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AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN
IRRATIONAL BELIEFS, NEGATIVE AFFECT, STAGE OF CHANGE
AND ESSENTIAL HYPERTENSION

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Craig S. Travis, B.A., M.A.

* * * * *

The Ohio State University
1999

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ABSTRACT

Purpose of the Study: The present study investigates the relationship between Rational Emotive Behavior Theory (Ellis, 1962), negative affect (anxiety, depression, hostility), the Transtheoretical Model of behavior change (Prochaska & DiClemente, 1983) and essential hypertension.

Procedure: Subjects were 78 volunteers from the Mount Carmel Family Practice Centers. Subjects completed 3 instruments: Demographic Risk Factor Questionnaire, Attitudes and Belief Scale-II (A&B-II), and the Multiple Affect Adjective Checklist-Revised (MAACL-R) trait form. The independent variables included 7 subscales on the A&B-II: Total Score (TOT), Total Irrational Score (TIS), Total Rational Score (TRS), Demandingness (DEM), Self-Rating (SR), Awfulizing (AWF), and Low Frustration Tolerance (LFT); anxiety, depression and hostility scores on the MAACL-R; and stage of change scores from the demographic questionnaire. Forward stepwise multiple regression analysis and analysis of variance (ANOVA) answered the following research questions:
Research Question 1: What are the demographic risk factor characteristics of the sample?

Research Question 2: Is there a relationship between irrational beliefs and essential hypertension?

Research Question 3: Is there a relationship between negative affect and essential hypertension?

Research Question 4: Is there a relationship between stage of change and essential hypertension?

Results. Data did not show a statistically significant relationship between essential hypertension and Ellis’s irrational beliefs. However, data did indicate a moderate negative relationship between depression and essential hypertension ($R = .234$). No other statistically significant relationship between negative affectivity and hypertension was found. Finally, no statistically significant relationship was found between Prochaska and DiClemente’s Transtheoretical Model of behavior change and hypertension.

Conclusions. This investigation set out to examine the relationship between irrational beliefs, negative affect, stage of change, and essential hypertension. Based on prior research, it was expected to find a significant positive correlation between irrational beliefs, negative affect, and essential hypertension, and that stage of change would explain a significant proportion of variance in blood pressure. These hypotheses were not supported empirically. Speculations regarding the findings are discussed. In addition, supplemental analyses are addressed regarding questions that arose during the investigation. Moreover, limitations of the investigation are considered. Finally, implications for future research are indicated.
DEDICATION

This Dissertation is dedicated to my dear wife, Heather, and to my parents, Alan and Fiona, without whose support this dream never would have been possible. I would also like to dedicate this to my son, Nathan: may you reach all of your goals; and perhaps write a dissertation of your own.
ACKNOWLEDGMENTS

I would like to thank my committee members: Joe Wheaton, my advisor, who taught me a lot about research and myself in the dissertation process; Paul Granello, who supported this process; Doug Post who has been my mentor and friend; and W. Bruce Walsh who supported me and showed me how to begin the pursuit of my doctoral degree.

I would also like to thank the Family Practice Department at The Mount Carmel Health System and all of those patients who agreed to participate in my dissertation research. Without your help and support, this research never would have been possible.
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# FIELDS OF STUDY

**Major Field: Counselor Education**

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Introduction/Problem Statement

Hypertension is the largest risk factor predictive of premature cardiovascular disorders, renal disease, stroke, and triglyceride and cholesterol abnormalities (Gordon, Sorlie & Kannel, 1971; Kaplan, 1983; Rudy & Eshbaugh, 1982). Approximately 5-10% of persons with hypertension may be attributed to endocrine, kidney, and other physiological disorders. The remaining cases with no known etiology are diagnosed with essential hypertension which generally is defined as blood pressure greater than 140 mm Hg systolic/greater than 90 mm Hg diastolic. Hypertension is a well-established medical risk and even mild to moderate cases may lead to atherosclerotic disease, including coronary heart disease and brain infarction (Gordon, Sorlie & Kannel, 1971; Kaplan, 1983). When severe and untreated, hypertension constitutes a risk to cardiopulmonary dysfunction. The risks of myocardial infarction, stroke, and mortality are well documented (Alderman et al., 1991).
It has long been felt that essential hypertension manifests in part a relationship to behavioral phenomena (neurogenicity) (Davies, 1971; Dequattro, Campese & Muro, 1976). Rudy, Tosi, and Lewis (1995) suggest that essential hypertension includes a subset that is neurogenically induced and that such neurogenicity is mediated by inappropriate normal or elevated renin levels. Furthermore, Psychobiological perspectives on essential hypertension have been proposed suggesting the influence of non-medical factors such as family history, personality type (TYPE A), psychological stress, dietary sodium and caffeine, and alcohol (Bailey & Gross, 1971; Baisden, 1985; Goldstein, Shapiro, Thananpavarn & Shambi, 1982; Jorgenson & Houston, 1986; Kopp & Koranyi, 1982). Emotional factors such as anger, guilt, anxiety, and mild depression are found to be associated with essential hypertension (Baisden, 1985; Sullivan et al., 1981).

Dequattro, Campese, and Muro (1976) have documented the role of anxiety and neurogenic factors in essential hypertension. Hypertensive patients have been characterized as having inhibited or suppressed hostility in combination with anxiety and neuroticism and often exhibit the attitude or belief that "I must be alert and on guard" in association with defensiveness and marked anxiety (Graham, Kabler & Graham, 1962; Sapira, Scheib, Moriarty & Shapiro, 1971).

Importance of the study

Cognitions and belief systems are inherently important in the nature of behavior. Never has this been more evident than in the popularity of cognitive-behavioral approaches to psychotherapy. Cognitive-behavior theorists postulate that mental events and cognitive processes influence the nature of behavior.
Ellis (1994) Theory of Rational Emotive Behavior Therapy (REBT) is one of the most popular cognitive-behavioral approaches to counseling. In 1994, Ellis changed the name from Rational Emotive Therapy (RET) to Rational Emotive Behavior Therapy (REBT), and sparked a debate about adding the word behavior to the theory's title. This debate is addressed in a latter section, but, for clarity, the acronym REBT will be used throughout this paper.

The basic assumption to Rational Emotive Behavioral Therapy (REBT) is that emotional disturbances are caused by the individual's irrational beliefs (Ellis, 1973, 1979). This basic tenet of REBT is organized and defined by using what is called the ABC theory of personality. According to the ABC theory of personality and human functioning, thinking and emotion overlap. Ellis and Harper (1975) state that:

Human emotions do not magically exist in their own right, and do not mysteriously flow from unconscious needs and desires. Rather, they almost always directly stem from ideas, thought, attitudes, or beliefs, and can usually get radically changed by modifying our thinking processes (p. 11).

Therefore, thinking, a cognitive process, mediates between some stimulus event and a response. In other words, one's emotional response to a situation is not caused by the situation itself, or by other people, but rather to the thoughts, beliefs and attitudes the person has about the event or persons (Cormier & Hackney, 1987).

The activating experience, A, refers to some real external event or stimulus, to which the individual is exposed. The belief or idea, B, refers to the chain of thoughts or self-verbalizations the individual goes through in response to the event (A). The consequences, C, symbolizes the emotional and behavioral response that result from this belief (B). REBT
contends that an event (A) does not cause emotional upset (C), but rather, it is (B), the beliefs or ideas about (A), that more directly contributes to point (C).

When people hold rational beliefs they tend to experience less excessive and problematic emotional stress (Tosi, Leclair, Peters, & Murphy, 1987). However, as noted earlier, people can hold both rational and irrational beliefs about the same event. Irrational beliefs (IBs) are generally expressed in unquestioned absolutes, musts, shoulds, oughts, and demands. Irrational beliefs are hypothesized to influence and generate emotional disturbances such as depression, anxiety, and hostility.

Tosi, Rudy, Lewis, and Murphy (1992) have elaborated on REBT. Cognitive Experiential Therapy (CET) combines cognitive restructuring, hypnosis, and developmental staging (Tosi, 1980) and is based upon Ellis' (1962) "ABC" theory of emotional disturbance. CET reframes the ABC model by expanding "B" (cognition) and adds "D" (physiological-biochemical responses) and "E" (behavioral responses). It is the introduction of physiological-biochemical responses that is of theoretical significance. This addition assumes that cognitions may influence physiological-biochemical responses in the body. As Tosi and Murphy (1994) explain, genetics and predispositions do not suffice to explain the onset of illness. Weiner (1989) concurs stating that conditions that initiate illness may be quite different from those that predispose them. Thus, the literature suggests that social psychological factors (i.e., anxiety and depression) are associated with the onset of disease (Tosi & Murphy, 1994).

Acute situational disturbance, or mental stress, is defined as some task (such as mental arithmetic or public speaking) and has been shown to be a factor related to cardiovascular disease in the literature (Niaura & Goldstein, 1992; Jiang et al., 1996).
Although these transient cognitions seem important in their relation to cardiovascular disease, such as hypertension, what may be of greater investigation is the connection between more enduring and pervasive cognitive processes and cardiovascular disorders, particularly essential hypertension. As Tosi and Murphy (1994) point out, cognitive processes need to be recognized in the study of psychosomatic illness.

Bernard (1995b) asserts that REBT is closer to the trait rather than state end of the generality-specificity continuum of cognitive constructs. REBT is less concerned with specific behavioral change that occurs using more situationally-bound automatic thoughts and self statements. Rather, he notes, REBT searches for robust, general, underlying core beliefs and philosophical assumptions of life which elicit and influence different emotions and behaviors across time and situations. Therefore, beliefs, rational or irrational, tend to be pervasive and enduring personality characteristics.

Most research emphasizes lifestyle change in the management of essential hypertension listing the common variables addressed in the demographic risk factor questionnaire as well as stress, but few, if any, address cognitive changes. Cognitive behavioral approaches have been cited in the literature as methods to treat essential hypertension, however, none has addressed cognitions/beliefs as associated with hypertension specifically comparing well-controlled to uncontrolled hypertensives. If there is a significant relationship between IB’s and uncontrolled essential hypertension, then this study will provide significant support for the use of cognitive behavioral techniques in the treatment of essential hypertension, particularly in the areas of uncontrolled hypertension and compliance. This would be especially true if the two groups did not differ on the demographic known risk factor characteristics. However, I am expecting that they will differ
with the assumption that uncontrolled hypertensives will be characterized as having more risk factors explained by their greater irrational beliefs.

Furthermore, although the treatment of essential hypertension has historically emphasized lifestyle or behavioral change along with medication compliance, essential hypertension for many individuals remains uncontrolled. The question of why certain individuals change their behavior (i.e., quit smoking) and others do not, is not only important for intervention purposes, but also largely ignored in the literature (Benfari & Eaker, 1984). Perz, DiClemente, and Carbonari (1996) assert that the missing piece of the puzzle appears to be how change works for each individual: The cognitive, affective, and behavioral changes that do or do not take place, and how those changes relate to success in eliminating high risk behavior. Prochaska and DiClemente (1983, 1992) have proposed a model attempting to shed light on this missing piece of the puzzle.

The transtheoretical model of behavior change (Prochaska & DiClemente, 1983) attempts to explain how people reduce or remove high risk behaviors. The basic assumption to the Transtheoretical model is that there are five stages of change that one completes before change is permanent, and that different processes are emphasized at different stages. The five stages of change posited in this model are: Precontemplation, contemplation, preparation, action, and maintenance. The processes of change are: Consciousness raising, dramatic relief, self-reevaluation, social reevaluation, social liberation, environmental reevaluation, relationship fostering, counter conditioning, contiguity management, and stimulus control. Because well-controlled management of essential hypertension is such a problematic issue, it seems appropriate to investigate the possible relationship between stages of change and essential hypertension comparing those whom
have well-controlled hypertension to those whom have uncontrolled hypertension. In
addition, it seems reasonable to assume that those who have uncontrolled hypertension will
be in earlier stages of change than those who have well-controlled hypertension.

Finally, the Sixth Report of the Joint National Committee on the Prevention,
Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI) states that
hypertension control rates have not continued to improve despite an increase in awareness
and treatment of the disease. The fact that hypertension control rates have not continued to
improve despite an increase in treatment suggests that other variables outside of the known
risk factors may be responsible for uncontrolled hypertension. These variables are
hypothesized to be irrational beliefs, negative affect, and stages of change. The preceding
arguments support the importance of this study.

Purpose of the Study

The assumption that irrational beliefs are enduring and pervasive characteristics, and
that these beliefs are associated with possible physiological responses in the human body, is
the premise of my investigation into the relationship between IB's, negative affect, stages of
change, and essential hypertension. Silverglade, Tosi, Wise, and D'Costa (1994) have shown
a relationship between irrationality and emotionality and physical disease. Irrational
cognitions and self-reported emotional states were dependent on disease severity.
Therefore, the nature of my study is to investigate the hypothesis that persons with un-
controlled essential hypertension will report more irrational beliefs and report more
negative affectivity than persons with well-controlled essential hypertension. In addition, it
is hypothesized that persons with un-controlled essential hypertension will be in earlier
stages of the Transtheoretical model than persons with well-controlled essential
hypertension. Thus, the fundamental research hypothesis is: Those who have un-controlled essential hypertension will be in earlier stages of change in the Transtheoretical model, adhere more to Ellis irrational beliefs, and report more negative affectivity than those who have well-controlled essential hypertension.

Research Questions

Several specific research questions are of interest to this study.

Research Question 1: What are the demographic risk factor characteristics of each hypertensive group?

Research Question 2: Is there a relationship between IB's and uncontrolled essential hypertension?

Research Question 3: Is there a relationship between negative affect and uncontrolled essential hypertension?

Research Question 4: Is there a relationship between stages of change and uncontrolled essential hypertension?

Definition of Terms

Negative Affectivity

Negative affectivity suggests "a pervasive disposition toward the subjective experience of several highly intercorrelated negative affects which include anxiety, depression, anger and hostility" (Waked & Jutai, 1990, p. 265). Negative affectivity is operationally defined for this study as high scores on the psychometric subscales of the Multiple Affect Adjective Check List (MAACL): anxiety, depression, and hostility.
Irrational Beliefs

Irrational beliefs are a set of pervasive cognitive structures that are generally expressed in unquestioned absolutes (Tosi et al., 1987), and are illogical, nonempirical, and self-defeating (Robin & Digiuseppe, 1995). An irrational belief is operationally defined for this study as high scores on the psychometric subscales of the Attitudes and Belief Scale-II (A&B-II) (DiGuiseppe, Leaf, Exner, & Robin, 1988; DiGuiseppe, Robin, Leaf, & Gormon, 1989).

Stages of Change

The concept of stages is important for understanding behavior change because it reflects the temporal dimension in which change unfolds (Prochaska & Marcus, 1994). Cognitions, although important to behavior change as postulated by Ellis, lack a temporal dimension or sense of directionality (Prochaska & Marcus, 1994). Stages of change are operationally defined for this study as each of the five stages of change in the transtheoretical model (Prochaska & DiClemente, 1983) and will be measured by a set of five questions on the demographic questionnaire that correspond to each stage. Subjects can be in only one stage at a time and will be ranked in order according to the transtheoretical model.

Essential Hypertension

Essential hypertension is generally referred to in the literature as high blood pressure that poses a significant health risk and is diagnosed at greater than 140 mm Hg systolic/90 mm Hg diastolic. This is achieved by averaging blood pressure readings over two or more separate occasions (Shulman, Saunders, & Hall, 1993). Hypertension has several classifications (e.g., borderline, mild-to-moderate, severe), but of interest to this study is the
categorization of well-controlled versus uncontrolled hypertension. Epidemiological research and medical manuals state that un-controlled essential hypertension is indicated by a BP reading greater than 140/90 mm Hg. Therefore, uncontrolled hypertension is operationally defined as average blood pressure greater than 140 mm Hg systolic/90 mm Hg diastolic, while well-controlled hypertension is operationally defined as average blood pressure less than 140/90 mm Hg. Although subjects will be divided into these two groups based upon the criteria of BP reading of 140/90 mm Hg, analysis of data will be run using mean arterial pressure (MAP). The mean arterial pressure is "the average blood pressure over the cardiac cycle and is approximated by the diastolic pressure plus one-third the pulse pressure" (Wollam & Tuttle, 1980, p. 517). Thus, MAP is operationally defined as the following: MAP = DBP + 1/3(SBP-DBP), or MAP = 2DBP + SBP

By using the ratio data of MAP in the statistical analysis, a more powerful analysis can be conducted.

Assumptions

The primary assumption underlying this study is the theoretical position of Psychoneural Identity (see, for example, Uttal, 1978), or what is known as monistic mind-body unity. Secondly, an assumption is that the A&B-II and the MAACL measures accurately represent the constructs of irrational beliefs and negative affectivity as defined here. Third, an assumption is that the five stages of change questions adequately measure each stage of the Transtheoretical model. Finally, an assumption is that negative affectivity and irrational beliefs are both pervasive characteristics held over time (Beck, 1995; Watson & Clark, 1984).
Limitations

This study will be correlational in nature and will not involve the direct manipulation of an independent variable, thus, no cause and effect relationship can be presumed. In addition, due to the preliminary nature of the study, the findings will need to be interpreted with caution. Many other factors not addressed in this study may also have an influence on the results. For instance, this study will not examine factors such as social support, economic status, ethnicity, environmental factors (e.g., regional residence, exposure to chemicals, etc.), locus of control, or self efficacy. As a result, any findings will need to be interpreted with caution.
CHAPTER 2

LITERATURE REVIEW

Over the past few decades, cognitive theories of personality have become a major influence in clinical psychology. These theories share an emphasis on internal, inferred mental structures that are understood to be closely related to an individual's experience and behavior. Currently, cognitive or cognitive-behavioral models of personality seem to have replaced psychoanalytic theory as the predominant theory of personality development, at least in terms of treatment for psychopathology. As Messer and Warren (1990) point out, the cognitive revolution that took place during the 1960's and 1970's stimulated new thinking about the nature and development of personality and that this new approach provided a basis for theorizing about personality and change differently than psychoanalytic, experiential, and trait theories. The latter three have dominated personality theory throughout the first half of the 20th century.

Although cognitive theories of personality are relatively recent, their antecedents can be traced throughout history. Greek and Roman Stoic philosophers believed that a rational principle guides the universe and that each person has a duty to follow and promote reason;
passion and emotion were to be subdued (Hothersall, 1990). As Ellis and Harper (1975) indicate, the principle foundation for Rational Emotive Behavior Theory can be found in the Stoic philosopher Epictetus: Men are disturbed not by things but the judgments and views they take of them. Ellis (1975) even credits William Shakespeare with influencing his theory, who in Hamlet wrote: "There [exists] nothing either good or bad but thinking makes it so."

According to Beck (1967, 1985), an important precursor to current cognitive models of personality and psychopathology was Kelly's personal construct theory, which presented the idea that individuals construe the world in relatively enduring ways and that these cognitive structures are determinants of behavior. Therefore, cognitive theories of personality are based on the assumption that there are structures of cognition that determine how an individual evaluates, interprets, and organizes the large and complex amounts of information related to self, others, and the world. In particular, cognitive theories share the idea that there are mental structures such as "scripts", "schemas", and "concepts" that organize and determine individuals' behavior, affect, and experience (Beck, 1967; Hirschfeld & Shea, 1985; Kagan, 1984; Messer & Warren, 1990). Ellis (1975, 1982) refers to these constructs as beliefs.

According to Messer and Warren (1990), also relevant to cognitive theories of personality and cognitive therapy are attribution theory, social judgment, person perception, and implicit personality theories. Attribution theory attempts to explain the way individuals attribute causality to themselves or others, whereas social judgment, person perception, and implicit personality theory examine the ways that people look at themselves, others, and the world, and how interpersonal information is encoded, organized, and utilized.
Cognitive psychologists believe that mental events are not mere epiphenomena, as the behaviorists would have us believe, but that cognitive processes influence behavior. Specifically, the cognitive behavioral approach contends that disordered cognitive processes cause some psychological disorders and that by changing these cognitions, the disorder can be alleviated or even cured (Rosenhan & Seligman, 1995). Beck and Ellis were the earliest pioneers in attempting to apply cognitive concepts to clinical problems and psychopathology. REBT and CBT are both cognitive methods, but in the literature, REBT seems to stand alone as its own method, often receiving detailed description, while many other cognitive approaches to therapy fall under the general rubric of CBT, an approach attributed to Beck, and receive only general attention. This is also evident in works by Bernard (1995a, 1995b) who states that he is surprised by the lack of cross fertilization of REBT and CBT, two singular identities, and by providing 10 reasons why REBT will remain as a distinctive approach separate from CBT.

Rational Emotive Behavior Therapy (Theory) (REBT)

The most popular and representative of the rational or cognitive approaches to counseling is Ellis Rational Emotive Behavior Therapy (REBT) (Osipow, Walsh, & Tosi, 1984). Many counseling psychology textbooks dedicate detailed sections to REBT while only providing general descriptions of other cognitive behavioral methods showing the popularity of REBT (Corey, 1990; Cormier & Hackney, 1987; Osipow et al., 1984; Sundberg, Taplin, & Tyler, 1983; Thompson & Rudolph, 1988; Tosi, et al., 1987). As Rimm and Masters (1979) indicate, although it would be inappropriate to designate any one individual as the founder of cognitive therapy, Albert Ellis has been one of the most influential theorist/practitioners in this area.
Why is REBT such an intriguing approach to the treatment of psychopathology and emotional disturbance? Rimm and Masters (1979) provide several fundamental reasons for the widespread acceptance of REBT. First, for many practitioners, as well as laypeople, the basic assumption that what one thinks or says to oneself has a major bearing on the way one feels and acts is irrefutable. Second, the primary method of REBT, a direct attempt by the therapist to change these mental processes, is a plausible therapeutic corollary to the first assumption. Third, in terms of both theory and practice, REBT's detailed explanation of emotional upset is clear and explicit. After merely reading some of Ellis' works (1962, 1975), practitioners (justifiably or not) can feel sufficiently knowledgeable in REBT to begin applying it to clients. Another reason REBT is so popular, although it lacks empirical justification, lies in the fact that it just makes common sense to most people.

The ABC's of REBT

The basic assumption to Rational Emotive Therapy is that emotional disturbances are caused by the individuals irrational beliefs (Ellis, 1973, 1979). This basic tenet of REBT is organized and defined by using what is called the ABC theory of personality. According to the ABC theory of personality and human functioning, thinking and emotion overlap. Ellis and Harper (1975) state that:

Human emotions do not magically exist in their own right, and do not mysteriously flow from unconscious needs and desires. Rather, they almost always directly stem from ideas, thought, attitudes, or beliefs, and can usually get radically changed by modifying our thinking processes. (p. 11)

Therefore, thinking, a cognitive process, mediates between some stimulus event and a response. In other words, one's emotional response to a situation is not caused by the
situation itself, or by other people, but rather to the thoughts, beliefs and attitudes the person has about the event or persons (Cormier & Hackney, 1987).

The activating experience, A, refers to some real external event or stimulus, to which the individual is exposed. The belief or idea, B, refers to the chain of thoughts or self-verbalizations the individual goes through in response to the event (A). The consequences, C, symbolizes the emotional and behavioral response that result from this belief (B). RET contends that an event (A) does not cause emotional upset (C), but rather, it is (B) the beliefs or ideas about (A), that more directly contributes to point (C).

The semanticist, Korzybski, has had a substantial influence on the development of REBT (Ellis, 1962, 1975, 1994). Semantic processes in the form of self-statements or beliefs affect people's emotions, and serve to motivate their behavior. Furthermore, people can talk to themselves in optimistic, hopeful, and joyful ways inducing more positive emotions, or they can engage in self-talk that is pessimistic, hopeless, and derogatory resulting in feelings of sadness, emotional upset, anxiousness, and being depressed. Ellis also contends that this semantic labeling and self-talk can be unconscious as well as conscious. As a result, people are often unaware of the meanings or values they place onto themselves, or the attributions they make to significant other people, places and things.

REBT suggests that when people do become emotionally upset (C), that they can have either rational beliefs (rBs) and/or irrational beliefs (iBs). Rational beliefs are simply those views, philosophies, and evaluations of events (A) that help you assess whether your basic desires are being fulfilled. Rational thinking, according to Ellis (1975), has five main characteristics: (a) thought is derived primarily from objective fact as opposed to subjective opinion; (b) thinking, if acted upon, most likely will result in preservation of one's life and
limb; (c) it will help define one's personal life goals most quickly; (d) it will produce a
minimum of inner conflict and turmoil; and (e) if acted upon, it will prevent undesirable
conflict with those whom one lives and associates. These beliefs (rBs) are expressed in
wishes, preferences, desires and wants. For example: "I desire the approval of others for the
things that I do"; "I like behaving competently and achieving things that are important to
me." These types of beliefs tend to lead to appropriate emotional responses (C), such as
frustration, happiness, sorrow, hope, or regret, rather than depression, rage, intense anxiety,
and loss of self-esteem (Ellis, 1975; Tosi, et al., 1987). The former set of responses is
deemed appropriate because they are much more likely to bring about constructive, goal-
oriented behavior than the latter responses, which tend to produce stagnation and inertia.
Ellis and Becker (1982) assert that, unlike other schools of therapy, REBT clearly
distinguishes between appropriate and inappropriate emotional responses (C) to activating
experiences (A). Whilst the original Stoic philosophers believed passion and emotion were
to be subdued, REBT merely distinguishes between appropriate and inappropriate feelings,
it does not advocate eliminating emotional responses altogether.

When people hold rational beliefs they tend to experience less excessive and
problematic emotional stress (Ellis, 1994). However, as noted earlier, people can hold both
rational and irrational beliefs about the same event. Irrational beliefs (iBs) are generally
expressed in unquestioned absolutes, musts, shoulds, oughts, and demands. Examples
include: "I should be perfect"; "I must be loved by everyone I ever meet." Irrational ideas
like these can lead to unpleasant emotional and behavioral consequences (i.e., feeling
depressed and suicidal).
Ellis and Harper (1975) have compiled a list of irrational beliefs that influence emotional and behavioral disturbance. The list is as follows:

1. The idea that you must have love and approval from all people you find significant
2. The idea that you must prove thoroughly competent, adequate, and achieving
3. The idea that when people act obnoxiously and unfairly, you should blame and damn them, and see them as bad, wicked, or rotten individuals
4. The idea that you have to view things as awful, terrible, horrible, and catastrophic when you get seriously frustrated, treated unfairly, or rejected
5. The idea that emotional misery comes from external pressures and that you have little ability to control or change your feelings
6. The idea that if something seems dangerous or fearsome, you must preoccupy yourself with and make yourself anxious about it
7. The idea that you can more easily avoid facing many life difficulties and self-responsibilities than undertake more rewarding forms of self-discipline
8. The idea that your past remains all-important and that because something once strongly influenced your life, it has to keep determining your feelings and behavior today
9. The idea that people and things should turn out better than they do and that you must view it as awful and horrible if you do not find good solutions
10. The idea that you can achieve maximum human happiness by inertia and inaction or by passively and uncommittedly "enjoying yourself"

There appears to be some discrepancy in the literature from other authors regarding how many irrational beliefs exist. While Tosi et al. (1987) and Lichtenberg, Johnson and Arachtingi (1992) cite 10 irrational beliefs, they do not correspond with one another. Furthermore, Cormier and Hackney (1987) and Sundberg et al. (1983) cite 11 irrational
beliefs. Weeks and Treat (1992) refer to the original ten, but add two more. Thompson and Rudolph (1983) cite an additional 3 to the original 10 that don't correspond to any of the other citations.

Concepts of behavior change

As has already been suggested, REBT makes several assumptions about the conditions that foster behavioral change, most of which stress the importance of altering the way people think and consequently how they behave. According to Ellis (1962, 1975, 1994), the most fundamental assumption underlying REBT is that human emotion and thinking are interconnected. In other words people create most of their emotions by way of how they think and, conversely, create some of their thoughts by how they feel. Ellis and Harper (1975) state that humans have four basic processes: (a) perception or sensation; (b) emotion; (c) behavior; and (d) thought, and that ordinarily one does not experience these four basic processes in isolation. Bond and Dryden (1996) address this interdependent principle further suggesting that cognitions, emotions, and behavior are parts of an interdependent system, thus, none of the four elements can be measured independently of the others. They argue that because of this interdependent principle, it cannot be established that cognitive processes are at the core of emotional disturbance and health, the core hypothesis of REBT. Nonetheless, REBT argues that changing negative or inappropriate emotions such as anxiety, guilt, or depression, requires an individual to identify and challenge the irrational beliefs that most likely underlie them. REBT helps people to identify and challenge the beliefs that induce absolutistic and overgeneralized demands that they place on themselves and others, and to replace them with ones that promote less self-defeating behaviors (Tosi et al., 1987).
Rational Insight. Being trained as a psychoanalyst, Ellis values insight, however, REBT does not assume that insight will illicit spontaneous behavior change. Rather, one must actively practice rational thinking and behaving to produce healthy changes. Ellis and Harper (1975) identify three types of insight. Insight Number One implies the conventional kind of understanding postulated by Freud: that emotional and behavioral disturbances do have antecedent causes. However, REBT argues that antecedents are not deep rooted in the past, but rather, the person's existing system of beliefs constitute the most potent antecedent of most behavior. Insight Number Two consists of recognizing that we reindoctrinate ourselves with irrational and distorted ideas that originated in the past and that these continue to illicit emotional and behavioral disturbance. Essentially, we keep reinforcing dysfunction. Insight Number Three suggests that people change as a result of rational efforts consisting of steadily, persistently and vigorously working to change irrational beliefs and unhealthy behaviors. According to Tosi et al., (1987) this is considered the most important insight of the three.

Cognitive Restructuring. Rational insights allow people to better position themselves to identify their rigidly held irrational beliefs that produce emotionally disturbing consequences. Once this is accomplished, they can then solidly interrupt them with strong counterbeliefs that lead to more appropriate emotional responses and desirable behavior changes (Ellis, 1962, 1994).

Counseling methods and techniques of RET

Bradley (1989) and Rimm and Masters (1979) concur that the major thrust of RET is threefold. First, the therapist helps determine the activating external experiences or precipitating events (A). Second, the therapist helps determine the specific thought patterns
or beliefs (IBs) that constitute the internal response to these events and give rise to inappropriate emotions (C). Third, therapists assist clients in altering or modifying these beliefs and thought patterns. This is referred to as disputing irrational beliefs (D) or cognitive restructuring (Corey, 1990; Ellis & Becker, 1982).

Disputing Irrational Beliefs (DIBS). Ellis and Becker (1982) contend that DIBS is the most fundamental method used in REBT. DIBS begins with the ABC analysis but adds two new steps to the process, points (D) and (E). It involves logico-empirical analysis of irrational thinking (Corey, 1990). Logico-empirical methods entail applying logic, empirical observation, and testing for the purpose of achieving a more productive life. Once A, B, and C are identified clients are taught at (D) to vigorously dispute their irrational thinking, and replace them with more rational ones. Point (E) refers to the effect of disputing—the relinquishing of self-destructive ideologies, the acquisition of a more rational philosophy of life, and a greater acceptance of self, others, and the frustrations of life.

Rational Emotive Behavior Therapy: Recent Changes

Ellis has been promoting his cognitive form of psychotherapy since 1955, and in fact, refers to it as the first cognitive or cognitive behavioral therapy (Ellis, 1994). He first called this approach, Rational Therapy (RT), and then, in 1961, followed with Rational-Emotive Therapy (RET). In 1993, Ellis announced his latest revision, that Rational-Emotive Therapy would be changed to Rational-Emotive-Behavior Therapy (REBT) (Bernard, 1995a; Franks, 1995). The inception of this modification has proven most controversial and has produced a great debate within the camp of RE(B)T, and from "other" cognitive-behavioral theorists (Bernard, 1995a; Bond & Dryden, 1996; Corsini, 1995; Davison, 1995,
DiGiuseppe, 1996; Franks, 1995; Lazarus, 1995; Wessler, 1996). Following sections address the name change, additional modifications, and the name change debate.

From RET to REBT

Ellis (1995) argues that the reason he changed the name of his approach was that he was "wrong" to have omitted behavior in the first place. RET, he states, is misleading because it omits the highly behavioral aspect that he promoted from the start. Corsini (1995) concurs, indicating that behavior is, always has been, and always will be an essential part of Ellis' theory. Bernard (1995b) provides support for the change in the following:

If one chooses to define a therapy by its clinical methods, then there is little doubt in my mind that the "B" in RET deserves to see the light of day. For 40 years or so, Ellis has been writing about the importance of getting clients to change their behavior both as a means to reinforce cognitive change, but also to speed up the change process (p. 79).

Of course, there are plenty of opponents to this change as will be addressed in a subsequent section.

Additional revisions beyond the "B"

In addition to the controversial and hotly debated name change, Ellis modified other aspects of his theory. Two of the more prominent changes are revisions to his ABC model and adaptations to irrational beliefs.

The new ABC's of REBT. ABC theory contends that strong Beliefs (B) influence emotional and behavioral Consequences (C) about Activating events (A). According to REBT, rational beliefs (rB) about A will lead to more appropriate and functional feelings (C), however, irrational beliefs (iB) lead to disturbed emotions at C. Ellis (1994) takes this a
step further indicating that people can create secondary symptoms—called symptom disturbance—from the absolutistic musts they make about primary symptoms. Thus, the original disturbed feelings (C1) (i.e., depression) can become an Activating event (A2). Then, at point B2, one believes he/she absolutely must not be depressed, thus creating strong feelings of depression about one's depression (C2). This interaction of ABC's can be circular and exponential providing additional symptoms. The argument, then, is that thoughts, feelings and behaviors can become A2's, A3's, etc. Therefore, therapy includes addressing symptoms about symptoms in addition to addressing the client's original disturbance.

Amendment to the original Irrational Beliefs. Ellis originally devised a set of 10 irrational beliefs that he hypothesized promoted neurotic emotions and behaviors. He currently contends that the original beliefs can be reduced to three which encompass all others (Bernard, 1995a). These 3 main beliefs include demandingness (DEM), awfulizing (AWF), and global evaluations of human worth or self-rating (SR). DiGiuseppe (1996) argues that the theory has also included low frustration tolerance (LFT), although Ellis (1994) clearly emphasizes the first three. I pointed out this "beliefs discrepancy" earlier and Wessler (1996) concurs indicating that over the years the list of irrational beliefs has varied from book to book. At any rate, the emphasis of emotional disturbance lies in 4 demanding beliefs (DiGiuseppe, 1996; Ellis, 1994; 1996). Bernard (1995a) states that self-demandingness forms of irrational thinking lead to strong feelings of self-hatred, anxiety, and depression; other-demandingness leads to strong feelings of rage, jealousy, and self-pity; and world-demandingness leads to strong feelings of anger and depression. In addition, these three
main beliefs may lead to destructive behaviors such as suicide, withdrawal, obsessiveness, aggression, vindictiveness, love addiction, inertia, procrastination, and phobias.

The Name Change Debate

Davison (1995) contends that adding the word behavior to RET is long overdue. He argues that new behavior serves primarily to change cognition, from which other constructive emotions and behaviors follow. Ellis, he states, has been advocating since the 1950's that cognitive approaches to therapeutic change are incomplete without formal attention to behavior. Woods (1996) concurs that adding behavior is appropriate stating that although it may come as a shock, classical and instrumental conditioning occur on a regular basis in daily life. Furthermore, he argues, emotions are classically conditioned to present stimuli when the emotions occur and instrumental behavior in the future will be influenced by present contingencies. This, in turn, generates cognitive changes in peoples' expectancies. Thus, cognition's, emotions, and behaviors are all part of the domain. Corsini (1995) also favors the addition of "B" to RET. He argues that all therapy is essentially cognitive, but that without changes in behavior, assessment of therapeutic progress is difficult. He states that "in every successful therapy, the locus of change is in the mind—but for the change to be meaningful, more than just words are needed, action must take place during the process and be proved by action after the therapy" (p. 7). Finally, DiGiuseppe (1996) gives REBT high praise claiming that "it is the best system of psychotherapy ever developed" (p. 6).

Bernard (1995b) explains that some of the main criticisms of adding behavior to RET regard the perceived negative effects of RET becoming associated with behavior therapy. In addition, proponents of behavior therapy contend that REBT lacks empiricism,
the basic tenet of behavior therapy. In other words, opponents of REBT contend that it fails to present empirical support for its predictions (DiGiuseppe, 1996). Wessler (1996) addresses this concern. He argues that Ellis describes himself as a scientist, calling for studies to be done to test his hypotheses, yet he himself has done no studies that might provide the empirical basis for his theorizing. Franks (1995) concurs that REBT lacks empiricism claiming that validation has to precede implementation and that Ellis falls short of this formula.

Lazarus (1995) also heavily criticizes the name change (while at the same time promotes his own theory). He argues that:

Nothing is gained by fiddling with names, and by continuing to promote a school of psychotherapeutic thought... it would have been a boon and a blessing if Ellis, instead of tacking "B" for "Behavior" onto his well-known RET, had decided to change the name of his institute and his base of operation to that of Technical Eclecticism (original italics) (p. 100).

Bond and Dryden (1996) and Wessler (1996) reiterate the primacy of the musts hypothesis of REBT, but argue that it is untestable. They assert that the interdependency principle suggests that cognitions, emotions, and behaviors are part of an interdependent system, and therefore, none of the three elements can be measured separately from the others. Thus, it cannot be established that musturbatory cognitions are the "cause" of psychological disturbance (REBT's core hypothesis). This interdependent principle, they argue, prevents the primacy of musts hypothesis from being examined. As Wessler (1996) points out, Ellis spends most of his time writing on cognitions as causes of emotions, and
that this ignores the bi-directionality of cognitions and emotions. Thereby, the result is a very linear sounding ABC theory. This implies that Ellis would have been better off leaving behavior out of the title.

Finally, Bernard (1995b) asserts that REBT is closer to the trait rather than state end of the generality-specificity continuum of cognitive constructs. Preferential REBT is less concerned with specific behavioral change which occurs using more situationally-bound automatic thoughts and self statements. Rather, he notes, REBT searches for robust, general, underlying core beliefs and philosophical assumptions of life which elicit and influence different emotions and behaviors across time and situations. In other words, CBT seems to address situation specific disturbances, while REBT addresses more stable and pervasive general cognitive constructs.

Beliefs and Physical Illness

REBT has been applied to health psychology research. Lichtenberg et al. (1992) hypothesized and found a significant relationship between persons' subscription to irrational beliefs and their susceptibility to illness. Smith and Brehm (1981) found a positive correlation between irrational beliefs and Type A coronary-prone behavior pattern. In addition, Silverglade et al. (1994) have shown a positive correlation between irrational beliefs and disease severity in adolescent asthmatics. Finally, Tosi, et al. (1992) applied cognitive experiential therapy (CET) in the treatment of essential hypertension and found it to be effective in reducing several psychobiological measures of hypertension. CET is essentially the principles of REBT administered to patients while in a mildly hypnotic state.
Stages of Change Model

Prochaska and DiClemente (1983) have proposed a stages of change model for behavior modification. Their initial approach to understanding how individuals change was to study smokers attempting to change their behavior without professional intervention. They discovered that self-changers progress through specific stages as they struggle to remove or reduce their high-risk behaviors. The transtheoretical model of behavior change (Prochaska & DiClemente, 1983) attempts to explain how people reduce or remove high risk behaviors. The basic assumption to the transtheoretical model is that there are five stages of change that one completes before change is permanent, and that different processes are emphasized at different stages. The five stages of change posited in this model are: Precontemplation, contemplation, preparation, action, and maintenance. Prochaska and Marcus (1994) explain the five stages of change. Precontemplation is characterized by lack of awareness of the problem or lack of intention to change. Contemplation reflects a growing awareness of the problem, intent to change, potential solutions, as well as weighing the pros and cons of their risk behavior; consequently, they are ambivalent about change. Preparation is marked by intention to take action in the near future, usually in the next month, and behavioral adjustments have likely already begun (e.g., cutting down on number of cigarettes a day). Action describes the stage in which observable behavioral changes take place, and is the busiest stage involving most of the processes of change. Zero to six months is the usual time period for the action stage. Maintenance involves long term adjustment to the changes made during the contemplation, preparation, and action stages. Five years of continued maintenance is likely to result in continuous abstinence of the high
risk behavior. Prochaska, DiClemente, and Norcross (1992) have proposed a final, termination, stage signaling the end of the change cycle.

Different change processes are emphasized at the various stages of change. Processes of change are activities, overt or covert, that individuals use to modify their experiences and environments in order to change behavior (Prochaska & Marcus, 1994). The processes of change are: consciousness raising, dramatic relief, self-re-evaluation, social re-evaluation, social liberation, environmental re-evaluation, relationship fostering, counterconditioning, contingency management, and stimulus control. These ten processes are further divided into two higher order constructs, experiential and behavioral, with the first five processes categorized under the experiential construct and the last five are incorporated in the behavioral construct (Prochaska & Marcus, 1994). These sets of processes are emphasized differently across the stages of change. Experiential processes involve cognitive and/or affective activity, and tend to be used relatively often by those in the contemplation and preparation stages, while individuals in the action stage tend to emphasize behavioral processes over experiential processes (Perz, DiClemente, & Carbonari, 1996).

Because healthcare is interested in the management of essential hypertension through lifestyle change, then what seems practical is an understanding of behavior change as it relates to well-controlled versus uncontrolled essential hypertension. Specifically, in what stages of change are persons with uncontrolled hypertension as compared to persons with well-controlled hypertension. Identifying specific stages of change and consequently specific processes, allows for more effective intervention and treatments for essential hypertension.
Behavioral Medicine and Cardiovascular Disease

Chronic illnesses such as coronary artery disease (CAD), cancer, and diabetes have replaced infectious diseases as the major causes of death, disability, reduced quality of life, and medical expenditures (Contrada, Leventhal, & O'leary, 1990). Cardiovascular disease remains a major cause of premature mortality and morbidity in most industrialized countries and recent literature suggests that 10% to 30% of these populations have some form of heart and blood vessel disease (Fielding, 1991; Gomel, Oldenburg, Simpson, & Owen, 1993; Livneh & Sherwood-Hawes, 1993; Trzcieniecka-Green & Steptoe, 1994). Biopsychosocial factors associated with cardiovascular disease have been thoroughly investigated over the years with various research suggesting that cardiovascular disease has multiple causes linking the development of disease to such risk factors as variations in lifestyle (diet, smoking, exercise), traditional biomedical variables (serum cholesterol, elevated blood pressure, obesity), as well as to emotional stress, personality, and psychosocial determinants (Contrada et al., 1990; Fielding, 1991; Freedland, Lustman, Carney, & Hong, 1991; Friedman & Rosenman, 1971; Goldstein & Niaura, 1992; Gomel et al., 1993; Haynes, Levine, Scotch, Feinleib, & Kannel, 1978; Jiang et al., 1996; Jenkins, Stanton, & Jono, 1994; Legault, Joffe, & Armstrong, 1992; Littman, 1993; Lozano et al., 1989; Niaura & Goldstein, 1992; Nickel, Brown, & Smith, 1990; Ornish et al., 1990; Stoudemire, 1993; Tosi, et al, 1992; Wulsin & Yingling, 1991).

Contrada et al. (1990) indicate that to laypersons, including behavioral scientists, the term "cardiovascular disease" is thought to refer to a specific disease entity. However, "cardiovascular disease" refers to a number of conditions affecting the heart and blood vessels such as, coronary artery disease (CAD), which is also referred to in the literature as
coronary heart disease (CHD), coronary insufficiency, coronary thrombosis, angina pectoris, myocardial ischemia, arteriosclerosis, myocardial infarction, and hypertension. Although these specific disorders have some features in common, they differ with respect to etiology, clinical manifestation, and course. Contrada et al. (1990) assert that because the known biomedical risk factors often differ for specific disorders falling under such general headings, psychosocial factors are likely to contribute in different ways to these different conditions.

It is not the scope of this paper to end the debate or issue on how these psychosocial factors contribute differently to the different medical conditions, but rather to provide sound empirical support for the association of these risk factors to cardiovascular disease, with particular emphasis on essential hypertension.

**Psychosocial Factors and Cardiovascular Disease**

As previously mentioned, there is an extensive body of literature addressing psychological factors affecting the development of cardiovascular disease with significant attention on CAD, myocardial infarction, and hypertension. As Gomel et al. (1993) suggest, the major aim of cardiovascular disease prevention has been to modify those factors that are associated with increased risk of developing cardiovascular disease. It is important to point out that psychosocial factors are not only determinants in the development of cardiovascular disorders but these factors may be evident after the development of disease as well (Freedland et al, 1991; Livneh & Sherwood Hawes, 1993). Thus the importance of behavioral medicine cannot be overlooked in the treatment and prevention of cardiovascular disease.

According to Goldstein and Niaura (1992), the psychological and behavioral factors that have been studied in association with cardiovascular disease include affective states (e.g.,
depression, anxiety, acute situational disturbance); personality or coping style (e.g., Type A behavior pattern [TABP], components of TABP); physiological hyperreactivity to environmental stimuli (cardiovascular reactivity); sociocultural factors (e.g., work "overload", life stress); and interpersonal factors (e.g., lack of social support). Each of these psychosocial factors is subsequently addressed. What is not mentioned in the literature is the influence or association of enduring cognitive structures on cardiovascular disorders. There is recent mention of mental stress induced cardiovascular and hypertensive symptoms, however these studies examined transient cognitive stressors as acute triggers of cardiac events (Jiang et al., 1996; Waked & Jutai, 1990). Hence the importance of this investigation.

Affective States

Depression. Various articles have suggested a high incidence of depressive symptomology in patients with coronary artery disease. Several authors contend that between 20 and 40% of patients with coronary artery disease have been found to exhibit depressive symptoms (Freedland et al. 1991; Littman, 1993).

Fielding (1991) contends that good reason exists for examining the nature of links between CAD and depression stating that depression is commonly related to acute myocardial infarction. Furthermore, depression is frequently described and widely accepted as occurring in response to myocardial infarction and is an important determinant of recovery (Fielding, 1991; Livneh & Sherwood-Hawes, 1993; Nickel, Brown, & Smith, 1990). Depression may also adversely affect the prognosis of acute myocardial infarction in that depressive disorders are the major obstacle in return to fully functioning lifestyle following acute myocardial infarction (Fielding, 1991; Stoudemire, 1993). Littman (1993) states further that another study found 33% of a sample of postmyocardial infarction patients exhibited
signs of severe depression as much as 18 months after infarction. In a study by Legault et al. (1992), the authors found that there was a high prevalence rate of depressive symptoms during the early course of hospitalization among patients confirmed with myocardial infarction.

Littman (1993) provides evidence showing a lower rate of adherence to treatment in coronary artery disease patients manifesting depressive symptoms. Furthermore, although the impact of depressive symptoms on the mortality of patients with coronary artery disease is unknown, several authors have indicated that patients with major depression, especially if untreated, have an increased risk of mortality from natural causes, and specifically from cardiovascular disease, especially from sudden death (Goldstein & Niaura, 1992; Littman, 1993). Another study by Carney et al. (1988) on the relationship between depressive disorder and cardiac events demonstrated that a DSM-III diagnosis of major depressive disorder, derived from the Diagnostic Interview Schedule, is the best predictor of major cardiac events (e.g., myocardial infarction, angioplasty, coronary artery bypass, death) during the 12 months following diagnostic catheterization in coronary artery disease patients. This effect was independent of the severity of CAD, left ventricular ejection fraction, and smoking status.

These articles suggest that there is good evidence that patients with a major depressive disorder are at increased risk for a cardiovascular morbidity and mortality. Goldstein and Niaura (1992) caution that we clearly cannot generalize from these results to assume that individuals with depressive symptoms that do not meet the criteria for major depressive disorders would also have greater risk of cardiovascular morbidity and mortality. However, they suggest that the results of several other studies have focused on the
relationship between depressive symptoms and cardiac disease demonstrating that self-reported depressive symptoms are correlated with sudden death, severe ventricular arrhythmias, and cardiac arrest. Booth-Kewley and Friedman (1987) performed a meta-analysis of the literature that looked at the relationship between patients' depressive symptoms or mood and CAD outcomes and concluded that depression is related to coronary heart disease outcomes (i.e., global myocardial infarction, angina, cardiac death) with an effect size that is greater than that for Type A behavior pattern.

Thus, there is clearly an association between the presence of a clinical depressive disorder and cardiovascular morbidity and mortality, with prevalence rates estimated to be as high as 20% (Freedland et al. 1991; Wulsin & Yingling, 1991). Major depression in the CAD population is associated with an increased risk of cardiac events including myocardial infarction and sudden cardiac death. However, primary care physicians and cardiologists seldom diagnose or treat depression in these patients (Freedland et al. 1991). With these prevalence rates and the increased risk of cardiac events associated with major depression, Wulsin and Yingling (1991) contend that careful assessment of psychiatric disorders in CAD patients is justified.

**Anxiety.** Nickel, Brown, and Smith (1990) note that the literature has long noted increased anxiety among heart patients. Haynes, Fienleib, Levine, Scotch, and Kannel (1978) concur reporting several studies have found relationships between tension, anxiety, emotional upset, and worry with coronary heart disease. Further evidence for the
relationship between anxiety and cardiovascular disease comes from Lozano et al. (1989) who assert that anxiety is usually accompanied by adrenergic hyperresponsiveness which produces tachycardia and hypertension.

Physiological systems have been linked to anxiety and other affective states (Contrada et al. 1990). One path, the sympathetic-adrenomedullary system (SAM), has been linked to the development of atherosclerosis and clinical coronary disease (Contrada et al. 1990; Niaura, & Goldstein, 1992). Situations of threat that activate the SAM system are thought to elicit active emotions such as fear, anxiety, and anger, and to increase the risk of coronary disease. The SAM system will be elaborated in a subsequent section.

Booth-Kewley and Friedman (1987) performed a meta-analysis of studies of the relationship between anxiety and CAD outcomes. The 15 studies in their meta-analysis concluded that anxiety is only slightly related to CAD outcomes. Livneh and Sherwood-Hawes (1993) contend that approximately two-thirds of myocardial infarction survivors experience anxiety and other psychosocial symptoms. There appears to be significant discrepancy in the literature related to anxiety and the development of CAD which has lead some authors to conclude that the relationship between anxiety symptoms and other measures of patient anxiety and the development and progression of CAD is unclear (Goldstein & Niaura, 1992).

**Type A Behavior (TABP) and Cardiovascular Disease**

Of the many varieties of cardiovascular disease, the most prevalent is coronary artery disease (CAD) and this disease has been the focus of extensive research attempting to associate personality with cardiovascular disease (Contrada et al., 1990; Friedman and Rosenman, 1971; Haynes, Levine, et al., 1978). CAD typically exhibits the clinical
manifestation of *coronary atherosclerosis*, a slowly developing disorder that affects the coronary arteries, the blood vessels supplying heart tissue. Atherosclerosis occurs initially by injury to the endothelial cell layer that lines the inner walls of the coronary arteries. This sets in motion a number of processes that promote the accumulation of lipids, lipoproteins, blood products, vascular tissue, and other substances that narrow the arterial opening and reduces myocardial blood supply (Contrada et al., 1990).

Epidemiologic research has identified three major risk factors for CAD: smoking, serum cholesterol, and high blood pressure. However, this entire set of variables accounts for no more than about 50% of new cases of CAD, thus investigators have examined other possible risk factors, including several psychosocial variables, of which personality has been the most extensively researched.

Type A behavior pattern (TABP) has its roots in clinical observations dating back to the emergence of CAD as a common disorder, but it wasn't until the crystallized description of two cardiologists, Friedman and Rosenman (1971), that TABP became widely known and accepted. Individuals described as Type A characteristically display excessive achievement striving, competitiveness, impatience, hostility, and vigorous speech and motor mannerisms. Individuals exhibiting a relative absence of these behaviors were designated as Type B and are presumably less prone to CAD. Type A refers to a number of distinct behavioral tendencies rather than to a single entity (Goldstein & Niaura, 1992). TABP is assessed by a structured interview developed by Friedman and Rosenman, which is considered the standard measure for Type A behavior (Contrada et al., 1990; Haynes, Levine, et al., 1978).

The two pioneering studies attempting to show the relationship between TABP and CAD are the Western Collaborative Group Study (WCGS) and the Framingham Heart...
Study (Haynes, Levine, et al., 1978; Rosenman et al., 1975). The WCGS sampled 3,500 initially healthy men but found in an 8 1/2 year follow-up that those individuals characterized as Type A on the basis of their structured interview were about twice as likely as their Type B counterparts to develop angina, myocardial infarction, and sudden cardiac death. Similar results were found in the Framingham Heart Study which included 1822 men and women aged 45 to 77 years of age. These associations held when statistical adjustments were made to control for traditional coronary risk factors such as age, blood pressure, cholesterol, and smoking. In 1981, Type A behavior was recognized as an independent risk factor for CAD by the Review Panel on Coronary Prone Behavior and Coronary Heart Disease of the National Heart Lung and Blood Institute (Littman, 1993).

Epidemiological evidence suggests that TABP is a risk factor for the development of CAD, however evidence that has accumulated since the WCGS and Framingham Study supports the hypothesis that emotional subcomponents of TABP may be more strongly associated with CAD (Contrada et al., 1990; Stoudemire, 1993). The following section addresses the relationship of Type A subcomponents and CAD.

Physiological Hyperresponsiveness to Environmental Stimuli and Subcomponents of TABP

In recent years, researchers have shifted away from measuring global TABP and have attempted to identify the subcomponents of TABP that are most strongly associated with increased risk of CAD. Evidence that has accumulated to support this hypothesis suggests that anger and hostility may be the essential toxic emotional subcomponents of the Type A behavior pattern involved in the pathogenesis of cardiovascular disease (Lozano et al., 1989; Stoudemire, 1993).
Several authors have discussed the association of TABP subcomponents with enhanced physiological responsiveness to psychological stressors and challenges, and that this hyperresponsiveness reflects processes involved in the development of CAD (Goldstein & Niaura, 1992; Stoudemire, 1993). Particular emphasis has been placed on SAM activity, which is connected to various cardiovascular and metabolic adjustments that are presumed to be involved in the initiation and progression of different cardiovascular disorders.

Readers are referred to Contrada et al., (1990) for a complete discussion of physiologic systems and disease. It has long been known that SAM activity is associated with stress and emotions and has been identified as the "fight-or-flight" survival mechanism (Selye, 1956). Goldstein and Niaura (1992) contend that there are numerous studies that report that TABP subjects frequently display larger episodic increases in blood pressure, heart rate, and catecholamines when confronted by stressful situations. Furthermore, the authors state that considerable evidence exists that the activation of the sympathetic nervous system during behavioral challenge contributes to the development of atherosclerosis and clinical CAD, suggesting that the best evidence comes from primate studies.

Sociocultural and Interpersonal Factors and Cardiovascular Disease

Acute situational disturbance, or mental stress, and sociocultural factors, such as work "overload" or life stress, are treated as separate factors related to cardiovascular disease in the literature, but it seems appropriate to discuss these together. In the literature, mental stress is defined as some task (e.g., mental arithmetic, public speaking) and this has been shown to be associated with symptoms of myocardial ischemia and hypertension (Niaura & Goldstein, 1992; Jiang et al., 1996; Waked & Jutai, 1990). It seems appropriate to subsume mental stress under the rubric of excessive workload and life stress in that many of the tasks
categorized as mental stress are indeed tasks of daily life. The importance is not under which category these factors fall, but rather the significance of the relationship between these psychosocial variants and increased risk of cardiovascular disease (Niaura & Goldstein, 1992; Haynes, Feinleib, et al., 1978; Jiang, et al., 1996). In addition to mental stress and sociocultural factors, interpersonal components have been shown to be related to increased risk for CAD. Stoudemire (1993) reports that nonmarried individuals with CAD are at a higher risk for death compared with married individuals. In the Beta-Blocker Heart Attack Trial study (cited in Niaura & Goldstein, 1992), the presence of the combination of high life stress and social isolation was associated with more than four times the risk of death than low levels of stress and isolation.

Although there appears to be substantial evidence linking psychosocial factors to increased risk of cardiovascular disease, not all the research supports this hypothesis. In a recent study by Vogt, Pope, Mullolly, and Hollis (1994), the authors found that in the adjusted models, psychological indices were not related to mortality hazard or to the incidence of major morbidities such as ischemic heart disease.

**Psychosocial Factors and Hypertension**

Hypertension is generally defined as the presence of elevated blood pressure, the force with which the heart pumps blood through the body, that places patients at increased risk for target organ damage (TOD) (Shulman, Saunders, & Hall, 1993). This cardiovascular disease is the most common condition for which patients receive prescription medication in the United States (McKenzie & Peterson, 1995). Various epidemiological studies assessing the prevalence of hypertension concur that 15-20% of the adult population in the United States is hypertensive (Alpert & Rippe, 1988). Furthermore, hypertension constitutes a
problem for 20% of the white and 30% of the black U. S. adult population (McKenzie & Peterson, 1995). Hypertension remains a significant health problem and is the most common cardiovascular disease, placing as many as 58 million people in the U. S. at increased risk for a variety of health problems (TOD) including stroke, CAD, retinal damage, and kidney failure (Alpert & Rippe, 1988; McKenzie & Peterson, 1995; Sherbourne et al, 1994; Towner & Blumenthal, 1993). It is widely accepted in the literature that hypertension may begin in early childhood but may not be detected until well into adulthood. Furthermore, of the 58 million persons estimated to have hypertension, only 35% are aware of their condition (McKenzie & Peterson, 199). Kaplan (1994) and McMahon (1990) concur that most hypertension remains poorly controlled and only adequately treated. Alpert and Rippe (1988) estimate that approximately one-third to one-half of this population is adequately treated. Shulman, Saunders, and Hall (1993) suggest that only 21% of hypertensives are adequately controlled to a level of 140/90 mm Hg or less. Furthermore, The Sixth Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (1997) contends that hypertension control rates have not continued to improve stating that nearly three fourths of adult Americans with hypertension are not controlled to below 140/90 mm Hg. More than 90% of patients with hypertension have essential hypertension, which is characterized as having no known underlying etiology (Kaplan, 1994).

Dating back to when the phrase "fight-or-flight" was first used to describe the physiologic changes that occur during stress, physiologists have known that emotional situations can cause transient elevations of blood pressure (Alpert & Rippe, 1988; Kaplan, 1994; Light, 1987; McMahon, 1990; Shapiro, 1988). It is axiomatic that substantial changes
in autonomic activity can be elicited when individuals are exposed to mental challenges or emotionally arousing stimuli (Light, 1987). Furthermore, many authors believe that psychosocial factors play a role in the pathogenesis of essential hypertension by triggering these autonomic systems. It seems reasonable to assume that because 90% of all hypertension has no known physiological etiology and that psychosocial factors may be associated with this disorder, then behavioral medicine is an appropriate adjunct to medical treatment. As McMahon (1990) points out:

Psychologists argue, reasonably, that since the etiology of essential hypertension is unknown and multifaceted; that everyone agrees that stress produces hypertension; and pharmacological interventions produce side effects; therefore it is reasonable to aggressively pursue nonpharmacological intervention such as relaxation, meditation, and biofeedback. (p. 102)

Although it may be reasonable to assume behavioral phenomena are related to essential hypertension, little, if any, research has looked at pervasive or enduring cognitive patterns or beliefs and their association with hypertension.

In the Framingham Heart Study (Haynes, Levine, et al., 1978), men had significant correlations in aging worries with systolic and diastolic blood pressure while marital disagreement and personal worries were significantly correlated with diastolic blood pressure. Among women, both types of blood pressure were significantly correlated with anxiety symptoms and fewer work changes, while anger symptoms (e.g., anger-in, tension) were significantly associated with diastolic blood pressure. It should be pointed out,
however, that although these findings are statistically significant, the authors contend that overall, few consistent associations were found between psychosocial variables and levels of blood pressure.

Other studies involving research with animals have confirmed that behavioral factors can play a causal role in the development of hypertension, particularly in interaction with other factors that enhance susceptibility, such as inherited predispositions for high sympathetic myocardial and renal reactivity to behavioral stressors (Light, 1987). Although definitive experimental evidence regarding the contribution of stress to human hypertension is not available, Light (1987) contends that there are numerous lines of indirect support. She states further that the most consistently positive correlations have involved anger coping styles, but ironically, studies have found a positive relationship between hypertension and both excessive anger expression and inhibited anger expression. This suggests that stable "middle-of-the-road" behavior may indeed be the healthiest, both mentally and physically. Hence, Krantz et al., (1987) suggest:

...treatment for mild hypertensive patients for inward anger and associated raised neural tone may be in accord with recent guidelines of the Joint National Commission on Hypertension. Specifically, it is recommended that where possible, "nondrug" therapies be initiated in patients with mild hypertension. It may be fruitful to apply behavioral therapies to those hypertensive subgroups with presumed psychoneurogenic interaction and to determine predictors of favorable blood pressure responses (p. I-87).

Another study has shown the effectiveness in treating essential hypertension through behavioral medicine or "alternative" treatment modalities. Fahrion, Norris, Green,
Green, and Snarr (1986) conducted a study on the effects of behavioral medicine on essential hypertension and found that their treatment modality had long term benefits with 51% of the total patient sample remaining well controlled off medication over an average of 33 months. The treatment they used was a multicomponent psychophysiologic therapy consisting of biofeedback for temperature regulation, cognitive explanation, muscle biofeedback, diaphragmatic breathing exercises, autogenic relaxation techniques, home practice, and home monitoring. The fact that essential hypertension is a multifaceted disease with many different etiologies may explain the effectiveness of this integrated treatment perhaps setting the standard for behavioral interventions with hypertensive patients. Lastly, as a result of the extensive research on psychosocial factors in and the efficacy of alternative treatments for essential hypertension, a variety of behavioral medicine modalities have been advocated for lowering blood pressure including psychotherapy, relaxation, biofeedback, mind-body approaches, and environmental modification (Alpert & Rippe, 1988; Gordon, 1996).

Although it may be reasonable to assume behavioral phenomena are related to essential hypertension, little, if any, research has looked at pervasive or enduring cognitive patterns or beliefs and their association with hypertension. While Tosi et al. (1992) and Tosi and Murphy (1994) have examined this relationship, more research is warranted in the area of variables associated with uncontrolled essential hypertension.
Cardiovascular Disease and Behavioral Medicine:
Improvements in Patient Care and Health Care Costs

Improvements in Patient Care

Historically, research has shown an association of psychosocial factors and increased risk of developing cardiovascular disease (Friedman & Rosenman, 1971, Jonas, Franks, & Ingram, 1997). Over the years, clinicians have gained a better understanding of these psychosocial stresses that are experienced by patients with cardiovascular disease and recent advances in medical technology and treatment modalities have resulted in both a longer life expectancy and a better quality of life for cardiac patients (Livneh & Sherwood-Hawes, 1993).

Extensive research indicates that behavioral medicine is effective in improving quality of care in patients with cardiovascular disease. In a recent study (Livneh & Sherwood-Hawes, 1993), group counseling strategies have been shown to be highly beneficial to post myocardial patients. The authors suggest that the group atmosphere provides for a special protective environment where members can (a) come to understand that their concerns are not unique and that other people share similar issues; (b) express emotions, disclose information about personal issues, and receive encouragement, understanding, and support from others; (c) focus on daily stressors, work on problem solving skills, and practice new coping strategies; and (d) achieve a less complicated transition from the hospital or rehabilitation center into the external community.

In another study, stress-management was compared to a usual-care control group with results suggesting that comprehensive lifestyle changes may be able to bring about regression of severe coronary atherosclerosis after only one year, without the use of lipid-
lowering drugs (Ornish et al., 1990). The experimental group was prescribed a lifestyle program that included a low-fat diet, moderate exercise, stress-management, stopping smoking, and group support. The stress-management approach consisted of stretching exercises, breathing techniques, meditation, progressive relaxation, and imagery. Control group patients were not asked to make any behavioral changes. The results of this study showed that patients in the usual-care control group exhibited significant overall progression of coronary atherosclerosis. The authors suggest that this finding shows that conventional recommendations for patients with CAD are not sufficient to bring about regression in many patients.

Further support that behavioral medicine has potential for improvements in patient care comes from Trzcieniecka-Green and Steptoe (1994), who studied stress management in cardiac patients as predictors of improvement in quality of life. Patients experiencing myocardial infarction and coronary artery bypass surgery both showed significant reductions in anxiety and depression and improvements in psychological well-being, daily living activities, social activity, quality of interactions, and satisfaction with sexual relationships were observed post-treatment and were maintained at follow-up. In addition, reductions in chest pain were recorded.

Another recent study suggests that mental stress can serve as an active and acute trigger of cardiac events (Jiang et al., 1996). These results further indicate that patients who display myocardial ischemia during laboratory mental stress testing may be particularly vulnerable to subsequent cardiac events leading the authors to imply that testing mental
stress induced ischemia, which predicts cardiac events over and above exercise ischemia, might compliment traditional exercise stress testing in select individuals, thus providing improvement in patient care.

Littman (1993), in his literature review, asserts that treatments that were most successful in reducing Type A behavior were part of a multifaceted comprehensive treatment modality. Of these comprehensive approaches, the most efficacious was the combination of an educational intervention, a coping method utilizing either relaxation or cognitive orientation, and a behavioral intervention. Although there is plenty of evidence suggesting that behavioral medicine is effective in the treatment of cardiovascular disease and thus improved patient care, much research still needs to be done.

Health Care Costs

Relating to the issue of improvements in patient care (i.e., improvements in the quality of life) is finding treatment modalities that reduce health-care costs. One of the issues that can interfere with reduction in medical costs is the status quo ideology within the healthcare system. Ketterer (1993) makes mention of this issue suggesting that we cannot ignore the role of a reimbursement system that handsomely rewards high-tech procedures at the expense of cognitive services. He further argues that:

although pressures for cost-effectiveness may open a window of opportunity...persistent, gentle, and scientifically informed persuasion will have to be applied to achieve the recognition among our colleagues in cardiology, that IHD is, to a large extent, a behavioral disorder requiring behavioral care (p. 482).

Although there exists this medical inertia, Mumford, Schlesinger, Glass, Patrick, and Cuerdon (1984) contend that there is an extensive body of literature suggesting that the
provision of outpatient mental health services convincingly reduces the utilization of medical and surgical services and that patients who receive outpatient mental health treatment subsequently reduce their need for inpatient medical care, regardless of their mental or physical diagnosis.

There is plenty of evidence suggesting that behavioral medicine reduces health-care costs in general (Cummings & Follette, 1968; Hellman, Budd, Borysenko, McClelland, and Benson, 1990; Rainer, 1996). Specifically, several studies have shown that behavioral medicine is effective in reducing health-care costs in the treatment of cardiovascular disease. Mumford et al. (1984) demonstrated that coronary patients who receive education and psychological support improve faster than those patients who receive only customary medical care. In another study, Miller, Leinbach, and Brody (1989) contend that individuals tend to use medical services when their psychological distress levels and specific concerns about their physical symptoms are high. They further hypothesized, and subsequently found, that considering hypertension is quite prevalent, aggregates in families, and can lead to early heart disease, that this may make hypertensive patients more likely to use medical services for acute problems and to show more sustained symptomology. In another hypertension study, Towner and Blumenthal (1993) found that more intensive exercise alone may reduce blood pressure in hypertensive patients as much as a beta-blockade. Friedman et al., (1984) placed patients who had survived a heart attack, thus at high risk for
another, in groups of standard care or care-plus-group psychotherapy and found conclusive evidence that the rate of second heart attacks reduced by nearly 50 percent in the psychotherapy group.

Behavioral medicine is not to be suggested as a replacement for traditional medical care, but rather as a complimentary approach. As Ketterer (1993) suggests, routine psychometric screening of ischemic heart disease patients may provide a cost-effective means of alerting cardiologists and internists to the relatively high levels of distress among their patients. He argues, perhaps too assertively, that with the exception of aspirin use in patients with unstable angina, the results so far observed for behavioral treatments are superior to any form of medical therapy.

The literature suggests that evaluation of medical outcomes should expand beyond the traditional standards of mortality and morbidity (Street, Gold, & McDowell, 1994). Medical care also should be assessed with respect to the patients health-related quality of life, a measure of the biomedical, behavioral, and social dimensions of living, which can add an important dimension to the cost-effectiveness and improvement of the physician's ability to monitor patients (Street, Gold, & McDowell, 1994; Testa, Sudilovsky, Rippey, & Williams, 1989).

Collaborative Care Intervention and Research Potential in the Treatment of Cardiovascular Disease

Economic factors pushing for cost-effective medical treatment has provided for an apparent shift in the health-care delivery system. This transition seems to be toward a system of integrated primary care (Belar, 1995; Blount & Bayona, 1994; Jones, Badger, Ficken, Leeper, & Anderson, 1987). The theoretical assumption underlying this transition is
that multiple disciplines involved in the provision of health-care are unable to operate independently or in isolation from one another and that this serves to foster multidisciplinary collaboration between health-care providers within the same clinic (Belar, 1995; Katon, 1995). Although there is a push to heal the mind-body split, this is still perhaps the most significant threat to integrated health-care within the American health-care policy (Belar, 1995; McDaniel, Campbell, & Seaburn, 1995). As Blount and Bayona (1994) point out, although integrating mental health services into primary medical care seems appropriate as a way of implementing a collaborative biopsychosocial model of health-care, it has happened in only a few settings. Several authors (Blount & Bayona, 1995; Doherty, 1995; Katon, 1995; McDaniel, Campbell, & Seaburn, 1995) provide models or descriptions of collaborative care and agree that collaboration can be a very broad term leading to different definitions. However, Belar (1995) provides a good operational definition of a collaborative health-care model suggesting that there would be no distinction between psychological services offered for psychiatric disorders versus those offered for medical-surgical problems. Furthermore, she suggests that:

systems develop a single multidisciplinary service made up of behavioral scientists, clinicians, and educators that would be responsible for the management of resources for the integration of behavior and health throughout the health care system. Integration would be accomplished through direct member service and treatment programs, case consultation, liaison activities, and membership on specific health care teams (p. 144).

The primary assumption underlying this study, the theoretical position of Psychoneural Identity or what is known as monistic mind-body unity, provides support for this notion of
integrated healthcare. Perhaps the current study, as well as others that address the mind/body connection, will enhance the efforts of the healthcare community in integrating its treatment systems.

Dustan (1987) and Herd et al., (1987) concur that we are beginning to understand the importance of the central nervous system and biobehavioral factors in essential hypertension. Rudy, Tosi, and Lewis (1995) suggest that it is apparent that there are neurogenic pressure mechanisms in some people with essential hypertension. The task is to find ways to identify these patients easily and to provide specific interventions. Herd et al., (1987) argue that further research is necessary to select subjects most appropriate for behavioral treatments, to standardize techniques, to improve compliance, and to devise a systematic approach for the treatment of essential hypertension. Perhaps evidence showing a relationship between enduring cognitive structures, negative affectivity, and essential hypertension will provide the building block for identifying such patients, understanding noncompliance, and developing specific techniques for the treatment of hypertension.

In summary, although transient or situational cognitions have been examined in relation to cardiovascular disease, research in the area of essential hypertension has not examined the relationship between pervasive or enduring cognitive characteristics, such as Ellis irrational beliefs, and well controlled versus uncontrolled hypertension. Furthermore, uncontrolled hypertension is a serious health issue, and any information shedding light on why controlling hypertension is such a problem, despite medical treatment, is warranted.
CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

Overview

The purpose of this study was to investigate the relationship between irrational beliefs (IBs), negative affect, stages of changes, and essential hypertension. The nature of this research is descriptive with a correlational design and multivariate data analysis procedures were used in the data analysis. Known demographic risk factors for essential hypertension were statistically controlled in the data analysis. Four research questions were addressed:

Research Question 1: What are the demographic risk factor characteristics of the sample?

Research Question 2: Is there a relationship between IB's and essential hypertension?

Research Question 3: Is there a relationship between negative affect and essential hypertension?
Research Question 4: Is there a relationship between stages of change and essential hypertension?

Participants

Participants were persons known to have essential hypertension. The subject pool was drawn from essential hypertensives currently undergoing treatment at the Mount Carmel Family Practice Centers. The center is an outpatient facility that provides a full range of family practice medical care to a Midwestern community. The sample included 78 participants who were medically diagnosed as having essential hypertension. Participants were screened on medical standards and categorized or defined as well-controlled hypertensives whose mean arterial pressure (MAP) reading is < 100 and uncontrolled hypertensives whose MAP reading is > 100.

Data Collection

Family practice patients who have been diagnosed with essential hypertension were identified over a 6 month period from August 1998 through January 1999. A mail survey was sent out asking patients to voluntarily participate in the study. The mailing list was generated from a computer database from office visits to the Mount Carmel Family Practice Residency Program that were given the International Classification of Diseases (ICD-9) code of unspecified hypertension. A total of 293 test packets were mailed. Upon obtaining informed consent, subjects were given a test packet with written instructions and then completed a series of objective psychological measures and a demographic known risk factor questionnaire. The test packets included measures on (a) irrational thinking (Attitudes & Belief Scale-II [A&B-II]), (b) anxiety, depression, and hostility (Multiple Affective Adjective Checklist-Revised [MAACL-R]), and a demographic questionnaire. Completion of
test packet materials was expected to take 20-30 minutes. (Two different test packets were organized so that the A&B-II was alternated in presentation order with the MAACL-R to separate effects of presentation of one instrument upon the other).

Variables

Demographics

Prior research has determined risk factors for essential hypertension. These variables include: sex, age, race, obesity, sedentary lifestyle, salt intake, alcohol consumption, caffeine intake, family history, and smoking. Information about known risk factors for essential hypertension were obtained from the demographic questionnaire. Gender, race, and family history data are categorical. Age, weight, consumption of salt, caffeine, and alcohol, smoking, and exercise level are interval scales of measurement.

Irrational Beliefs

From Albert Ellis' theory of Rational Emotive Behavior Therapy (REBT) irrational beliefs are a set of pervasive cognitive structures that are generally expressed in unquestioned absolutes, musts, shoul ds, oughts, and demands. Irrational beliefs are hypothesized to influence and generate emotional disturbances such as depression, anxiety, and hostility. An irrational belief was operationally defined for this study as scores on the psychometric scales of the Attitudes and Belief Scale-II (A&B-II) (DiGuiseppe, Leaf, Exner, & Robin, 1988; DiGuiseppe, Robin, Leaf, & Gormon, 1989). It is a continuous measure on an interval scale. The A&B-II consists of the following scales: Total Score (TOT), Total Irrational Score (TIS), Total Rational Score (TRS), Demandingness (DEM), Self-Rating (SR), Awfulizing (AWF), and Low Frustration Tolerance (LFT). These are the independent
variables in the multiple regression analysis with mean arterial pressure and are all continuous measures on an interval scale.

**Negative Affectivity**

Affect is a general tendency toward a particular emotion or feeling. Negative affectivity refers to a pervasive disposition toward the subjective experience of anxiety, depression, and hostility. Negative affectivity was operationally defined for this study as scores on the psychometric subscales of the Multiple Affect Adjective Check List-Revised trait form (MAACL-R) (anxiety, depression, and hostility) (Zuckerman & Lubin, 1985), which is a continuous measure on an interval scale. Negative affect is the independent variable in the regression analysis with mean arterial pressure.

**Stage of Change**

Stages are abstract constructs that reflect the temporal dimension in which change unfolds. Stages of change were operationally defined for this study as each of the five stages of change in the transtheoretical model (Prochaska & DiClemente, 1983) and were measured by a set of five questions on the demographic questionnaire that correspond to each stage. Subjects can be in only one stage at a time and were assessed for inclusion to each category according to the transtheoretical model: Precontemplation, contemplation, preparation, action, and maintenance, stages 1-5 respectively. This is a categorical measure on an nominal scale.

**Essential Hypertension**

Blood pressure is measured using a sphygmomanometer and a stethoscope. Essential hypertension is high blood pressure (BP). Well-controlled essential hypertension was operationally defined for this study as BP <140/90 mm Hg on two or more
consecutive occasions and uncontrolled essential hypertension was operationally defined as BP > 140/90 mm Hg on two or more consecutive occasions. BP readings were identified by using the vital signs sheet in the subject's medical chart. The last recorded BP reading in the patient's medical chart was used in the data analysis. Although subjects were identified based upon the diagnosis of hypertension (BP reading of 140/90 mm Hg), analysis of data was run using mean arterial pressure (MAP). The mean arterial pressure is "the average blood pressure over the cardiac cycle and is approximated by the diastolic pressure plus one-third the pulse pressure" (Wollam & Tuttle, 1980, p. 517). Thus, MAP is operationally defined as the following: MAP = DBP + 1/3(SBP-DBP), or MAP = (2DBP + SBP) + 3 (where DBP = diastolic blood pressure; SBP = systolic blood pressure). Mean arterial pressure is a continuous measure on a ratio scale. By using the continuous variable of MAP in the statistical analysis, a more powerful analysis was conducted than if using the dichotomous variable of uncontrolled versus well-controlled hypertension.

Instrumentation

The instruments used to measure the variables were the Attitudes and Belief Scale-II, the Multiple Affective adjective Checklist-Revised trait form, Demographic questionnaire, and the vital signs sheet in the subject's medical chart.

The Multiple Affect Adjective Checklist-Revised (MAACL-R)

The MAACL-R is a 132 item inventory for assessing clinically relevant negative affects of depression (D), anxiety (A), and hostility (H) (Zuckerman & Lubin, 1985). Norms for the trait form of the MAACL-R are based on a representative, nationwide sample of 1491 subjects in the United States. Satisfactory internal reliabilities and retest reliabilities have been shown as well as good convergent and discriminant construct validity scores.
The MAACL has been widely used in the literature and specifically in conjunction with irrational beliefs and hypertension (Kassinove & Eckhardt, 1994; Silverglade, 1989; Waked & Jutai, 1990). In addition, this study was interested in dimensions of negative affect, not psychopathology levels. Furthermore, the MAACL-R measures the three dimensions of interest quickly, reliably and validly all in one measure rather than needing three different instruments to measure each variable. In addition, a composite score of overall dysphoria (Dys) (the sum of the anxiety + depression + hostility subscales) can be easily obtained, if necessary. Lastly, Lubin, et al. (1986) has indicated that the MAACL is one of the most widely used measures of affect in clinical, experimental, and epidemiological studies.

Subject’s raw scores on the MAACL-R were computed and then converted to T-scores. Conversion of subject’s raw scores to T-scores allows for the comparison of subject’s scores to nationally normed data and is recommended by the MAACL-R manual.

Reliability. Zuckerman (1983) has noted that the reliability expectations are different for state and trait tests. Affect states depend on many immediate external and internal factors that are not likely to be highly similar on two different testing occasions, however, trait tests are expected to have high retest reliability and high internal reliability (Zuckerman & Lubin, 1985). The trait form of the MAACL-R was used because it was assumed that these are pervasive affects held over time similar to the assumption that beliefs are pervasive cognitions held over time. Trait retest reliabilities and internal reliabilities were conducted by Zuckerman and Lubin (1985). Retest reliabilities for college student samples retested after a period of 8 weeks showed reliabilities of $A = .64$, $D = .61$, $H = .53$, and $Dys = .62$. Internal reliabilities for the general population were: $A = .79$, $D = .81$, $H = .84$, $Dys = .92$. Several other authors have conducted reliability investigations providing evidence for the use of the
MAACL-R in measuring negative affect. (Gosselin, Lubin, & Sokoloff, 1983; Lubin, Grimes, & Van Whitlock, 1997; Lubin, Van Whitlock, & Rea, 1995; Lubin, et al., 1986; Nickel, Lubin, & Rinck, 1986). Specifically, Lubin et al. (1988) indicate Cronbach alpha coefficients of \( \Lambda = .79; \ D = .81; \ H = .84; \) and Dys = .92.

Validity. Zuckerman and Lubin (1985) have conducted a number of validity studies of the MAACL-R using self-ratings (SR), peer ratings, Profile of Mood States (POMS) (McNair, Lorr, & Droppelman, 1971), and the Minnesota Multiphasic Personality Inventory (MMPI) (Hathaway & McKinley, 1951). The authors constructed self-rating scales of tense-anxious, sad-depressed, and irritated-angry designed to correspond to anxiety, depression, and hostility respectively. Self ratings were done on a 5 point likert scale. Correlations for five clinical samples were conducted: two state hospitals, two community clinics, and one university counseling center. Correlations for Anxiety ranged from .19 to .56, for Depression from .31 to .62, and for Hostility .11 to .52. In summarizing the patient data, all of the MAACL-R scales except H had good convergent validity, but only A and D showed good discriminant validity as well.

Zukerman and Lubin (1985) also conducted validity studies using the POMS (McNair, Lorr, & Droppelman, 1971). Anxiety, Depression, and Hostility on the MAACL-R correspond respectively to Tension, Depression, and Anger scales on the POMS. Correlations for A, D, and H were .16, .42, and .29, respectively. When correlating the Dys scale with the POMS correlations increased to .22, .47, and .33 respectively. Some correlations were found on the MAACL-R and the POMS, but with the exception of the two depression scales (\( r = .42 \)) these were low and failed to show a pattern of discriminant
validity (i.e., both A and H MAACL-R scales correlated more highly with the POMS Depression scale than with their corresponding scales on the POMS).

Zuckerman and Lubin (1985) used the MMPI to determine validity in the MAACL-R as well. The MMPI is a trait test and would be expected to correlate more highly with the trait than with the state MAACL-R. The highest correlations were between the MMPI D scale and the trait MAACL-R Dys (positive correlations) and the positive affect scales (negative correlations). For all subject groups, lower scores on the Positive Affect (PA) scale of the trait MAACL-R were more related to the MMPI depression scale than high scores on the trait MAACL-R depression scale, thus lending consideration of the PA scale in the prediction of depression.

Several other authors have conducted validity studies providing support for the use of the MAACL-R in measuring negative affect (Lubin, Cain, & Van Whitlock, 1992; Lubin, Grimes, & Van Whitlock, 1997; Lubin, Van Whitlock, & Rea, 1995; Nickel, Lubin, & Rinck, 1986; Zuckerman, et al., 1986). Specifically, Lubin et al. (1986) found effect sizes ranging from .32 to .62. Although research indicates moderate reliability and validity for the MAACL-R, Jacobsen, Munro, and Brooten (1996) have shown a discrepancy between the original MAACL and the MAACL-R and have suggested researchers use caution in their use of the MAACL, and that they should determine prior to conducting the study which scoring system will be used.

In summary, the literature has indicated that the MAACL-R has been a widely used instrument to measure negative affect, and has specifically been used with hypertension research. Moreover, several studies have shown that the MAACL-R has moderate reliability
and validity. Thus, the MAACL-R was an appropriate measure for use with the current investigation.

**The Attitudes and Belief Scale-II (A&B-II)**

The A&B-II is a 72 item test consisting of a 4 x 3 x 2 matrix; the first factor is cognitive process and has four levels: demandingness, self-worth, low frustration tolerance (LFT), and awfulizing; the second factor, content/context, has three levels: affiliation, achievement, and comfort; and the third factor has two levels: irrationally worded items and rationally worded items (DiGuiseppe et al., 1989). DiGuiseppe et al. (1989) contend that the A&B-II can derive 24 separate scales or one could collapse across different scales and could possibly yield 43 subscales. Robin, DiGuiseppe, and Naimark (1990) argue for the use of seven scales: Total score, total irrational sub-scale, total rational sub-scale, and subscales for each of Ellis' updated major categories of irrational beliefs - demandingness, self-rating, awfulizing, and low frustration tolerance. They further indicate that "the total score and the subscales have been demonstrated to have excellent internal consistency, to discriminate between normal outpatient and inpatient populations, and to correlate...with measures of emotional disturbance...depression, [and] anxiety..." (Robin et al., 1990; p. 2-3).

Although the Irrational Beliefs Test (IBT) (Jones, 1969) is probably the most popular and most widely used measure of beliefs in the literature, it has its critics (See Woods, 1992). One argument has been over the nature of item content. Critics argue that the items on the IBT not only refer to beliefs, but also refer to emotional reactions, while others refer to behavioral responses, and still others are ambiguous as to whether they refer to beliefs, emotions, or behaviors (Woods, 1992). Smith and Zurawski (1983) and Zurawski and Smith (1987) contend that discriminant validity is of concern with such a mixing in item
content. Smith (1989) has concluded that the item content of the IBT "...produces concerns over interpreting much of the apparent support for the RET model that has accumulated..." (p. 141). Such arguments have led Woods (1992) to argue that the Attitudes and Belief Scale - II (A&B-II) (DiGuiseppe, Leaf, et al., 1988; DiGuiseppe, Robin, et al., 1989) may be a better instrument than the IBT for testing REBT theoretical assumptions because it is an instrument with the goal of being based entirely on belief statements. Woods (1992) further states "It is hoped that it will receive additional attention from researchers and clinicians" (p. 51). Furthermore, the A&B-II is an attempt to assess recent changes in Ellis' (1994) theory that other measures of irrationality do not consider (i.e., changing the core beliefs from 10 to 4) (DiGuiseppe et al., 1989). Finally, Robb and Warren (1990) reiterate Ellis (1962) position that emotion and behavior are not simply a function of either the rational or irrational beliefs which a person holds but a function of both. Therefore, they assert that:

...it is not enough to know if someone agrees or disagrees strongly with what are presumed to be irrational beliefs. We also had better know if that person agrees or disagrees strongly with what are presumed to be rational beliefs (p. 309).

Of the irrational belief measures available, only the A&B-II has adequate assessment of both rational and irrational beliefs (Robb & Warren, 1990). Thus, the preceeding was the rationale for the use of the A&B-II in this study.

Reliability. DiGuiseppe et al. (1988) examined reliability data on the A&B-II from a college sample and found correlations ranged from .71 to .89. DiGuiseppe et al. (1989) show alpha coefficients ranging from .47 to .78 for all of the possible subscales, while the total score for the entire test items yielded an alpha coefficient of .96.
Validity. DiGiuseppe et al. (1988) also conducted validity studies using the 13 item version of the Beck Depression Inventory and Spielberger's Trait Anxiety and Trait Anger Scales. Correlations of irrational and rational scores with the cross-validation measures listed above ranged from .21 to .51, while correlations for the irrational beliefs sub-scales ranged from .37 to .42, .37 to .48, and .21 to .31 for depression, anxiety, and anger cross validation measures respectively. Robin et al. (1990) contend that validity data correlate between .40 to .50 for the A&B-II.

Statistical Design

Research Question One

Research question one was: What are the demographic characteristics of each hypertension group? Statistics for this question are descriptive along already known risk factors for essential hypertension. These are sex, age, race, obesity, sedentary lifestyle, salt intake, alcohol intake, caffeine intake, family history, and smoking. Gender, race, and family history data are categorical. Age, weight, consumption of salt, caffeine, and alcohol, smoking, and exercise level are interval scales of measurement. These variables were examined using a variety of statistical techniques that included frequency counts, and descriptive statistics.

Research Question Two

Research question two was: Is there a relationship between IB's and essential hypertension? Specifically, the relevance of this question is can certain IB scores on the A&B-II predict the severity of essential hypertension. In order to accomplish this task, multiple regression was chosen because the research problem involves a single metric dependent variable and several metric independent variables (Hair, Anderson, Tatham, &
Due to the preliminary nature of this study and the relative newness of the A&B-II, independent variables were entered in a forward stepwise fashion. Whenever an investigation is primarily predictive, the stepwise method is appropriate (Cohen & Cohen, 1983; Hair et al., 1995; Menard, 1995). "In purely predictive research, there is no concern with causality, only with identifying a model, including a set of predictors that provides accurate predictions of some phenomena" (Menard, 1995; p. 54). Forward stepwise multiple regression selects which variable at each step that makes the largest contribution to the coefficient of determination. The independent variables were scores on the A&B-II reflecting: Total Score (TOT), Total Irrational Score (TIS), Total Rational Score (TRS), Demandingness (DEM), Awfulizing (AWF), Self-Rating (SR), and Low Frustration Tolerance (LFT). These variables are all continuous measures on interval scales. The dependent variable was essential hypertension using Mean Arterial Pressure (MAP) as the operationally defined dependent variable. MAP is a continuous measure on a ratio scale.

Research Question Three

Research question three was: Is there a relationship between negative affect and essential hypertension? The effects of negative affect on essential hypertension were examined by multiple regression. The forward stepwise method was used to enter the independent variables of Dysphoria (Dys), Hostility (HOST), Anxiety (ANX), and Depression (DEP). These variables are continuous measures on interval scales. The dependent variable again was hypertension measured as MAP and is a continuous measure on a ratio scale.
Research Question Four

Research question four was: Is there a relationship between stages of change and essential hypertension? The effects of stages of change on essential hypertension were examined by analysis of variance (ANOVA). ANOVA is the preferred method of analysis when the research problem involves the analysis of one or more independent variables with two or more levels (Hinkle, Wiersma, & Jurs, 1988). Changes in the dependent variable are presumed to be the result of changes in the independent variable (Gay, 1987). The independent variable was stage of change and has five levels: Precontemplation, contemplation, preparation, action, and maintenance. This variable is a categorical measure on a nominal scale. The dependent variable was hypertension (MAP) and remains a metric level of measurement on a ratio scale.

Power Analysis

Several authors have argued the need for power analysis in psychological research (Cohen, 1977, 1988; Cohen & Cohen, 1983; Hair et al., 1995; Heppner, Kivlighan, Wampold, 1992). Determining statistical power is dependent on four elements: the statistical test, effect size, alpha level, and sample size. These elements are so related that fixing any three completely determines the fourth (Cohen & Cohen, 1983).

The statistical tests of ANOVA and multiple regression were chosen because they are believed to be the best to answer the research questions. A method of increasing power is using measures with large effect sizes. In a previous study (Waked & Jutai, 1990), effect size of the measure MAACL for patients with borderline hypertension was moderate to high with r's ranging from .44 to .65. Effect size for the A&B-II range from .40 to .50, according to Robin et al. (1990). Greater effect size is an efficient way to increase statistical
power. Alpha levels were set according to conventional guidelines at .05 (Hair, et al., 1995). Because there were ten independent variables, at a specified .05 significance level, and a specified power of .80, then a sample of 50 subjects detects coefficient of determination values of 29 percent and greater (Cohen & Cohen, 1983; Hair, et al., 1995). This is well within the effect size indicated in the literature for the MAACL and the A&B-II. Furthermore, Heppner et al. (1992) state that "...stipulation of a "medium"-sized effect has guided many a researcher" (p. 277). However, Cohen (1977) indicates that most research has small effect size.

Limitations

Cook and Campbell (1979) address several factors that will affect internal, external, and statistical conclusion validity.

Threats to internal validity

Internal validity refers to the confidence that researchers can place in inferring a causal relationship among variables while simultaneously eliminating rival hypotheses (Gay, 1987). In other words, the outcome of the study is the direct result of the manipulation of the independent variable. If someone came up with a tenable alternative explanation, a rival hypothesis, then the study might not be internally valid. Thus, internal validity is concerned with the most basic aspect of research, the relationship among the variables of interest (independent and dependent variables). Internal validity is also related to experimental control. Because the independent variables in this study were not directly manipulated, but rather, were only controlled statistically, causality cannot be inferred (Campbell, & Stanley, 1963; Cook & Campbell, 1979).
Threats to external validity

External validity refers to the generalizability of the results of the study to nonexperimental populations. That is, to what extent can the results be generalized to other persons and to other environments. Heppner, et al. (1992) discuss three threats to external validity: Interaction of selection and treatment, interaction of setting and treatment, and interaction of history and treatment. The major threat to external validity of this study was interaction of setting and treatment (Cook & Campbell, 1979). Specifically, generalization beyond the Mount Carmel affiliated Family Practice Centers is problematic for all analyses.

Gay (1987) alludes to another threat to external validity: Experimenter bias. Experimenter bias refers to the way that the experimenter looks, feels, or acts that may intentionally or unintentionally affect the study results, usually in the desired direction. This was not a problem due to the procedure of administering and collecting testing materials using a mail survey with written instructions.

Statistical conclusion validity

The major threat to statistical conclusion validity was low statistical power (Cook & Campbell, 1979). Every effort was made to increase statistical power, and a power analysis was conducted on each analysis.
CHAPTER 4

RESULTS

The relationship between irrational beliefs and essential hypertension has not been extensively examined, despite numerous research addressing the relationship between psychosocial, emotional, and behavioral factors and physical illness and medical conditions. The purpose of this study was to fill this gap by identifying relationships between Ellis's irrational beliefs, negative affect and essential hypertension, along with examining the relationship between Prochaska and DiClemente's (1983) transtheoretical model of behavioral change and essential hypertension.

The research questions addressed in this investigation were:

Research Question 1: What are the demographic risk factor characteristics of the sample?

Research Question 2: Is there a relationship between IB's and essential hypertension?

Research Question 3: Is there a relationship between negative affect and essential hypertension?
Research Question 4: Is there a relationship between stages of change and essential hypertension?

Participants

Participants were persons known to have essential hypertension undergoing treatment at a Midwestern family practice residency program. A mail survey was sent out asking patients to voluntarily participate in the study. A total of 293 test packets were mailed. Of the 293 patients treated over the six-month recruitment period, 58% were women. Seventy-eight participants returned the materials (26% response).

Exclusion of Cases

Of the 78 participants completing the Attitudes and Belief Scale-II (A&B-II), the decision was made to exclude two cases. The responses to the A&B-II for these two cases were interpreted as invalid. One respondent entered the same response on all items indicating neutrality to all 72 items. A second respondent, after varying responses to the first 20 items, entered the same response ("strongly disagree") on all of the remaining 52 items. The A&B-II was constructed to differentiate between rational and irrational thinking as defined by Ellis (1994). This is not possible when respondents enter the same answer to all items as the degree of rationality or irrationality cannot be computable for such cases. Thus, the valid number of respondents on the A&B-II was 76.

Of the 78 participants who returned the questionnaires, three did not complete the MAACL-R. After several attempts to obtain completion on these measures were unsuccessful, the decision was made to not include these cases in the analysis of relationship between negative affect and mean arterial pressure (MAP). In addition, one of the responses
to the MAACL-R was interpreted as invalid, as indicated by the MAACL-R manual, thus, it was not used in the data analysis. Valid MAACL-R respondents equaled 74.

Distribution of the Variables

Verification of the Raw Data

Before beginning the statistical analysis of the data, the data were verified and descriptive statistics were calculated. The raw data used for all the measures were verified by obtaining a printout of the SPSS data file. This printout allowed visual checking of the actual respondents' answers and raw data (e.g., frequencies) entered into the SPSS program. Several discrepancies were found and subsequently corrected. Raw scores on the MAACL-R were converted to T-scores as indicated by the manual. The manual and syntax file distributed by the authors of the A&B-II do not indicate the use of T-scores, thus raw data were used for analysis with the A&B-II.

Demographic Characteristics

The first research question addressed the demographic characteristics of the sample. The overall sample for this study consisted of 78 subjects, of which, all demographic questionnaires were utilized in the analysis (n=78). Demographic characteristics were as follows: Age ranged from 27 to 76 years old; 70.5% were female (58% of 293 possible participants were female, thus, the sample seems representative of the population treated for essential hypertension during the six month recruitment period); 89.7% were European American and 10.3% were of other ancestry, and 62.4% were currently married (either first marriage [41.6%] or remarried [20.8%]) (see Appendix A). The majority of subjects (69.2%) had a MAP of 100 or greater indicating uncontrolled hypertension (see Appendix A).
Of the 78 respondents, seventy (89.7%) were on blood pressure medication (Table 4.1).
Sixty-seven subjects (85.9%) had a genetic predisposition for hypertension (Table 4.2).

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
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<tr>
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<td></td>
</tr>
<tr>
<td>no</td>
<td>8</td>
</tr>
<tr>
<td>yes</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
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</table>

Table 4.1: Subjects on blood pressure medication

<table>
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<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>no</td>
<td>11</td>
</tr>
<tr>
<td>yes</td>
<td>67</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
</tr>
</tbody>
</table>

Table 4.2: Relatives with high blood pressure
The majority of subjects (51.3%) did not exercise at the current national physical fitness recommendations of 20 minutes 3 times a week. Three fourths (74.4%) of the respondents were nonsmokers. The majority of subjects did not have the complicating medical factors of diabetes and high cholesterol (78.2% and 64.1%, respectively) contributing to their hypertension. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-VI) (1997) recommends limiting alcohol intake to fewer than two drinks per day as a way to control hypertension.

Seventy-three (93.6%) subjects fell within the accepted limits of two drinks a day or less for daily alcohol consumption. Forty-one (65.4%) subjects had three servings or less of caffeine per day. The JNC-VI recommends limiting sodium intake to 2.4 grams per day. There was no practical way to determine precise salt consumption for each subject, therefore, estimation of servings was calculated. The majority of subjects (64.1%) reported that they limited their sodium intake to three servings per day.

Descriptive Statistics

Descriptive statistics were generated on the A&B II, the MAACL-R, and the demographic questionnaire measures. Table 4.3 displays the following statistics for the A&B-II, MAACL-R, and MAP variables: Minimum and maximum scores, mean, median, standard deviation, skewness, standard error of skewness, kurtosis, and standard error or kurtosis.
<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>Skew</th>
<th>SES²</th>
<th>Kurtosis</th>
<th>SEK²</th>
</tr>
</thead>
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<td>129.80</td>
<td>105.75</td>
<td>104.53</td>
<td>9.43</td>
<td>.406</td>
<td>.272</td>
<td>-.358</td>
<td>.538</td>
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<tr>
<td>TOT</td>
<td>76</td>
<td>21.00</td>
<td>205.00</td>
<td>85.36</td>
<td>70.50</td>
<td>46.49</td>
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<td>.276</td>
<td>-.295</td>
<td>.545</td>
</tr>
<tr>
<td>TRS</td>
<td>76</td>
<td>52.00</td>
<td>138.00</td>
<td>105.36</td>
<td>111.50</td>
<td>21.99</td>
<td>-.634</td>
<td>.276</td>
<td>-.687</td>
<td>.545</td>
</tr>
<tr>
<td>TIS</td>
<td>76</td>
<td>6.00</td>
<td>123.00</td>
<td>46.73</td>
<td>40.50</td>
<td>27.57</td>
<td>.919</td>
<td>.276</td>
<td>.203</td>
<td>.545</td>
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<tr>
<td>AWF</td>
<td>76</td>
<td>2.00</td>
<td>51.00</td>
<td>21.57</td>
<td>20.00</td>
<td>12.66</td>
<td>.486</td>
<td>.276</td>
<td>-.544</td>
<td>.545</td>
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<tr>
<td>DEM</td>
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<td>6.00</td>
<td>47.00</td>
<td>23.01</td>
<td>20.00</td>
<td>11.01</td>
<td>.496</td>
<td>.276</td>
<td>-.749</td>
<td>.545</td>
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<tr>
<td>SR</td>
<td>76</td>
<td>.00</td>
<td>51.00</td>
<td>14.78</td>
<td>9.00</td>
<td>14.02</td>
<td>1.139</td>
<td>.276</td>
<td>.046</td>
<td>.545</td>
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<td>LFT</td>
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<td>4.00</td>
<td>56.00</td>
<td>25.98</td>
<td>24.00</td>
<td>12.33</td>
<td>.495</td>
<td>.276</td>
<td>-.299</td>
<td>.545</td>
</tr>
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<td>ANX</td>
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<td>88.00</td>
<td>58.74</td>
<td>59.00</td>
<td>13.41</td>
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<td>.279</td>
<td>-.807</td>
<td>.552</td>
</tr>
<tr>
<td>DEP</td>
<td>74</td>
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<td>122.00</td>
<td>62.66</td>
<td>58.50</td>
<td>19.50</td>
<td>.865</td>
<td>.279</td>
<td>-.065</td>
<td>.552</td>
</tr>
<tr>
<td>HOST</td>
<td>74</td>
<td>42.00</td>
<td>94.00</td>
<td>54.51</td>
<td>50.00</td>
<td>13.50</td>
<td>1.001</td>
<td>.279</td>
<td>-.182</td>
<td>.552</td>
</tr>
<tr>
<td>DYS</td>
<td>74</td>
<td>41.00</td>
<td>94.00</td>
<td>59.74</td>
<td>57.50</td>
<td>14.88</td>
<td>.423</td>
<td>.279</td>
<td>-.917</td>
<td>.552</td>
</tr>
<tr>
<td>PA</td>
<td>74</td>
<td>12.00</td>
<td>75.00</td>
<td>45.86</td>
<td>47.50</td>
<td>14.93</td>
<td>-.485</td>
<td>.279</td>
<td>-.634</td>
<td>.552</td>
</tr>
<tr>
<td>SS</td>
<td>74</td>
<td>26.00</td>
<td>67.00</td>
<td>44.01</td>
<td>44.00</td>
<td>10.37</td>
<td>.259</td>
<td>.279</td>
<td>-.869</td>
<td>.552</td>
</tr>
<tr>
<td>PASS</td>
<td>74</td>
<td>15.00</td>
<td>67.00</td>
<td>44.59</td>
<td>48.00</td>
<td>14.16</td>
<td>.453</td>
<td>.279</td>
<td>-.789</td>
<td>.552</td>
</tr>
<tr>
<td>COMFORT</td>
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<td>3.00</td>
<td>68.00</td>
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<td>23.50</td>
<td>15.99</td>
<td>.610</td>
<td>.276</td>
<td>-.498</td>
<td>.545</td>
</tr>
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<td>APPROV</td>
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<td>62.00</td>
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<td>.276</td>
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<td>.545</td>
</tr>
<tr>
<td>ACHIEVE</td>
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<td>85.00</td>
<td>33.39</td>
<td>28.50</td>
<td>18.31</td>
<td>.878</td>
<td>.276</td>
<td>.291</td>
<td>.545</td>
</tr>
</tbody>
</table>

Note: 1MAP = Mean Arterial Pressure; TOT = A&B-II Total score; TRS = Total Rational Score; TIS = Total Irrational Score; AWF = Awfulizing; DEM = Demandingness; SR = Self-rating; LFT = Low Frustration Tolerance; ANX = Anxiety; DEP = Depression; HOST = Hostility; DYS = Dysphoria Composite Score; PA = Positive Affect; SS = Sensation Seeking; PASS = Positive Affect/Sensation Seeking; 2SES = Standard Error Skewness; 2SEK = Standard Error Kurtosis

Table 4.3: Descriptive statistics
Distribution of the Variables

Table 4.3 shows the distribution of the A&B-II and MAACL-R variables. Histograms were also plotted and are displayed in Appendix B. Referring to Table 4.3, of particular notice are kurtosis and skewness. Kurtosis refers to the shape of the "bell curve" of a normal distribution (the normal distribution is superimposed upon the histograms in Appendix B). Values greater than zero indicate that the distribution is more peaked than the normal curve and is said to be leptokurtic. Conversely, distributions that are "flatter" than normal curve distributions are platykurtic, and have values less than zero. As Table 4.3 indicates, the range of kurtosis is from -.917 for MAACL-R Dysphoria (moderately flat) to +.291 (moderately peaked) for A&B-II Achievement subscale (ACHIEVE). (The A&B-II achievement subscale was used in analysis subsequent to answering the original research questions).

Skewness is a measure of the distribution's symmetry around the mean. The distribution is said to be skewed when a preponderance of cases tend to cluster on one side of the mean. When fewer cases cluster above the mean, the distribution is said to be positively skewed; when fewer cases fall below the mean, the distribution is said to be negatively skewed. Skew among the A&B-II and MAACL-R variables ranged from -.485 (MAACL-R positive affect) to +1.139 (A&B-II self rating).

As the histograms and descriptive statistics indicate, the distributions of the variables can be considered normal. Normality for each of the variables was also examined using normal probability plots (see Appendix C).

Frequency counts for variable stage of change were computed. Forty-seven (60.3%) subjects were in the maintenance stage; twelve (15.4%) were in the action stage; eight
(10.3%) were in the preparation stage; four (5.1%) were in the contemplation stage; and seven (9%) were in the precontemplation stage of change.

Table 4.4 displays the intercorrelations among the subscales of the A&B II and MAACL-R measures. The variable mean arterial pressure (MAP) is included in Table 4.4, as well.
<table>
<thead>
<tr>
<th></th>
<th>MAP</th>
<th>TOT</th>
<th>TRS</th>
<th>TIS</th>
<th>AWF</th>
<th>DEM</th>
<th>SR</th>
<th>LFT</th>
<th>ANX</th>
<th>DEP</th>
<th>HOST</th>
<th>DYS</th>
<th>PA</th>
<th>SS</th>
<th>PASS</th>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
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<td></td>
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<td></td>
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<tr>
<td>TRS</td>
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</tr>
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<td>TIS</td>
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<td>-0.757**</td>
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<tr>
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<tr>
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<tr>
<td>SR</td>
<td>-0.079</td>
<td>0.928**</td>
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<td>0.805**</td>
<td>0.796**</td>
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</tr>
<tr>
<td>LFT</td>
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<td>0.809**</td>
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<td></td>
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<td>ANX</td>
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<td>-0.532**</td>
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<td>0.548**</td>
<td>0.441**</td>
<td>0.580**</td>
<td>0.585**</td>
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<td>0.110</td>
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* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Note: MAP = Mean Arterial Pressure; TOT = A&B-II Total score; TRS = Total Rational Score; TIS = Total Irrational Score; AWF = Awfulizing; DEM = Demandingness; SR = Self-rating; LFT = Low Frustration Tolerance; ANX = Anxiety; DEP = Depression; HOST = Hostility; DYS = Dysphoria Composite Score; PA = Positive Affect; SS = Sensation Seeking; PASS = Positive Affect/Sensation Seeking.

Table 4.4: Pearson correlations for mean arterial pressure, irrational beliefs, and negative affect
Correlations between the Variables

Bivariate correlations were computed on all variables used for each research question. Table 4.4 identifies significant correlations at both the .05 and the .01 alpha levels for two-tailed tests. The highest positive correlation between the measures was found between MAACL-R Anxiety T-scores (ANX) and A&B-II Total Score (TOT) and the Low Frustration Tolerance (LFT) subscale (r = .585). The highest negative correlation between the measures was found between MAACL-R Anxiety (ANX) T-scores and A&B-II Total Rational Scale (TRS) scores (r = -.532). PASS was used in subsequent analysis after answering the original third research question. Rationale for using the variable PASS is found in the MAACL-R manual (Zuckerman & Lubin, 1985). The MAACL-R authors (Zuckerman & Lubin, 1985) found absence of positive affect to be a better predictor of depression on the MMPI depression scale than did the MAACL-R depression scale.

Correlations of the seven A&B-II scales [Total Score (TOT), Total Rational Score (TRS), Total Irrational Score (TIS), Awfulizing (AWF), Demandingness (DEM), Self-rating (SR), and Low Frustration Tolerance (LFT)] in Table 4.4 are in the expected direction as described by Ellis’s (1994) theory of irrational beliefs relationship to disturbed or negative emotions, such as depression and anxiety. These correlations are significant at the .01 alpha levels. The lack of statistically significant correlations for hostility and irrational beliefs, however, was not expected. No statistically significant relationship was found for any irrational measure and hostility.

There was a statistically significant relationship between Depression T-scores (DEP) and mean arterial pressure (r = -.23). The direction of this relationship was opposite of what
was hypothesized. This correlation was significant at the .05 alpha level. Mean arterial pressure was not statistically significantly related to irrational beliefs as measured by the A&B-II.

**Correlations Among the Variables Within Each Measure**

**A&B-II.** Correlations between the seven A&B-II variables were very strong (Davis, 1971). These correlations ranged from -.757 between Total Rational Score (TRS) and Total Irrational Score (TIS) and .951 between Total Score (TOT) and TIS. Table 4.4 indicates that these correlations are significant at the .01 alpha level. These correlations are all in the expected direction as described by Ellis’s (1994) Rational Emotive Behavior Theory (REBT) (e.g., TRS is negatively correlated with the six irrational variables).

**MAACL-R.** Correlations between the MAACL-R variables ranged from moderate association to very strong association (Davis, 1971). The lowest correlation was between Anxiety (ANX) and Hostility (HOST) (r = .38). The highest correlation was between Positive affect (PA) and Positive affect/Sensation seeking (PASS) (r = .947).

**Testing Assumptions for Regression and ANOVA**

The first step in examining data involves testing the assumptions underlying the statistical analysis. According to Hair, Anderson, Tatham, and Black (1995), the four assumptions to be examined in both multiple regression analysis and ANOVA are: 1) the linearity of the phenomenon measured, 2) the constant variance of the error terms (homoscedasticity), 3) the normality of the error term distribution, and 4) the independence of the error terms. The testing of violation of assumptions is addressed with each research question.
Research Questions Two and Three

Multiple Regression Analysis

Irrational Beliefs and Mean Arterial Pressure. The second research question was: Is there a relationship between irrational beliefs (IB) and essential hypertension? Specifically, the relevance of this question is can certain IB scores on the A&B-II predict the severity of essential hypertension. Multiple regression analysis was chosen to answer the research question because the research problem involved a single metric dependent variable and several metric independent variables (Hair, Anderson, Tatham, & Black, 1995). Due to the preliminary nature of this study and the relative newness of the A&B-II, independent variables were entered in a forward stepwise fashion. Forward stepwise multiple regression selects which variable at each step that makes the largest contribution to the coefficient of determination.

Violation of assumptions in the multiple regression analysis for the A&B-II variables and MAP were not computable since the regression equation was not statistically significant. Residual plots (residuals versus predicted) to test the violation of assumptions for this analysis were attempted, however the SPSS (1998) program did not compute this data.

The results of the regression analysis for each of the seven scales of the A&B-II failed to show statistical significance, thus no data output was displayed by the SPSS program. No significant relationship was found between irrational beliefs as measured by the A&B-II and mean arterial pressure. Examination of the correlation matrix (see Table 4.4) shows no statistically significant relationship between the A&B-II variables and MAP. The highest correlation was found between the A&B-II self rating subscale (SR) and mean arterial pressure at $r = -0.079$. 

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**Negative Affect and Mean Arterial Pressure.** Violation of assumptions for the MAACL-R and MAP regression analysis were computed using residual and normal probability plots. The normal probability plot compares the cumulative distribution of actual data values with the cumulative distribution of a normal distribution. If the distribution is normal, then the line of actual data distribution closely follows the diagonal of the normal distribution on the plot (Hair et al., 1995). Cumulative data for this analysis did closely follow the normal diagonal. Linearity and homoscedasticity were examined using residual plots. Neither of these assumptions were violated. The assumption of independence of the error terms was not violated. The residual plot pattern appeared random and similar to the null plot of residuals (See Appendix C).

Multicollinearity is also a problem in multiple regression analysis. This phenomenon occurs when some or all of the independent variables are substantially correlated with one another. According to Hair et al. (1995), one of the more common measures to assess multicollinearity is the variance inflation factor (VIF). These authors suggest that multicollinearity is not a problem when VIF values are less than 10. VIF values for the excluded variables ranged from 1.2 to 4.4, thus multicollinearity is not a problem in this analysis (see Appendix C).

The third research question examined the relationship between negative affect and essential hypertension. The results of the regression analysis for each of the subscales of the MAACL-R are shown in Table 4.5.
A multiple regression analysis was run to determine the linear combination of negative affect variables that best predict the severity in essential hypertension. MAACL-R variables were entered in a forward stepwise fashion. Forward stepwise multiple regression selects which variable at each step that makes the largest contribution to the coefficient of determination.

A significant relationship was found between depression T-scores (DEP) on the MAACL-R and mean arterial pressure (R=.234) (F =.044). The model summary for the MAACL-R regression analysis indicates that DEP accounts for approximately 5.5% of the variance in mean arterial pressure.
Research Question Four

Analysis of Variance (ANOVA)

Stage of Change and Mean Arterial Pressure. The assumption in ANOVA for Stage of Change (SOC) and MAP that was violated was equality of variance matrices or homoscedasticity. Differences were detected in MAP variance across the groups formed by SOC using the Levene statistic. The Levene statistic for the test of this assumption was 2.980 ($p = .025$) (see Appendix C). Values of .05 or less are considered significant (SPSS, 1998). Data transformations were conducted to remedy the violation of this assumption based on suggestions from Hair et al. (1995) and the SPSS (1998) Users Manual.

Transformation of data resulted in a statistically significant Levene statistic of 2.762 ($p = .034$), thus, even with transformed data, the assumption of homoscedasticity was violated. Hayes (1994) states that the assumption of homogenous variances can be very serious when the group sizes vary greatly, as they do in this case. Owing to the large variation in the sizes of the groups, an appropriate solution would be to collapse the groups, if the collapsing made theoretical sense. An examination of the stages of change indicated that two groups could be rationally formed by collapsing all the nonmaintenance groups (i.e., precontemplation, contemplation, preparation, and action) to create a group of persons who were "changing" and compare that group to the group that had "changed" (that is, those who were in maintenance). The appropriate analysis for testing hypotheses about population means is the t-test for independent groups (Hopkins, Glass, & Hopkins, 1987).

The assumptions of the t-test were tested. The nonmaintenance group is considered independent of the maintenance group because participants cannot be in both groups at the same time. The Levene's statistic for the t-test was 1.465 ($p = .23$) indicating statistical
nonsignificance, thus assumption of equal variances was not rejected, and the t-test was conducted under this assumption. MAP means between the two groups (nonmaintenance = 108.25 and maintenance = 104.11) did not significantly differ statistically (t = 1.93; p = .057). Table 4.6 shows the percentages of the participants in each of the five stages of change. Sixty percent of participants (n = 47) were in the maintenance stage of the transtheoretical model of behavior change. Moreover, nearly 70% (n = 54) of the total sample were considered to be uncontrolled hypertensives. Thus, sixty percent of this sample were strictly adhering to current treatment recommendations, but only 30% were controlling their blood pressure. This finding supports the literature that states high blood pressure is poorly controlled despite following treatment recommendations (JNCVI, 1997).
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Note: $^1$MAP = Mean Arterial Pressure

Table 4.6: Percentages of stage of change and mean MAP

Figure 4.1 is a plot of MAP means by stage of change. From lowest to highest, the maintenance stage had the lowest mean MAP (104.10) followed by the contemplation (105.14), precontemplation (107.98), action (108.22), and preparation (110.05) stages.
Figure 4.1: Means Plot for Stage of Change and Mean Arterial Pressure
Summary

Chapter four reviewed the results of the data analysis for each research question. Demographic characteristics for the sample were computed. Multiple regression analysis was conducted between the seven A&B-II and MAP variables with no statistically significant results. A second multiple regression analysis was done with the MAACL-R and MAP variables. Depression T-scores accounted for six percent of the variance in blood pressure as measured by mean arterial pressure. A t-test was used to investigate the relationship between stage of change and MAP, but no statistically significant relationship was found.

Chapter five provides discussion of the possible explanations to the current investigation's results. The results of the two multiple regression analyses, blood pressure regressed on Ellis's irrational beliefs and blood pressure regressed on negative affect, are addressed first, followed by discussion of the t-test between stage of change and blood pressure. In addition, supplemental analyses conducted after answering the original research questions are also addressed. Moreover, limitations to the current investigation are discussed. Finally, implications for future research are indicated.
The research questions of interest in the current investigation were as follows:

Research Question 1: What are the demographic risk factor characteristics of the sample?

Research Question 2: Is there a relationship between IB's and essential hypertension?

Research Question 3: Is there a relationship between negative affect and essential hypertension?

Research Question 4: Is there a relationship between stages of change and essential hypertension?

Results of this investigation failed to show a significant relationship between Ellis (1995) irrational beliefs and essential hypertension. However, the current investigation did find a significant relationship between depression and essential hypertension. Furthermore, the relationship between depression and essential hypertension was negative, which contradicts prior cardiovascular research findings. Finally, no significant relationship was shown between the stages of the transtheoretical model of behavior change and essential hypertension.
Research Questions Two and Three

Multiple Regression Analysis

Discussion of A&B-II and MAP. The results of this investigation fail to support the hypothesis that scores on an irrational beliefs measure (A&B-II) would be positively correlated to essential hypertension as measured by mean arterial pressure (MAP) (a negative relationship was hypothesized for total rational score (TRS) and MAP). No statistically significant relationship was found for the seven scales of the A&B-II and MAP. Although some research indicates a relationship between physical illness and irrational beliefs (Lichtenberg, Johnson, & Arachtingi, 1992; Woods & Lyons, 1990), the results suggest a relationship between irrational beliefs and subjective somatic complaints, not a specific disease entity. Lichtenberg et al., (1992) examined the relationship between total frequency of illness, number of chronic illnesses, number of organ systems affected by illness, and Ellis' irrational beliefs. Furthermore, the dependent measures for physical illness were self reported data, not an objective measure. Similarly, Woods and Lyons (1990), relied on subjective reports on psychosomatic complaints from the Physical Symptom Checklist, not objective data from a specific disease. Moreover, the subjects from Woods and Lyons (1990) research were derived from psychotherapy populations not a medical one, as was done with the current investigation.

Perhaps, the current study provides clarification. It is possible that irrational beliefs are related to subjective somatic complaints, but when compared to a specific, objective measurement of a chronic disease entity, such as essential hypertension, there is no significant relationship.
Another possible explanation may lie in using different tools to measure irrational beliefs. As indicated earlier, the Irrational Beliefs Test (IBT) (Jones, 1968) has met with much criticism, primarily around affective and behaviorally worded items used to measure thought processes (Smith, 1989; Smith and Zurawski, 1983; Woods, 1992; Zurawski and Smith, 1987). It is possible that the affective and behaviorally worded items are the ones that were significantly related to physical illness in Lichtenberg et al. (1992) and Woods and Lyons (1990) research. Both Lichtenburg et al. (1992) and Woods and Lyons (1990) used the IBT in their investigations.

Furthermore, Ellis (1994; 1995) has updated his theory by collapsing the original ten irrational beliefs into four reflecting awfulizing (AWF), demandingness (DEM), self-rating (SR), and low frustration tolerance (LFT), which the A&B-II reportedly measures accurately (DiGiuseppe, Robin, Leaf, & Gorman, 1989; Robin, DiGiuseppe, & Naimark, 1990). The IBT measures Ellis' original ten irrational beliefs. Lichtenberg's et al. (1992) research indicated that four of Ellis' original irrational beliefs are correlated to physical illness, only two of which, low frustration tolerance and demandingness, seem to correspond to the revised "big four". Perhaps the difference in outcomes is due to the different variables. It would be interesting to determine how each of the four beliefs in the study by Lichtenberg et al. (1992) load on the revised irrational beliefs measured by the A&B-II.

Investigation into the relationship between Type A coronary prone behavior pattern and Ellis' irrational beliefs has produced mixed results (Hamberger & Hastings, 1986; Lohr & Bonge, 1980; Smith & Brehm, 1981). While some studies (e.g., Smith & Brehm, 1981) indicate a relationship between Type A behavior and irrational beliefs, this relationship is not with objective medical data (i.e., CAD, arterial damage, blood pressure, etc.) but with
the psychosocial variants and behavioral risk factors that are implicated in coronary heart
disease (e.g., achievement striving, competitiveness, impatience, hostility, vigorous speech
and motor mannerisms).

Finally, Silverglade, Tosi, Wise, and D'Costa (1994) revealed that irrational
cognitions were related to disease severity in asthmatic adolescents. However, disease
severity was ordinally classified as mild, moderate, and severe; the authors did not use an
interval or ratio variable for the medical condition, as was done in this investigation, and this
may be why a statistically significant relationship was found between irrational beliefs and
physical illness.

Reiterating the above points, the key difference between past research and the
current investigation seems to lie primarily in the subjective versus objective measurement
of the dependent variable. Further research investigating these discrepancies is warranted.

Discussion of MAACL-R and MAP. The results of this investigation fail to support
the hypothesis that scores on a measure of negative affect (MAACL-R) would be positively
correlated to MAP. No statistically significant positive relationship was found between
negative affect and MAP.

Based upon prior cardiovascular research, the expectation was to find a statistically
significant relationship between negative affect and essential hypertension, especially for
hostility and anxiety. Hypertensive patients have been characterized as having inhibited or
suppressed hostility in combination with anxiety and neuroticism and often exhibit the
attitude or belief that "I must be alert and on guard" in association with defensiveness and
marked anxiety (Graham, Kabler & Graham, 1962; Sapira, Scheib, Moriarty & Shapiro,
However, this investigation showed no significant relationship between hostility (nor anxiety) and hypertension.

The reason for the contradictory evidence found in this investigation is not clear. One possibility lies in not examining individuals coping mechanisms for hostility. It seems plausible that subjects who self-report hostility may have better coping skills than those who deny they are hostile or angry. Perhaps the subjects in this investigation have found appropriate strategies for outwardly expressing their angry feelings rather than keeping them "bottled up" by suppressing them. Sixty-two percent of the subjects were married; perhaps having a significant life partner to discuss life's nuisances and frustrations impacts the effect hostility may have on hypertension. Although research indicates that people are most often and most intensely angered by those they live with, and that inability to engage the other party in constructive problem solving causes anger to be prolonged and indirectly expressed (Averill, 1982), Ewart, Taylor, Kraemer, and Agras (1991) discovered that "it is not how "nice" spouses are to each other - but how "nasty" they are not - that appears to determine the acute cardiovascular impact of relationship discord..." (p. 161). The current investigation did not examine coping styles and social support effects on essential hypertension. Furthermore, Light (1987) contends that anger coping styles are the most consistently positive correlations for stress variables related to hypertension, but she includes that ironically, studies have found a positive relationship between hypertension and both excessive anger expression and inhibited anger expression. This suggests that stable "middle-of-the-road" behavior may indeed be the healthiest, both mentally and physically. This may be true of the subjects in the current investigation.
No relationship between anxiety and MAP in this study may have a similar explanation to that of the above explanation for hostility. Those who report feelings of anxiety but who have found healthy coping mechanisms to the point that the anxiety is not considered disruptive to their daily functioning may impact the effect that anxiety has been reported to have on hypertension.

This investigation did find a significant relationship between depression and essential hypertension, but the relationship was in direct opposition to past cardiovascular research findings. This investigation found a negative relationship between depression and MAP ($r = -.234$). Prior research indicates a positive correlation between depression and cardiovascular disease suggesting that an increase in depression is associated with an increase in cardiovascular disorders. It is possible that those subjects in this study who reported depression were so depressed that they were vegetative and lethargic enough as to slow down physiological processes, hence lowering their blood pressure, although this is speculative.

Research Question Four

Analysis of Variance (ANOVA)

Stage of Change and MAP. The results of this investigation fail to support the hypothesis that stage of change (SOC) from the transtheoretical model of behavior change would predict changes in blood pressure as measured by MAP. Changes in MAP were not found to be statistically significantly related to SOC. Assumptions for ANOVA were violated and data transformations and nonparametric tests did not remedy the violations. Therefore, a t-test analysis was conducted, but results indicated no statistical significance.
The explanation for a lack of relationship between SOC and MAP is not clear. One possibility may lie in the instrument used to determine SOC may not be a valid or reliable measure. This may be due to the lack of clarity in how the questions were worded. A number of respondents left the items blank and others responded in contradictory fashion, thus needing clarification by phone contact. Perhaps a more comprehensive measure, such as The Process of Change Scale (Prochaska, Velicer, Di Clemente, & Fava, 1988), would solicit different outcomes between SOC and MAP. The Process of Change Scale is a 40 item questionnaire representing each of the 10 processes of change and can then be grouped by each of the five stages.

Another plausible explanation for no relationship between SOC and MAP may be due to the phenomenon of uncontrolled essential hypertension. Sixty percent of this sample were strictly adhering to current treatment recommendations (maintenance stage), yet only 30% were controlling their blood pressure. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-VI) (1997) indicates that despite following current treatment recommendations, many Americans still are not able to control essential hypertension. This investigation supports this phenomenon.

Another possible explanation for the lack of relationship between SOC and MAP may be due to inaccurate reporting by subjects. It is possible that subjects wanted their doctor to think they were following the recommendations when in fact they were not.

What do the different mean levels for mean arterial pressure at the different stages suggest? One possible explanation is provided in the following. Those subjects in the precontemplation stage have no idea or deny there is a problem with their blood pressure.
and may not be following their treatment recommendations, thus they have uncontrolled hypertension. Those in the contemplation stage might be thinking about changing behavior and movement toward positive behavior or thoughts may reduce blood pressure. The preparation stage may imply more stress as one gathers to get ready to change, thus a spike in blood pressure. The action stage might imply that these people are in control of their health and believe they have the power to change their health, as a result lowering blood pressure. Maintenance was the stage with the lowest mean blood pressure of all the stages. This suggests that following treatment recommendations does lower blood pressure although not to the targeted level of 100 or below as indicated by a mean MAP of 104. These interpretations are speculative.

Supplemental Analyses

Supplemental statistical analyses were run after answering the original research questions in order to answer some of the questions raised during the investigation. DiGuiseppe, Leaf, Exner, and Robin (1988) and DiGuiseppe, Robin, Leaf, and Gormon (1989) suggest the use of the comfort, approval, and achievement subscales of the A&B-II when investigating Ellis's irrational beliefs. When including these variables in the A&B-II multiple regression analysis with MAP, the results suggested no statistically significant relationship.

Zuckerman and Lubin (1985) contend that absence of positive affect (PA) was a better predictor for MMPI depression scores than the MAACL-R depression subscale. Based on this finding, the current investigation explored whether or not PA would significantly contribute to the explanation of variance in MAP in the multiple regression
analysis of negative affect and MAP. However, this variable made no statistically significant contribution to the model.

Summary of Findings

This investigation set out to examine the relationship between Ellis irrational beliefs, negative affect, stages of change, and essential hypertension. Based upon prior research investigating the relationship between irrational beliefs and physical illness, it was expected that there would be a positive correlation between measures of irrational beliefs, negative affect, and essential hypertension. As indicated earlier, this was not supported empirically. The significance around the discrepancy between this and prior research examining this relationship may lie in the different dependent measures. As reported elsewhere, prior research investigated irrational beliefs and psychosomatic illnesses that were recorded as self report data. The current investigation examined these beliefs using objective medical recordings.

Limitations

Shuman (1996) in her structural analysis found significant residual error that led her to conclude that the Attitude and Beliefs Survey did not adequately define only Ellis irrational beliefs constructs, but may measure something other than that which was intended. She concluded that the core concept of irrational thinking is statistically efficient, however it is unclear if the other major elements to the theory are integral to the theory or simply redundant terms. O'Kelly, Joyce, and Greaves (1998) concur that there are questions surrounding the primacy of the "shoulds" or demandingness (DEM). Their data suggest that the processes of awfulizing (AWF), low frustration tolerance (LFT), and self-rating (SR) are more significantly associated with emotional disturbance than DEM. Their results suggest
the need for rigorous examination of rational emotive behavior theory thus, any
interpretations from this investigation need to be viewed with caution.

Other limitations include small sample size. A larger sample size may have produced
different results. Moreover, the response rate was considerably low and the sample was
self-selective in nature, both of which are limitations. Low response rate and self-selection
do not allow for generalizing the results beyond the current sample. An additional limitation
includes interaction of setting and treatment. Although inventory instruction was
standardized by using a typed narrative, the testing environment would not have been
identical for all participants, as they completed the instruments at home. In addition, some
subjects may have had influence from others (i.e., spouses) while completing the
inventories. Finally, addressing differences between respondents and nonrespondents on
the measures could possibly further clarify the current findings. However, this was not
ethically possible due to the lack of consent to participate in research from nonrespondents.
One might assume a significant difference would exist on the measures between the 78
respondents and the 215 that did not respond.

Implications for Future Research

The present study did not examine psychological "hardiness" (Kobasa, 1979), a
personality style that has been found to moderate the relationship between certain stressful
life events and physical illness. Shuman (1996) found that hardiness shared one dimension
with irrational indicators and another dimension with stress. She concluded that although
hardiness does not appear to be a measure of cognitive processing, there appears to be
overlap between measures of hardiness and irrational beliefs. Further exploration into the
role of hardiness, irrational beliefs, and essential hypertension is warranted.
Perhaps using a measure of DSM IV psychopathology, such as the MMPI or the MCMI, would have been a better measure in determining negative affect as a trait rather than the MAACL-R. In addition, these types of scales have "lie" scale indicators that determine response validity; the MAACL-R does not.

Many other factors not addressed in this study may also have an influence on the results. For instance, this study did not examine factors such as social support, economic status, ethnicity, environmental factors (e.g., regional residence, exposure to chemicals, etc.), locus of control, or self-efficacy. Any of these variables may have interacted with the current constructs producing different outcomes. As a result, the findings need to be interpreted with caution. Further research including other pertinent variables is warranted to further understand the nature of essential hypertension.

Finally, examination into the relationship between irrational beliefs and other chronic illnesses, such as diabetes, using objective medical data (i.e., lab reports, blood draws, cholesterol levels, etc.) need to be conducted. Perhaps, this will further the clarification of issues generated by mind-body medicine and psychosomatic illness.


Professional Psychology: Research and Practice, 26(2), 139-146.


### APPENDIX A

**FREQUENCY TABLES**

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Table A.2: Gender of sample
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Table A.5: Frequency of age for the sample
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ABII Comfort subscale

Figure B.1: Comfort histogram
ABII Approval Subscale

Figure B.2: Approval histogram
Figure B.3: Achievement histogram
Figure B.4: Total score histogram
Figure B.5: Total rational score histogram
ABII Total Irrational subscale

Figure B.6: Total irrational score histogram
Figure B.7: Awfulizing score histogram
Figure B.8: Demandingness score histogram
Figure B.9: Self-rating score histogram
Figure B.10: Low frustration tolerance score histogram
MAACL-R Anxiety T score

Figure B.11: Anxiety score histogram
Figure B.12: Depression score histogram
MAACL-R Hostility T score

Figure B.13: Hostility score histogram

Std. Dev = 13.51
Mean = 54.5
N = 74.00
Figure B.14: Dysphoria score histogram

MAACL-R Dysphoria T score

Std. Dev = 14.89
Mean = 59.7
N = 74.00
Figure B.15: Positive affect score histogram
Figure B.16: Sensation seeking score histogram

MAACL-R Sensation Seeking T score

Std. Dev = 10.37
Mean = 44.0
N = 74.00
MAACL-R Positive Affect/Sensation Seeking

Figure B.17: Positive affect/sensation seeking score histogram
APPENDIX C

TESTS OF ASSUMPTIONS

Figure C.1: Normal probability plot of regression standardized residual for MAACL-R and MAP
Figure C.2: Homoscedasticity residual plot for MAACL-R and MAP regression analysis
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a Predictors in the Model: (Constant), MAACL-R Depression T score
b Dependent Variable: Blood Pressure/Mean Arterial Pressure

Table C.1: Variance inflation factor for excluded MAACL-R variables

Levene Statistic df1 df2 Sig.

2.980 4 73 .025

Table C.2: Test of Homogeneity of Variances for SOC and MAP ANOVA
APPENDIX D

INSTRUMENTS
Dear «Title» «LastName»:

I am a Ph.D. student at The Ohio State University and a family therapist at the Mount Carmel Family Practice Center. I am conducting a study for my doctoral dissertation. This study has been approved by OSU Human Subjects Committee and Mount Carmel Health System Institutional Review Board and is designed to examine the relationship between high blood pressure, emotions, and beliefs. Let me assure you that information on any individual will be kept confidential to the limits of the law. No individual information on any person will be reported. Group averages will be summarized and may be published in a research journal. We are asking 150 people to participate in this study.

The purpose of this letter is to ask you to volunteer to participate in this study. Please fill out the attached forms. They may look long, but they only take about 20-30 minutes of your time. The forms are: a consent to participate form, a short questionnaire about yourself, a short survey about emotions called the Multiple Affect Adjective Checklist, and a slightly longer survey on beliefs called the Attitudes and Belief Scale. You have the option to not participate with no penalty to you.

As a bonus to participating, a lottery drawing for a $100 gift certificate to Lazarus will be held two months after all information has been collected (March or April, 1999). The winner will be notified by telephone and mailed the certificate.

Be sure to complete all the forms and note the instructions at the top of each form, because they are all slightly different. When you complete the surveys, answer the forms quickly with your first thought. There are no right or wrong answers to any of the questions; we are just looking for your first impression.

When you have completed the forms, please put them in the self-addressed, stamped envelope and return the packet to: Craig Travis
Mount Carmel Family Practice
1335 Dublin Road, Suite 110 E
Columbus, OH 43215

Thanks very much for your help,

Craig S. Travis, MA, LPCC
Director of Behavioral Sciences
Mount Carmel Family Practice

Joe E. Wheaton, Ph.D.
Associate Professor and Advisor
The Ohio State University
CONSENT FOR PARTICIPATION IN SOCIAL AND BEHAVIORAL RESEARCH

I consent to participating in (or my child's participation in) The Ohio State University dissertation research entitled:

An investigation into the relationship between beliefs, emotions, stages of change and essential hypertension.

Joe Wheaton/Craig Travis or his/her authorized representative has...
(Principal Investigator)

explained the purpose of the study, the procedures to be followed, and the expected duration of my (my child's) participation. I understand that there may be no benefit to me for participating in this study. I also understand that the benefit of the study to society may be the use of information gained from the study to help treat patients in the future. Furthermore, I understand that 150 people are being asked to participate in this study. I understand that an alternative is to not participate in the study with no penalty to me (my child).

If I have any questions regarding my rights, I may call the Mount Carmel Health System Institutional Review Board at (614) 234-2005, or by writing the IRB Chairma, c/o IRB Coordinator, Mount Carmel Health System, Room 201 College of Nursing, 793 West State Street, Columbus, Ohio 43215. I acknowledge that I have had the opportunity to obtain additional information regarding the study and that any questions I have raised have been answered to my full satisfaction. Further, I understand that I am (my child is) free to withdraw consent at any time and to discontinue participation in the study without prejudice to me (my child).

I understand that my participation in this study will be treated as confidential and any records or results relating to the study shall not be given to anyone. I understand that all or part of my medical records may be reviewed by representatives of the Food and Drug Administration, the Mount Carmel Health System Institutional Review Board or other responsible organizations/agencies who may be concerned about the character of my records.

Finally, I acknowledge that I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date: ____________________________ Signed: ____________________________
(Participant)

Signed: ____________________________ Signed: ____________________________
(Principal Investigator or his/her authorized representative) (Person authorized to consent or participant - if required)

Witness: ____________________________
DEMOGRAPHIC QUESTIONNAIRE

Please fill out the following:

Age ______ Gender ______ Race _______ Height ______ Weight ______ Marital Status __________________

Please answer YES or NO to the following:

1) Has your physician advised you to treat your high blood pressure with any of the following:

   YES NO
   Diet
   Exercise
   Medication

2) Are you currently on blood pressure medication

3) Have any blood relatives in your immediate family ever been treated for high blood pressure

4) Do you have any of the following medical problems

   Diabetes (sugar)
   High Cholesterol
   Overweight

5) In the past month, how many days per week did you average 30 minutes or more of physical activity?

6) Do you smoke? If yes, in the past month, how many packs of cigarettes per day did you average?

The following question asks about your average consumption of certain foods and drinks PER DAY during the past month.

7) In the past month, how many of the following did you consume per day:

   12 ounces of beer  __________
   4 ounces of wine  __________
   2 ounces of liquor __________
   Servings of salty foods (Listed below) __________
   Servings of caffeine (Listed below) __________

Please answer YES or NO to the following:

REGULARLY = every day follow medication prescription, diet and exercise suggestions, and alcohol and smoking restrictions

8) I currently follow my Dr’s orders about my blood pressure

9) I do not now follow my Dr’s orders about my blood pressure, but intend to in the next 6 months

10) I currently follow my Dr’s orders about my blood pressure regularly

11) I followed my Dr’s orders about my blood pressure regularly for the past 6 months

12) I followed my Dr’s orders about my blood pressure regularly in the past for at least three months, but do not follow them now

SALTY FOODS

<table>
<thead>
<tr>
<th>Ham</th>
<th>Sauerkraut</th>
<th>Tacos</th>
<th>Canned/dehydrated soups</th>
<th>Soufflés</th>
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<tr>
<td>Bacon</td>
<td>Pickles</td>
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<td>Ketchup</td>
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<td>Breakfast sausage</td>
<td>Olives</td>
<td>Enchiladas</td>
<td>Canned vegetables</td>
<td>Worcestershire sauce</td>
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<td>Luncheon meats</td>
<td>Cheese</td>
<td>Pizza</td>
<td>Packed/canned fish</td>
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<td>Pretzels</td>
<td>Packed dinners</td>
<td>Barbecue sauce</td>
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<td>Cheese casseroles</td>
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<td>Pot pies</td>
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<td>Hot dogs</td>
<td>Cheese spreads</td>
<td>Crackers</td>
<td>Fast foods</td>
<td>Steak sauce</td>
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<td>Salad dressing</td>
<td>Seasoning salts (e.g. Accent, Lowery's, meat tenderizers, onion &amp; garlic salt, regular salt)</td>
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</table>

FOODS WITH CAFFEINE

Coffee Tea Chocolate
Sodas (e.g. Mountain Dew, Kick, Pepsi, Coke, Dr. Pepper)
April 30, 1999

Craig Travis
5224 Windsock Ct.
Hilliard, OH 43026

Dear Mr. Travis,

I am writing to inform you that we will be happy to grant permission for you to reproduce the front side of the Multiple Affect Adjective Checklist-Revised (MAACL-R) in the appendices of your dissertation, provided you include the appropriate citation.

If I can be of any further assistance, please don't hesitate to contact me.

Sincerely,

Daisy Gard
Permissions Department

Mailing address: P.O. Box 7234 • San Diego, California 92167
MULTIPLE AFFECT
ADJECTIVE CHECK LIST

By Marvin Zuckerman
and
Bernard Lubin

Name ........................................ Age .... Sex ....
Date ........................................ Highest grade completed in school ....

DIRECTIONS: On this sheet you will find words which describe different kinds of moods and feelings. Mark an ☑ in the boxes beside the words which describe how you generally feel. Some of the words may sound alike, but we want you to check all the words that describe your feelings. Work rapidly.
ATTITUDES AND BELIEF SCALE - II

Please do not mark on this question booklet. Use the ANSWER SHEET provided and fill in the information asked for at the top.

(Items 1 to 4 on the Answer Sheet.)

FOR EACH ITEM BELOW, CHECK THE CORRESPONDING BLANK ON THE ANSWER SHEET WITH AN "X" AND SELECT.

A. if you STRONGLY DISAGREE
B. if you SOMewhat DISAGREE
C. if you are NEUTRAL
D. if you SOMewhat AGREE
E. if you STRONGLY AGREE

5. It's unbearable being uncomfortable, tense or nervous and I can't stand it when I am.
6. If important people dislike me, it goes to show what a worthless person I am.
7. It is disappointing to be disliked by people who are important to me, but I know it's only disappointing and not awful.
8. When I feel tense, nervous or uncomfortable, I think it just goes to show what kind of a bad worthless person I am.
9. If important people dislike me, it is because I am an unlikable bad person.
10. It's unbearable to fail at important things, and I can't stand not succeeding at them.
11. It is unfortunate when I am frustrated by hassles in my life, but I realize it's only disappointing and not awful to experience hassles.
12. If I do not perform well at things that are important, it will be a catastrophe.
13. I very much want to be liked by certain people, but I realize I don't have to be liked by them.
14. When important people dislike me, I realize that it does not reflect on my worth as a person.
15. I must do well at important things, and I will not accept it if I do not do well.
16. I do not like to be uncomfortable, tense or nervous, but I can tolerate being tense.
17. When I fail at an important task, I can accept myself with my faults and limitations, and not condemn myself for failing.
18. It's awful to do poorly at some important things, and I think it is a catastrophe if I do poorly.
19. I think that I can tolerate important people not liking or approving of me.
FOR EACH ITEM BELOW, CHECK THE CORRESPONDING BLANK ON THE ANSWER SHEET WITH AN "X" AND SELECT.

A. if you **STRONGLY DISAGREE**
B. if you **SOMEWHAT DISAGREE**
C. if you are **NEUTRAL**
D. if you **SOMEWHAT AGREE**
E. if you **STRONGLY AGREE**

20. I am a good person and can accept myself, even if I fail at some tasks that are important to me.

21. When life is hard and I feel uncomfortable, I realize it is not awful to feel uncomfortable or tense, only unfortunate and I can keep going.

22. I can't stand being tense or nervous and I think tension is unbearable.

23. If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person.

24. I do not want to fail at important tasks but I realize that I do not have to perform well just because I want to.

25. It's unpleasant to be tense, but I can stand the unpleasantness.

26. I can't stand being disliked by people who are important to me, and it is unbearable if they dislike me.

27. It's awful to be disliked by people who are important to me, and it is a catastrophe if they don't like me.

28. I can't stand not doing well at tasks that are important to me.

29. It's important to be liked by certain people, but I understand that they don't have to like me just because I want them to.

30. It is disappointing if I'm not doing well at tasks that are important to me, but I realize it is not awful or the worst thing in the world if I do not perform well.

31. I have worth as a person even if I do not perform well at tasks that are important to me.

32. Even when I feel tense, nervous or uncomfortable, I know that I am just as worthwhile as other people.

33. It's essential to do well at important jobs; so I must do well at these things.

34. Sometimes I think the hassles and frustrations of everyday life are awful and the worst part of my life.
FOR EACH ITEM BELOW, CHECK THE CORRESPONDING BLANK ON THE ANSWER SHEET WITH AN "X" AND SELECT.

A. if you STRONGLY DISAGREE  
B. if you SOMEWHAT DISAGREE  
C. if you are NEUTRAL  
D. if you SOMEWHAT AGREE  
E. if you STRONGLY AGREE

35. It's important to have a pleasant life most of the time; however, I realize I do not have to have a pleasant life just because I want it.

36. It is a disappointment if I'm disliked by some people I like, and I realize it's only unfortunate and not awful if they don't like me.

37. I must be liked by important people, and I will not accept not being liked by them.

38. If I succeed less well than I would like to, it will be only disappointing and unfortunate.

39. I cannot tolerate not doing well at important tasks and it is unbearable to fail.

40. If someone important to me disapproves of me or rejects me, I realize I can tolerate and bear his/her disliking me.

41. I want to perform well at some things, but I do not have to do well just because I want to.

42. I do not perform well at things which are important, it will be a catastrophe.

43. I must have a pleasant, comfortable life most of the time, and I can't accept it when life is a hassle.

44. If I am rejected by someone I like, I can accept myself and still recognize my worth as a human being.

45. When I feel tense or nervous, I think that it is only uncomfortable to feel tense or nervous and it is not awful.

46. It's unpleasant not to perform well at important tasks, but I can bear the discomfort of doing less well that I would like to do.

47. I can't stand hassles in my life.

48. I want to be liked and accepted by people whom I like, but I realize they don't have to like me just because I want them to.

49. It's awful to have hassles in one's life and it is a catastrophe to be hassled.
FOR EACH ITEM BELOW, CHECK THE CORRESPONDING BLANK ON THE ANSWER SHEET WITH AN "X" AND SELECT.

A. if you STRONGLY DISAGREE
B. if you SOMewhat DISAGREE
C. if you are NEUTRAL
D. if you SOMEWHAT AGREE
E. if you STRONGLY AGREE

50. I can't stand being disliked by certain people, and I can't bear the possibility of their disliking me.
51. It's bad to be disliked by certain people, but I realize it is only unfortunate to be disliked by them.
52. It's essential to be liked by important people, and I will not accept their not liking me.
53. I think it is awful and terrible to experience tension, nervousness or frustration, and having such feelings is the worst thing that can happen to me.
54. I get distressed if I'm not doing well at important tasks, but I can stand the distress of failing at important tasks.
55. I want to do well at important tasks, but I realize that I don't have to do well at these important tasks just because I want to.
56. I must have a pleasant life and I will not accept hassles when I don't want them.
57. If I am disliked by some important people, I realize I can bear their disliking me.
58. It is frustrating to be hassled but I can stand the frustration of being hassled.
59. It is awful and terrible to be rejected by people whom I want to like me.
60. When I experience hassles and/or my life is unpleasant, I believe I am a worthless person because I have hassles and/or an unpleasant life.
61. It's only frustrating not doing well at some tasks, but I know I can stand the frustration of performing less than well.
62. I believe that I would be a worthless person if I achieved poorly at tasks that are important to me.
63. I must be liked and accepted by people I want to like me, and I will not accept their not liking me.
64. When I feel tense, nervous and uncomfortable, I realize that I do not have to feel comfortable just because I want to.
65. I would not be a worthwhile person if I kept failing at work, school, or other activities that are important to me.

66. When people I like reject me or dislike me, it is because I am a bad or worthless person.

67. When people whom I want to like me disapprove of me or reject me, I can't bear their disliking me.

68. When I experience discomfort or hassles in my life, I tend to think that I am not a good person.

69. When I experience hassles, I realize that hassles are part of life and they do not have to disappear just because I want them to.

70. If I fail at tasks that are important to me, I realize that it is only disappointing to fail and not awful.

71. I must not feel tense, nervous or uncomfortable, and I believe that I cannot accept feeling badly.

72. When people whom I want to like me disapprove of me, I know I am still a worthwhile person.

73. Even when my life is tough and difficult, I realize that I am a person who is just as good as anyone else even though I have hassles.

74. I must be successful at things that I believe are important, and I will not accept anything less than success.

75. If loved ones or friends reject me, it is not only bad, but the worst possible thing that could happen to me.

76. When my life becomes uncomfortable, I realize that I am still a good person even though I am uncomfortable.
ATTITUDES AND BELIEF SCALE - II

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<th>DATE: ____________</th>
<th>AGE: ____________</th>
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<td>2. MARITAL STATUS</td>
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FOR EACH ITEM BELOW, CHECK THE CORRESPONDING BLANK WITH AN "X" AND SELECT:
A. if you STRONGLY DISAGREE
B. if you SOMEWHAT DISAGREE
C. if you are NEUTRAL
D. if you SOMEWHAT AGREE
E. if you STRONGLY AGREE

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