is a very pleasant breeze, moves you just ever so little...You notice the hammock moving, hear the slight squeak of the rope as you watch the rope as it's tied to the tree trunk. And it's so pleasant and it's so comfortable...The sky is blue and you notice a puffy white cloud

as you feel a breeze across your face that's just pleasantly cooling... You maintain yourself in this pleasant deep state of relaxation... Your body limp and loose, very free from tension, your mind calm and peaceful as you share this pleasant outdoor experience with nature ...so calming, so relaxing, pleasantly beautiful with the leaves, the breeze that sways the hammock...You see the hammock, you see the cord tied to the tree trunk...You look at the texture of the bark on the tree...And you carry your eyes upward where the tree branches, and you notice twigs and more branches...Finally, you see the clouds of shimmering leaves shaking in the breeze...the sky behind them, a background of blue...pure, beautiful blue and a puff of a white, cotton-like cloud, slowly drifting across, across the sky...You see it meeting the leaves of the tree, giving some white, puffy background. And you feel so comfortable, so relaxed, so free of care, so calm, peaceful, very very relaxed...swaying, you're relaxed, calm, feel the breeze across your face...See the trees, the lovely branches, the texture of the bark, the leaves moving in the light breeze...casting shadows on each other...the shadows moving because the leaves are moving...in the background a lovely blue sky.

You're picturing this vividly...Your imagination is working to make this almost as if you were actually there...You can experience the visions of this beauty...of this pleasantness, calmness, while you relax your body, getting all the tension to be rid of...very very limp, very loose, calm, peaceful, beautifully, beautifully relaxed... in this very pleasant scene that you can picture almost as if you are there...Now just continue this process for the next few minutes... Just picture yourself in your relaxing scene...Picture yourself in your scene, vividly, pleasantly...deeply, very deeply relaxed, picturing yourself in your scene...relaxing in your scene, seeing yourself in your scene vividly.....

In a moment, while you're still enjoying your deep relaxation and picturing yourself in your scene, someone will take two blood pressure readings. Just try to ignore this while you maintain your deep deep relaxation, while you picture yourself in your scene...Enjoy your good feelings. So do not open your eyes or speak, just try to remain deeply relaxed while all the measurements are taken, and you're told what to do next. So, now, just maintain your deep deep relaxation...Focus on your good feelings...Continue to see yourself in your scene...

APPENDIX E

Tape C

(First part of Tape C is identical with Tape B, Part 1)

...Now that you've put yourself into a state of complete relaxation, we shall go on to the second part of the relaxation exercises. And here you can use your powers of imagination to relax even more, and to lower your blood pressure even more. Now recall that your arteries are the blood vessels which carry your blood from your heart to nourish all your muscles and tissues and organs. Recall the sketches which you've seen. Thus, you might think of the arteries as a system of irrigation pipes or hoses or tubes running from the heart to all parts of the body. So picture this system of tubing. Picture these tubes in your mind. Imagine the arteries in your own body. Think of those pipes strung out through your body... They go to all the muscles...all the muscles you have controlled by making them deeply relaxed...They go to all the internal organs, like the kidneys, through the neck, through the arms...Recall pictures you may've seen...of the arteries...going through the arms...Focus your mind and attention on picturing these arteries, picturing these arteries or any arteries you like...the large arteries in the forearm...Focus on the artery in the same way that you focused on the muscles you've just deeply relaxed...except I would like you to picture the artery...The important thing is to have a clear image of the tubes in your arms or wherever you choose...

Think of these tubes as being muscle, very much like a tube that can get wider...As you relax the muscles in the walls of the tubes, your arteries get wider...Imagine this, focus on the picture of the artery walls relaxing, getting wider, expanding, very, very pleasantly relaxed...And the wider your arteries get, the more easily your blood can flow through. The more easily your blood can flow through, the lower your blood pressure gets. And thus, you can picture in your mind, your blood pressure system working normally, the way it should... Arteries wider, blood flowing smoothly, very easily, and blood pressure is going down. Picture this in your mind any way you like. The important thing is to have a picture in your mind, an image of the arteries relaxing, getting wider and wider, the blood flowing through easily, more and more easily, and the blood pressure falling...

The arteries are relaxed, getting wider...wider...You can focus on any one of your arteries, like the arteries in your arm, or focus on arteries all throughout your body...Concentrate on those hoses or tubes or whatever, and relax them...Make these arteries loose and limp... Force out the tension in the muscles in your artery walls just as you did the other ones. As you do so, be sure to picture them getting wider...wider...expanding...Picture your arteries getting very free of tension...loose, blood flowing more easily and smoothly and calmly... through the widening arteries...Feel the blood flowing easily, calmly, smoothly, warmly through the widened arteries. You may concentrate on one artery or a group of arteries, or you may shift your focus to any part of your body or the arteries going through your entire body...

Remember the sketches of the arteries that showed how the arteries branched out, getting smaller, becoming very very much like a tree, as the arteries multiply and get smaller and carry the blood throughout your entire body...

Artery walls are made of muscle, so you can relax these muscles, just as you relaxed the other muscles...Think about these arteries, picture these arteries which branch out through your body...Feel them, make these arteries relaxed, see them widening, expanding, feel the blood flowing very very freely through them, as you picture this in your mind...as you picture this in your mind, and you make the muscle walls loose and limp, wider and wider, more and more relaxed, the blood flowing freely, more and more, your blood pressure going down...The muscle walls of the little tubes relaxed, getting larger, getting so relaxed, expanding, permitting the blood flow to be more easy, calm, therefore lowering the blood pressure down as the blood flows through easily, loosely, calmly...

It's as if there's an added warmth also spreading, spreading with the freely flowing, nourishing blood...Feel this relaxing pleasant warmth spread throughout your body...As you relax your arteries and picture them widening, your blood pressure falling...As you do this, let the new inner deeper sensations pleasantly add to your already deeply relaxed state, so that you have loose, limp muscles...enjoying the feeling of deep deep relaxation...And you have the blood flowing easily, warmly, the arteries more expanded...Feel these processes and picture them in your mind, this health-giving process of relaxation and expanding your arteries...the blood easily flowing, lowering the blood pressure...

What you're doing is focusing your attention on rebalancing the natural and normal way your body should work. And by picturing this process, and by feeling it...by visualizing it and by experiencing it your mind has the power to help you create a state of health...wholeness, normal pleasant health...Continue to relax the arteries...Relax the arteries, continue to picture them widening, feel them expanding...Let these new inner deep sensations pleasantly add to your very comfortably relaxed state...blood flowing easily, freely...blood pressure lowering, falling...As you are experiencing this relaxed process, you can actually feel that it is helping you...You are experiencing yourself being well, your blood pressure lower, normal...

Consider this feeling of being well, this relaxed calmness, this healthful, positive sense of well-being. Picture yourself and feel yourself completely well and healthy. See yourself healthy and well. Let these feelings combine with your deep relaxation feelings...The muscles in the arteries relaxed...giving you a sense of healthy, positive well-being...deeply relaxed and feeling well...These are powerful health-giving feelings, as you picture yourself and you feel yourself healthy and well, this helps to make you well...As you experience these feelings you are actually helping to

make yourself healthier...Experience these feelings...Allow yourself to feel a sense of being perfectly well as you relax...deeply relaxed... as you see yourself well...

Now, just continue this process for the next few minutes...Just continue to picture yourself healthy and well...Picture yourself healthy and well.....deeply relaxed.....picturing yourself healthy and well.....arteries wide, blood pressure down, seeing yourself healthy and well.....feeling well, picturing yourself healthy... feeling deeply relaxed and calm.....

In a moment, while you are still enjoying your deep relaxation and picturing yourself healthy and well, someone will take two separate blood pressure readings from you. Try to ignore this while you maintain your deep relaxation and while you picture yourself well... Just enjoy your good feelings...So, do not open your eyes or speak. Just try to remain deeply relaxed while all the measurements are taken and you are told what to do next...So now, just maintain your deep deep relaxation, focus on your good feelings...Continue to see yourself healthy and well...

APPENDIX F

Outline of Procedure

Hypertensives^a

Week	Session	
1	1...	(Discussion, STAI)...Rest...Baseline BP ^b ...DMI
	2...	(" , I-E)...Rest...Baseline BP...ABS, SCT
2	3...	(Rest, BPs) ^bTape...(BPs) ^b
	4...	(" , ")Tape...(")
3	5...	(" , ")Tape...(")
	6...	(" , ")Tape...(")
4	7...	(" , ")Tape...(")
	8...	(" , ")Tape...(")
5	9...	(" , ")Rest...Baseline BP ^b
	10...	(STAI, Rest, BPs)...Rest...Baseline BP...Discussion

Normotensives^c

1	1...	(Discussion, STAI, DMI)
	2...	(" , I-E, ABS, SCT)

^a \underline{n} = 41 for session 1; \underline{n} = 27 for blood pressure data reported in Results (\underline{n} = 9 per subgroup A, B, and C).

^b \underline{n} = 2 per subject.

^c \underline{n} = 29.

APPENDIX G

Instructions Following Blood Pressure Measurements

In a few seconds I'm going to count backwards from 5 to 1, and I'd like each number to serve you as a signal to pay more and more attention to the outside, to this room...At the number 1 you can open your eyes and you'll be very refreshed...and inside you'll feel calm ...And try to continue these pleasant feelings and the good effects of these exercises...Conserve your pleasant feelings...5...4...3... paying more attention to the outside...2...1...Open your eyes... calm and refreshed.....Now please just remain seated while we proceed...

APPENDIX H

Baseline Diastolic Pressures for Hypertensives

Diastolic Blood Pressures (mm Hg)^a

AVERAGE PER WEEK

Subject ^b	I	II	III	IV	V
A1	76.8	68.0	71.4	70.7	73.4
A2	86.0	94.2	87.0	84.3	85.1
A4	86.4	66.2	62.5	61.0	80.5
A6	105.0	91.0	99.2	96.5	95.5
A7	82.0	77.5	86.7	76.5	97.2
A9	85.5	85.5	89.5	83.5	85.0
A10	88.5	76.0	78.2	75.5	73.5
A11	100.0	100.0	97.0	87.5	99.0
A12	99.2	109.8	109.1	109.1	108.1
B1	77.6	89.8	77.0	99.0	90.2
B3	91.3	85.0	89.0	86.2	88.0
B4	87.0	75.0	84.5	81.6	84.4
B6	103.8	97.0	109.0	97.7	95.5
B7	77.0	76.8	72.5	79.5	73.2
B8	83.5	85.8	92.5	94.5	84.8
B9	92.5	93.5	88.0	96.0	104.8
B10	97.3	105.5	103.2	96.2	93.5
B11	95.0	91.0	89.3	92.2	91.2
C1	81.0	105.5	88.0	75.5	79.0
C3	87.2	82.0	77.0	78.0	77.0
C4	90.8	94.0	84.2	87.5	84.8
C5	96.2	86.8	94.5	88.0	84.0
C6	99.4	82.8	89.2	91.0	87.2
C7	85.5	83.2	78.0	81.5	77.0
C9	101.0	94.0	91.9	90.6	90.9
C10	89.2	81.2	77.5	80.0	82.8
C11	81.0	72.5	73.2	77.5	73.0

^an = 4 per subject.^bsubjects coded by subgroup.

APPENDIX I

Pre-Baseline Diastolic Pressures for Hypertensives

Diastolic Blood Pressures (mm Hg)^a

AVERAGE PER WEEK

Subject ^b	I	II	III	IV	V
A1	76.8	75.0	77.6	75.3	76.0
A2	86.0	90.0	86.0	89.3	86.0
A4	86.4	86.2	70.5	65.8	83.2
A6	105.0	92.5	99.0	108.0	98.0
A7	82.0	79.5	89.4	87.0	102.8
A9	85.5	84.8	89.0	84.5	85.8
A10	88.5	79.0	81.5	77.0	74.8
A11	100.0	104.0	102.0	97.2	102.0
A12	99.2	123.0	110.0	110.0	106.1
B1	77.6	110.0	88.5	113.6	94.5
B3	91.3	93.0	91.5	91.8	90.0
B4	87.0	92.0	89.0	86.7	86.1
B6	103.8	95.0	109.5	98.6	98.6
B7	77.0	85.5	79.0	84.0	76.2
B8	83.5	93.5	95.8	98.9	86.5
B9	92.5	96.0	97.0	105.7	108.5
B10	97.3	111.8	109.0	102.3	101.0
B11	95.0	101.5	96.9	94.8	92.2
C1	81.0	110.0	94.0	81.5	87.5
C3	87.2	83.8	76.0	82.5	80.2
C4	90.8	96.2	92.5	94.0	93.2
C5	96.2	92.0	94.5	95.8	92.5
C6	99.4	96.8	99.8	101.5	91.5
C7	85.5	91.0	83.8	89.0	85.5
C9	101.0	95.0	95.0	98.8	99.9
C10	89.2	86.2	83.0	84.0	87.8
C11	81.0	80.8	76.0	80.5	81.8

^a \bar{n} = 4 per subject.

^b subjects coded by subgroup.

APPENDIX J

Declines in Diastolic Pressure and Scores
on Personality Measures

Declines			Measures			
Subject ^a	-BP ^b	-%	SCT	Ab	I-E	Tr
A1	3.4	4	20	13	05	37
A2	0.9	1	15.5	30	10	49
A4	5.9	7	13	01	06	44
A6	9.5	9	25	18	10	73
A7	-15.2	-19	13.5	01	03	24
A9	0.5	1	20	09	11	39
A10	15.0	17	23.5	14	08	35
A11	1.0	1	18	08	08	28
A12	-8.9	-9	17.5	10	02	31
B1	-12.6	-16	26.5	03	00	46
B3	3.3	4	22	12	06	28
B4	2.6	3	24	17	16	57
B6	8.3	8	22.5	04	06	38
B7	3.8	5	18.5	22	11	45
B8	-1.3	-2	26	22	12	35
B9	-12.3	-13	14	10	18	37
B10	3.8	4	19.5	32	02	25
B11	3.8	4	22	02	08	50
C1	2.0	2	26	17	06	45
C3	10.2	12	22.5	17	08	40
C4	6.0	7	29.5	23	07	50
C5	12.2	13	24.5	02	07	35
C6	12.2	12	14	14	01	64
C7	8.5	10	13.5	10	08	25
C9	10.1	10	21	05	09	48
C10	6.4	7	15.5	15	05	31
C11	8.0	10	9.5	08	12	28

^a subjects coded by subgroup.

^b (mm Hg).

APPROVAL SHEET

The dissertation submitted by Paul J. Minsky
has been read and approved by the following committee:

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

June 8, 1977
Date

Roderick W. Pugh
Director's Signature