A STUDY OF AUTONOMY SUPPORT FOR RECOMMENDED LIFESTYLE
CHANGES WITH A VULNERABLE HYPERTENSIVE SAMPLE:
UTILITY OF SELF-DETERMINATION THEORY

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A STUDY OF AUTONOMY SUPPORT FOR RECOMMENDED LIFESTYLE
CHANGES WITH A VULNERABLE HYPERTENSIVE SAMPLE:
UTILITY OF SELF-DETERMINATION THEORY

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ABSTRACT

The study of qualitative differences in underlying reasons for our health actions and their relevance to health behavior outcomes has expanded in recent years, through the application of Self-Determination Theory (Deci & Ryan, 1985, 2002). Results of studies promoting lifestyle changes for various health problems have demonstrated empirical support for the theory’s proposed relations between autonomy-supportive health environments, increased autonomous reasons for recommended health behaviors, and improved health outcomes. Simultaneously, the medical literature is calling for more research to address the increasing disparity of hypertension prevalence and associated poor outcomes with African American persons. The current study sought to extend the literature examining the potential utility of Self-Determination Theory in a disenfranchised African American population, at risk of adverse health outcomes from hypertension. Study participants (N = 78) were recruited from a Midwest Free Clinic while attending their regular three-month outpatient appointments. Participants were randomly assigned to one of two groups, receiving either an autonomy-supportive intervention or a control standard education intervention, both focused on promoting recommended lifestyle changes for hypertension management. The Theory of Self-Determination was used as the conceptual lens for examining the effectiveness of the
autonomy-supportive intervention, which was based in the principles of Motivational Interviewing (Miller & Rollnick, 1991, 2002).

Results did not support any of the proposed relations between the constructs of Self-Determination Theory, or between any of those constructs and lifestyle health outcomes. In particular, the lack of an association between perception of the health environment as autonomy supportive and autonomous reasons for adopting recommended health behaviors was contrary to the underlying assumptions of both Motivational Interviewing and Self-Determination Theory. Conversely, results indicated a strong association between perception of autonomy support and controlled reasons for making health changes related to blood pressure control. Eighteen percent of participants reported moderate or severe levels of depression. Although there was some support for the direct relation between perception of autonomy support and improved dietary health outcomes, this association was eliminated after controlling for depression.
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CHAPTER I

STATEMENT OF THE PROBLEM

Non-adherence to medical recommendations has been of particular concern in hypertension management for more than three decades (Haynes, Taylor, & Sackett, 1979; Sackett et al., 1975). Today, hypertension has reached epidemic proportions, with recent research on racial disparity in cardiovascular care emphasizing the specific problems for African Americans, identified as the population at highest risk for long-term complications from uncontrolled high blood pressure (Adler, 2006; Bonow, Grant, & Jacobs, 2005; Hertz, Unger, Cornell, & Saunders, 2005).

Beyond the immediate need to control overly high blood pressure with medications, current hypertension management routinely addresses many lifestyle factors, such as diet and exercise, which are shown to impact long-term hypertension-related outcomes (Bramley, Gerbino, Nightingale, & Frech-Tamas, 2006; Harmon, Lefante, & Krousel-Wood, 2006; “Hypertension in America”, 2005; Morris et al., 2006). However, many behavioral interventions to promote health changes have demonstrated time-limited effects, and researchers are moving towards exploring aspects of
motivations underlying our health choices that appear to be related to the stability of health behaviors over time.

The application of Self-Determination Theory in health care settings (SDT; Deci & Ryan, 1985a, 2002), exemplifies the growing interest in motivational factors underlying our health choices. SDT suggests that autonomy-supportive health environments promote the internalization or self-regulation of recommended health behaviors. While external reinforcement or pressure may serve to initiate health changes, it is assumed that a behavior must be autonomously-regulated for it to be self-sustaining over time. Research demonstrating positive relations between autonomy-supportive health environments, measures of autonomous regulation, and stable health behavior changes support the assumptions of SDT (e.g., Schneider et al., 2005; Williams et al., 2006).

Promoting autonomously-regulated health behaviors is also central to Motivational Interviewing (MI; Miller & Rollnick, 1991, 2002), a culturally sensitive, client-centered style of counseling that is purported to work through increasing autonomous motivation for changing a behavior. However, although MI is shown to be effective in chronic disease management, where unique lifestyle factors are relevant to outcomes (e.g., Resnicow et al., 2009; Woollard, Burke, & Beilin, 2003), theoretical support for the processes underlying MI is lacking.

Research based in the theoretical organization of SDT has begun to explore the relationship between autonomy-supportive health environments and autonomously-regulated health behaviors, in a variety of health related problems. Although it has been suggested that MI and SDT are scientifically compatible (Vansteenkiste & Sheldon,
2006), the application of MI, within the theoretical organization of SDT, has not addressed ways of promoting lifestyle changes in a population at great risk from the potentially adverse outcomes of hypertension.

The purpose of the current research was to examine the processes underlying an MI intervention within the theoretical organization of SDT. Additionally, this study tested the constructs of SDT in a disenfranchised hypertensive population that has not previously been addressed in the SDT literature.

Hypertension Prevalence and Risks

High blood pressure, medically referred to as hypertension, is a major worldwide health problem now considered to be at epidemic proportions (Chockalingam, Campbell, & Fodor, 2006). Affecting almost one quarter of the world’s population, the numbers have risen by more than 20% in the past decade, and it is estimated that over 1.5 billion people are currently living with the disease (Kearney et al., 2005). In the United States (US) alone, the estimated hypertension prevalence rate of 31.3% in the year 2000 implied that over 65 million adults were living with a condition that increases the risk of mortality, morbidity and overall lower quality of life (Chockalingam et al., 2006). More recent statistics suggest these numbers are still increasing (Wong et al., 2007). National surveys show that age, weight, and ethnicity are strong predictors of hypertension, with non-Hispanic Blacks evidencing disproportionately higher rates of the disease than any other portion of the US population (Chobanian et al., 2003; Cutler et al., 2008).

Often referred to as the “silent killer,” due to a typical absence of symptoms until its later stages, high blood pressure may remain undiagnosed for years, with individuals unaware of the insidious nature of the disease. Although it is generally considered
modifiable, research shows that, even after diagnosis, up to 75% of those individuals living with high blood pressure remain hypertensive, at levels that increase their risk of related organ damage and lowered long-term quality of life (Adler, 2006).

Hypertension is now recognized as one of the primary risk factors in the development and progression of cardiovascular disease (Wong et al., 2007). In a seven-year population study conducted with over 5000 adults in the US, elevated levels of both systolic and diastolic pressure were related to 34% of strokes and 22% of myocardial infarctions, the two leading causes of death worldwide (Psaty et al., 2001). Results of a meta-analysis of 61 longitudinal studies of blood pressure and mortality (Lewington, Clarke, Qizilbash, Peto, & Collins, 2003), suggested that, between the ages of 40 and 69 years, the risk for coronary heart disease doubles with each 20 mm Hg (millimeters of mercury) increment in systolic blood pressure, and 10 mm Hg increment in diastolic blood pressure. However, a survey of studies conducted by the National Center for Health Statistics suggested that only 27% of all hypertensive individuals are controlled to <140/90 mm Hg, the recommended national guidelines (Hajjar & Kotchen, 2003). Based on the results of these major studies, it has been suggested that over 70% of Americans with known high blood pressure are currently at risk of avoidable cardiovascular complications, due to a failure to reach recommended blood pressure goals (Bramley et al., 2006). Even beyond the risks of coronary vascular disease, hypertension is also a primary risk factor for end-stage renal disease (ESRD), increasing the risk of long-term kidney failure and the subsequent need for kidney dialysis or transplant to maintain life (Adler, 2006; Smith et al., 2005).
Hypertension in African Americans

Of the more than 50 million individuals diagnosed with high blood pressure in the US, a disproportionate number are African Americans, accounting for 33.5% of the total hypertensive population. This is more than 21% higher than would be expected based on the percentage of non-Hispanic Black adults in the US (Williams, Flack, Gavin, Schneider, & Hennekens, 2007). Such disparity is compounded by the lower than average number of hypertensive African Americans who reach goal blood pressure after diagnosis (Bosworth et al., 2008; Chobanian et al., 2003; Fields et al., 2004; Rose, Kim, Dennison, & Hill, 2000).

The above statistics underscore the nearly 40% disparity in cardiovascular mortality, reported between African Americans and European Americans (Bosworth et al., 2008). In the 1990s, US epidemiological and statistical data confirmed that the leading cause of death for all races in the US was heart disease, with an age-adjusted death rate of 275.9 per 100,000 population for African American men compared with 202.0 for White men, and 168.1 for African American women compared with 103.1 for White women (Flack et al., 1995). Despite the considerable resources allocated over the past decade to address health disparities (Griffith, Neighbors, & Johnson, 2009), the results for heart-related diseases have been discouraging. For example, an initiative by the American Heart Association to reduce overall cardiovascular disease (CVD) prevalence and mortality by the year 2010 showed some early promising results (Fuster & Smaha, 1999). Yet, more recent studies suggest that those improvements are leveling out, and that any reductions in both prevalence and mortality are increasingly unequally distributed across race, ethnicity and socioeconomic status (Nemetz et al., 2008). A
further concern is that rates of decline in heart disease have been shown to be slower among African Americans than among European Americans (Mensah, Mokdad, Ford, Greenland, & Croft, 2005).

The racial disparity in CVD prevalence and outcome, described above, is partly accounted for by differences in treatment of heart disease, such as unequal access to cardiovascular procedures (Becker et al., 2005). Research suggests that it is also related to the differences in the successful management of earlier cardiovascular risk factors such as hypertension (Bonow et al., 2005; Douglas, Ferdinand, Bakris, & Sowers, 2002; Hertz et al., 2005). African Americans are not a homogeneous group, but researchers have found increasing support for observations that, overall, they are more at risk of developing hypertension, that the disease emerges earlier in life than in any other population (Ferdinand, 2000), and that they are subject to a higher prevalence of hypertension-related risk factors (Bonow et al., 2005). Perhaps the most concerning finding is that African Americans are the population found to be most susceptible to the complications and long-term damage to cardiovascular and renal systems that result from poorly controlled blood pressure (Adler, 2006; Tomson, Foley, Gilbertson, Xue, & Collins, 2008; Yancy, Benjamin, Fabunmi, & Bonow, 2005). Yet, despite these concerns, the disparity in blood pressure control between African Americans and Caucasian Americans is increasing (Hertz et al., 2005).

Treatment Adherence

Although many factors are known to contribute to the well-documented difficulties in hypertension management, adherence to recommended health behaviors is suggested as the major factor in successful treatment (“After the Diagnosis”, 2005). One
of the early definitions of treatment compliance was “the extent to which a person’s behavior (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice” (Haynes, 1979, p. 1). The original use of the term “compliance,” suggesting a passive acceptance of treatment recommendations, has primarily been replaced with the term “adherence,” which recognizes the transactional relationship necessary for a treatment regimen to be effective.

Three decades of research in health behavior have resulted in some success in initiating adherence to recommended behavior changes across many chronic diseases, but problems remain regarding maintenance of those behaviors over time (Bellg, 2003). Moreover, in the case of hypertension management, both the initiation and the maintenance of health behavior changes remain a problem beyond that of other disorders. For example, although it has been documented that non-adherence to drug therapy for all chronic diseases is about fifty percent, it is estimated that this rises to over two thirds of those people living with high blood pressure (Bane, Hughes, & McElnay, 2006). Even in those individuals who initially adhere to antihypertensive regimes, it has been suggested that many people discontinue treatment once they see their blood pressure under control, often within six months of initiating treatment (Harmon et al., 2006).

Certain biopsychosocial factors are shown to interact to increase the risk of non-adherence to medical recommendations. These include social and economic factors, patient and provider-related factors, and characteristic aspects of the disease itself (e.g., Bane et al., 2006; Harmon et al., 2006; Ndumele, Shaykevich, Williams, & Hicks, 2010; Shapiro & Goldstein, 1982; Smith & Ruiz, 2002). In a disease that is primarily asymptomatic in its early stages, there is little tangible reinforcement to encourage
medication adherence over time, such as exists in other chronic diseases like diabetes or asthma (Siegel, Lopez, & Meier, 2007; Wetzels, Nelemans, Schouten, & Prins, 2004). Understandable reluctance to engage in lifetime medications for a symptomless condition is increased when those medications are seen as, not infrequently, causing unacceptable side effects, a primary contributor to non-adherence to hypertensive therapy (Chobanian et al., 2003). Yet, while adhering to lifetime medications for a symptomless disease is a problem for many individuals, incorporating recommended lifestyle changes is shown to be even more difficult. Hypertension management is complex, frequently making demands on individuals to make dietary and activity modifications that conflict with individual values and cultural preferences. Variables such as level of education, literacy, employment status, level of income, and social support have all been shown to impact individuals’ health-related behaviors and the ability to adhere to a prescribed treatment regimen (Ferdinand, 2000).

For low-income African Americans, the likelihood of long-term adherence to hypertension treatment recommendations is especially low (Ndumele et al., 2010; Rose et al., 2000). Lack of trust in the health system related to perceived racism and well-documented racial disparity in health care access may dramatically reduce the potential for adherence in a chronic disease with few symptoms (Douglas et al., 2002; Hausman, Kressin, Hanusa, & Ibrahim, 2010). In addition to research documenting poor adherence to hypertensive medications in low-income African American populations (e.g., Ndumele et al., 2010), it has been suggested that newer more expensive medications with fewer side effects may be less readily available to lower-income minority patients (Chobanian et al., 2003).
Furthermore, research suggests that African Americans, especially inner city low-income men, have disproportionate social, educational, and economic burdens that make incorporating lifestyle behavior changes more difficult than for any other sectors of the US population (e.g., Hill et al., 1999; Rose et al., 2000). For example, recommended lifestyle changes, such as dietary restrictions for optimal hypertension management, may be a low priority for individuals who are struggling to meet their basic daily needs. While an earlier focus of concern in treatment compliance was on the high numbers of males with hypertension (e.g., Davis & Eichhorn, 1963; Sackett et al., 1975), recent statistics show that women now outnumber men in rates of hypertension. For African American women, those numbers have reached over 39.5% compared with 37.5% for African American men (Chobanian et al., 2003). Current low rates of adherence to treatment for high blood pressure, in a low-income African American female population, are thus even more concerning (Fields et al., 2004).

Past research has shown that the recommendation of culturally unfamiliar or unacceptable lifestyle changes further increases the likelihood of resistance to change and overall non-adherence to treatment recommendations (Johnson et al., 1995). Beyond the barriers to adherence facing all low-income populations, African Americans face additional problems. In the case of stable hypertension control, moderation of diet and exercise patterns are of primary importance, with the average African American diet and exercise patterns shown to increase the risk of high blood pressure. These culturally related factors contribute to the findings that African Americans are the population at highest risk of non-adherence to treatment recommendations for hypertension (Siegel et al., 2007).
Autonomy and Motivation to Change

In exploring factors that contribute to medical treatment adherence, certain aspects of the provider-patient relationship have been demonstrated as important in research with both Caucasian and African American populations (Aujoulat, d’Hoore, & Deccache, 2007; Hyre, Krousel-Wood, Muntner, Kawasaki, & DeSalvo, 2007). The value of the move away from hierarchical relationships between providers and patients is supported in research showing that patients appreciate collaborative relationships with their health providers, in which they feel respected and encouraged to take autonomous roles in their own treatment decisions and disease management (Molassiotis, Morris, & Trueman, 2007; Ravenell, Johnson, & Whitaker, 2006). In the management of chronic diseases, such as diabetes, obesity and hypertension, which are often the result of, or exacerbated by, lifestyle factors, the approach of providers is even more important. If individuals feel criticized for their current lifestyle choices, they may be more likely to resist medical recommendations, rather than take responsibility for making those necessary health changes.

Research in the area of motivation offers insights into ways of promoting health-related behavior changes within autonomy-supportive health care environments. In exploring underlying reasons for human behavior, Deci and Ryan (1985a, 2002) introduced Self- Determination Theory (SDT) to explain the variability in underlying motivations for our actions. This general theory of motivation proposes that autonomy is one of the innate needs driving all our actions. In relation to adopting recommended health changes, it is suggested that the likelihood and stability of a behavior change is related to the degree the surrounding health environment nurtures autonomously-
regulated self care (Deci & Ryan, 2002). From an SDT perspective, the limited time
effects, demonstrated in many behavioral interventions, suggest that such interventions
do not elicit the degree of autonomous regulation of those behaviors necessary for the
stability of those behaviors over time (Bellg, 2003; Deci & Ryan, 2000).

Autonomy-supportive interventions, using the theoretical organization of SDT,
have been targeting an increasing range of health behaviors, including diabetic self-
management (Williams, McGregor, Zeldman, Freedman, & Deci, 2004), in-patient
treatment for eating disorders (Vandereycken & Vansteenkiste, 2009), exercise behavior
(Edmunds, Ntoumanis, & Duda, 2008; Wilson & Rodgers, 2004), adherence to HIV
medications (Kennedy, Goggin, & Nollen, 2004), and tobacco cessation (Williams et al.,
2006). While research in SDT has not yet specifically addressed health behaviors related
to hypertension control, results overall suggest that autonomy-supportive interventions
promote autonomous regulation of recommended health behavior changes and predict
improved outcomes.

Motivational Interviewing (MI), a counseling style that similarly supports the
relationship between autonomy and behavior change, evolved from early work in the
field of addiction (Miller, 1983; Miller & Rollnick, 1991, 2002). Originating in
humanistic client-centered therapy (Rogers, 1959), and social psychological principles of
motivation (Bandura, 1971; Festinger, 1957), one of MI’s core principles is that
autonomy and choice in health decisions promote adherence to recommended health
behaviors. Over the past decade, use of MI techniques has expanded beyond the
treatment of addictive behaviors to a variety of healthcare settings and a diversity of
populations. In the mental health field, MI adherence studies have shown successful
outcome in diverse areas, from schizophrenia to eating disorders and dually diagnosed psychiatric patients (Feld, Blake Woodside, Kaplan, Olmsted, & Carter, 2001; Rusch & Corrigan, 2002; Swanson, Pantalon, & Cohen, 1999).

MI has been adapted for use in many primary care settings, where resources are often limited and opportunity for follow up may be minimal. In light of the growing acceptance of the need to involve patients as active partners in their treatment decisions, the increasing use of this collaborative, autonomy-supportive intervention style is contributing to the body of research addressing the problems of non-adherence to medical recommendations (Knight, McGowan, Dickens, & Bundy, 2006). Successful application of MI strategies has been shown in such areas as diabetic management (Smith, Heckemeyer, Kratt, & Mason, 1997) and medical adherence to asthma medications (Schmaling, Blume, & Afari, 2001). The use of MI as a technique to help weight management has also proved to be of value (Smith et al., 1997).

Underlying all MI interventions is the provision of an autonomy-supportive environment in which health providers seek to increase the individual’s intrinsic motivation to change through specifically designed autonomy-supportive strategies (Miller & Rollnick, 2002). Brief adaptations of MI are beginning to show promising results in encouraging treatment adherence, in a variety of psychological and medical health problems. These include substance abuse (e.g., Carey, Henson, Carey, & Maisto, 2007; Stein, Charuvastra, Maksad, & Anderson, 2002; Steinberg, Ziedonis, Krejci, & Brandon, 2004), eating disorders (Feld et al., 2001), chronic psychiatric treatment recommendations (Humphress et al., 2002), and diabetes (Swanson et al., 1999). Brief MI has also been applied to hypertension treatment adherence (Woollard et al., 2003). Meta-
analyses of the many time-limited MI interventions further support the fact that MI can successfully promote health behavior changes in diverse populations (Burke, Dunn, Atkins, & Phelps, 2004; Heather, 2005; Treasure & Ward, 1997).

While the authors of MI postulate that processes underlying the success of MI interventions involve qualitative changes in motivation, there is little theoretical support for this proposition. Recently however, researchers have begun to consider the utility of SDT as the organizing factor for MI interventions in primary healthcare settings (Britton, Williams, & Conner, 2008; Markland, Ryan, Tobin, & Rollnick, 2005). However, to date, researchers have not used the theoretical structure of SDT to investigate whether MI interventions promote autonomous regulation of recommended lifestyle changes in vulnerable, low-income, hypertensive populations.

Study Relevance to Counseling Psychology.

The disparity of preventive health care and health care outcomes between majority and minority populations in the U.S. should be of concern to us all. One of the unique strengths within the field of counseling psychology is its longstanding and ever increasing emphasis on issues of culture and social justice. Concurrently, in more recent years, there has been a growing awareness in the medical field of disparities in health care outcomes, especially regarding heart disease and its relevant precursors such as hypertension, with calls for more appropriate interventions to address these disparities (Bonow et al., 2005; Mensah et al., 2005). The case for inter-disciplinary research, contributing the awareness, knowledge and skills from counseling psychology practice to an issue of racial disparity within the physical health arena, is a strong one (Tucker et al., 2007).
The ability to help clients move forward, to the point where they are self-motivated in their adaptive behaviors is a primary goal of treatment from a counseling psychology perspective. Respecting clients’ rights to make choices, based on their own unique needs, preferences, and readiness to make those decisions, is also core to the multicultural approach of a counseling psychologist. While this framework remains less common in the traditionally more hierarchical relationship between medical providers and patients, the growing body of motivational research in health behavior supports the proposal that autonomous decisions, at levels that are culturally and personally acceptable to individuals, are more likely to result in sustainable health changes. Furthermore, in looking at chronic diseases such as hypertension that are frequently related to lifestyle factors, medical recommendations regarding lifestyle modifications may require considerable personal sacrifice. The emphasis on the need to change, without promoting autonomy and choice in the implementation of those changes, has been suggested as contributing to the ambivalence and resistance of many patients to treatment adherence (Britt, Hudson, & Blampied, 2004).

Summary and Statement of Purpose

Over the past decade, research in health behavior has increasingly focused on underlying motivation for change, with SDT providing a theoretical basis for testing the role of autonomy support in promoting autonomous regulation of a variety of health-related lifestyle changes. However, to date, SDT has not addressed the problems of lifestyle changes specifically recommended in the management of hypertension.

Successful behavior change interventions based in the principles of MI are similarly purported to effect change through the application of autonomy-supportive
interventions that promote autonomous regulation for recommended health behaviors. Interventions based in MI have been demonstrated as culturally appropriate in studies with low-income African Americans, and further shown to promote recommended lifestyle changes that are relevant to hypertension control. Yet, our understanding of the processes underlying MI remains limited. In using SDT as the organizing factor for an MI intervention, a goal of the current study was to provide empirical support for the assumption that MI effects change through qualitative changes in self-regulation. In examining this issue in a marginalized, hypertensive African American population, at high risk of adverse health outcomes, the current study sought to contribute to the growing body of research seeking to address the unacceptable disparity of cardiovascular healthcare outcomes across the nation.
CHAPTER II

LITERATURE REVIEW

Research over the past five years has highlighted the discrepancies in cardiovascular outcomes between Caucasian and African Americans (e.g., Bonow et al., 2005; Bosworth et al., 2008). Contributing to these discrepancies is the significantly higher rate of uncontrolled hypertension in African Americans (Williams et al., 2007), with lack of adherence to medical recommendations recognized for many years as the primary problem in all hypertension management (Haynes, Taylor, & Sackett, 1979).

After more than three decades of research in the area of treatment adherence, there is a wealth of knowledge regarding the multiple factors that impact individuals’ health-related actions. Relevant barriers to optimal hypertension control include lack of disease symptoms (Sherbourne, Hays, Ordway, DiMatteo, & Kravitz, 1992), side effects of medications (Harmon et al., 2006), health beliefs (Brown & Segal, 1996), depression and comorbidity (Bane et al., 2006; DiMatteo, Lepper, & Croghan, 2000), and health literacy (Ogedegbe, 2008). Beyond these long recognized barriers, current dietary choices and sedentary lifestyles compound the problem, resulting in increasing numbers of those with poorly controlled hypertension.
Much of the earliest research in hypertension management focused on improving medication adherence (e.g., Sackett et al., 1975), but more recent research suggests that difficulties in relevant lifestyle modifications are even greater barriers to blood pressure control and optimal long-term health outcomes (Coleman, Lott, & Sharma, 2000). Lifestyle behaviors reflect cultural choices and unique values, and sensitive interventions are required to avoid defensiveness or rejection of health advice versus eliciting and promoting the value of those recommended changes.

This chapter opens with a brief overview of early compliance literature, with a focus on how compliance was impacted by the traditional provider-patient relationship. Past and recent research on hypertension management approaches is next reviewed, including studies specific to African Americans. Changes in the role of the provider and the specific role of autonomy support in promoting health changes are then discussed. The chapter provides a theoretical grounding for the current research, and concludes with the specific, theory-based research questions explored in this study.

Adherence Research

Modern health care concerns have resulted in a plethora of research involving the intersection of medicine and psychology. Within the broad range of topics that have been studied, increasing our understanding of medical adherence behaviors has been a focal research area for many decades. However, prior to the 1970s, minimal convergence of medicine and psychology resulted in the topic attracting little interest in the scientific world. In a hallmark article recognizing the difficulties of a biomedical model that required disease to be treated independent of social behavior, Engel (1977) proposed a more holistic approach to understanding and managing physical disorders. “The
boundaries between well and sick are diffused by cultural, social, and psychological considerations and arriving at rational treatments and patterns of health care...requires a biopsychosocial model” (Engel, 1977, p. 132).

Prior to examining the issues involved in adherence, it is necessary to clarify use of the overlapping terms “compliance” and “adherence” in health behavior research. Today’s understanding of the term adherence was formulated over three decades ago. Haynes (1979) defined compliance as “the extent to which a person’s behavior (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice” (Haynes, 1979, p.1). The choice of the term ‘compliance’ to describe health behavior choices caused an ongoing debate from its earliest usage, in a post World War II society that associated the term with passive or pressured acceptance under duress (Jahoda, 1956). Even though such negative connotations are less powerful today, the term compliance still suggests a passive state in which it is the patient’s responsibility to follow the doctor’s orders. Such a hierarchical relationship conflicts with the current trend towards collaborative partnerships, familiar to those in therapy settings, in which individuals are active participants in decisions regarding their health care (Tabor & Lopez, 2004). Although the term compliance occasionally surfaces in the medical literature today, it has generally been replaced by the term adherence, which implies some degree of patient choice. In this study, while compliance may be used in reference to early studies, the term ‘adherence’ will primarily be used to describe the extent to which patients’ actions reflect health behavior recommendations.
Health Beliefs

World War II research interest in compliance was fueled by rising concerns about the lack of participation in public health immunization programs and tuberculosis screening. The earliest attempt to explain this lack of preventive health action was derived from Lewin’s (1951) Field Theory. The theory postulated that an individual’s behavior derived from an interaction of the value placed on outcome and the strength of belief that a specific action would result in that desired outcome. Lewin’s proposals were incorporated into a framework of health beliefs first applied to a study of the likelihood of individuals undertaking preventive health screenings. In a large Public Health Service study to evaluate this framework, Hochbaum (1958) took random samples from three urban populations in Boston, Cleveland, and Detroit. A total of 1,201 individuals over the age of 25 years were interviewed, using a standardized format of 90 questions covering psychological, medical, and sociological factors related to tuberculosis. The author reported an additional qualitative component to the study, involving the recording of free answers verbatim, and subsequent computer analysis of those responses, but no details were given regarding how this analysis was conducted, or how it was incorporated into the overall findings.

Results suggested that three separate health-related values and beliefs were fundamental to the decision to participate in the free screening programs. Specifically, an individual’s perceptions about personal vulnerability to tuberculosis, the acceptance of the premise that tuberculosis could exist without symptoms, and the perceived benefit of early diagnosis and treatment, were all indicated as contributing to preventive health behavior. It was concluded that “a person must be psychologically ready and conditions
must be opportune, before he will take action” (Hochbaum, 1958, p. 4). Such readiness was based on acceptance of those three beliefs. It is of note that it was another 25 years before Hochbaum’s proposal of a “psychological readiness” factor was formally incorporated in a model of behavior change, namely the Transtheoretical Model of Change (TTM; Prochaska & DiClemente, 1983).

Lewin’s field theory provided the foundations for the first model of health behavior (Health Belief Model [HBM]; Rosenstock, 1966), which incorporated Hochbaum’s definition of readiness or motivation to act as based in the innate desire to avoid negative health consequences. The model was the first empirical attempt to look at underlying motivations for health behaviors, but its assumption that an individual would naturally engage in a recommended behavior, once perceived barriers to that behavior were lifted, presumed that health behavior was primarily passively induced. This assumption was the source of early criticism (Lau, Hartman, & Ware, 1986). More recently, Bellg (2003) contended that models such as the HBM, which focus on eliminating barriers, ignore the underlying reasons that motivate our health actions. He encouraged researchers to move beyond the elimination of barriers, exploring any positive motivational forces that underlie our health actions. Rothman (2000) further criticized the HBM as focused primarily on reasons for the initiation of health behaviors, arguing that the psychological factors promoting a health behavior change are not always the same factors as those that maintain the stability of that behavior over time (e.g., Heimendinger et al., 2005; Nollen et al., 2008). Despite these limitations, the HBM has served to provide the theoretical foundation for much adherence research, with studies based in this model uncovering a range of patient and provider-related factors, many of
which are relevant to the current study. These factors include external reinforcement factors (Sullivan et al., 2008), knowledge base (Welch, Bennett, Delp, & Agarwal, 2006), and depression (Chao, Nau, Aikens, & Taylor, 2005).

Acknowledging that over the past two decades many interventions designed to reinforce behaviors have demonstrated positive short-term benefits, Orleans (2000) nevertheless contended that it is unsurprising that individuals revert to their original behaviors within 6 to 12 months, once they are out of that reinforcing environment. Successful behavioral interventions generally require ongoing levels of support that are both costly and impractical in many healthcare settings. Bellg (2004) further contended that in relation to reducing cardiovascular risks, the focus of behavior change research should be on the long-term goal of stable behavior change, rather than on short-term reinforcement interventions that artificially manipulate the environment. He cited evidence that, after heart attacks, the percentage of patients adhering to cardiac rehabilitation advice regarding exercise, diet, smoking cessation, and taking prescribed medications, diminishes to between 25% and 40% at six months post heart attack, even after months of intensive behavioral support programs (U.S. Department of Health and Human Services, 1996, as cited in Bellg, 2004).

In an ongoing, intensive, behavioral intervention to increase blood pressure control, Bosworth et al. (2008) exemplified the limited applicability of such behavioral interventions. Their study design incorporated many behavioral factors well established as promoting short-term treatment adherence. Hypertensive patients were randomized to one of four groups: usual care, nurse-administered tailored behavioral intervention, nurse-administered medication management, and a combination of the two interventions. At
the time of a 2008 interim report, over 200 individuals had been enrolled in the study, of whom half were minority patients. Study participants receiving tailored behavioral interventions were exposed to up to eleven health behavior modules, according to the issues relevant to each individual patient. While there are, to date, no published results, the study incorporated a multitude of behavioral health factors with no single behavioral intervention focus optimizing outcome success for all. Although such a labor-intensive intervention would be impractical in underfunded primary health facilities such as the current study setting, the study design highlights the complexities of hypertension management, and the need to explore more viable approaches that have the potential for long-term impact on health outcomes in under-served hypertensive populations.

Provider Patient Relationships

The HBM evolved at a time of biomedical advances in the treatment of chronic diseases, heralding a wave of medication efficacy trials that began to uncover overwhelmingly poor treatment compliance rates (e.g., Watkins, Williams, Martin, Hogan, & Anderson, 1967; Weintraub, Au, & Lasagna, 1973). This stimulated research regarding the variables contributing to medical noncompliance, with hypertension management one of the major focuses of study.

One far-sighted medical compliance study hypothesized that unique personal, health, and work values, social support, and the doctor patient relationship would all be related to compliance with recommended lifestyle changes in areas of work, diet, and personal habits. In this longitudinal study of 369 hypertensive farmers, compliance was defined as existing “when the patient carries out his doctor’s orders with regard to the medical regimen” (Davis & Eichhorn, 1963, p. 241). Those “orders” included such areas
as sodium intake and diet, exercise, smoking, alcohol consumption, and work
responsibility. The study highlighted the multiple demands of hypertension management
that continue today, with results showing degree of compliance inversely related to the
prescribed number of areas requiring health changes.

Results further demonstrated the short-term benefits of behavioral reinforcement
interventions, with levels of compliance to recommended lifestyle changes averaging
36% at the start of the trial, but diminishing to 13% at the end of a four-year follow up.
Certain factors such as individual work ethic and social influences appeared stronger than
health values in terms of either promoting or acting as barriers to compliance. It was
noted that fewer people who reported their doctor patient relationship as “formal” versus
“informal” had stopped complying at the four-year follow up, with the researchers
concluding that “where doctor and patient recognize their reciprocal role obligations as
healer and sick person…the doctor is vested with more authority. This authority better
assures the patient’s acceptance of the doctor’s advice” (Davis & Eichhorn, 1963, p.
248). Such a conclusion was perhaps questionable, due to the lack of operational
definition of “formal” or “informal” which left the response open to individual
interpretation. Nevertheless, Davis and Eichhorn were the first researchers to consider
the influence of the provider-patient relationship on hypertension treatment adherence,
and their conclusions give us some insight into the passive role expected of patients at
that time, a role that proved slow to change over the subsequent thirty years.

Unexpected results from another early hypertension study led to a follow-up study
examining specific aspects of the collaborative relationships between health providers
and patients, and whether these could positively impact health behavior (Sackett et al.,
In the initial study, 230 steelworkers, newly diagnosed with hypertension, were randomly assigned to follow up care with industrial physicians during work shifts, or to their own family doctors outside working hours. Contrary to predictions, at six months, the effect of convenience of follow-up at work had no effect on self-reported treatment compliance, or on blood pressure response. Considering the possibility that these results were influenced by the quality of provider patient relations, a second study ($N = 457$) incorporated the training of worksite health providers to work with patients in a collaborative way. These providers encouraged patients’ involvement in their own hypertension management, such as self-monitoring of blood pressure, and tailoring of medication schedules to meet individual needs (Logan, Milne, Achber, Campbell, & Haynes, 1979). Adherence outcome was measured primarily through pill counts, a method frequently employed in early medication adherence studies. Patients randomly allocated to receive care at work were, as predicted, significantly more likely to take the medications as prescribed (67.6% versus 49.1%, $p < .01$), and significantly more likely to reach blood pressure control within 6 months (48.5% versus 27.5%, $p < .001$). Although the researchers concluded that results supported the positive impact of collaborative relationships on outcome, the experimental group was also significantly more likely to be put on antihypertensive medications (94% versus 62.7%), a methodological confound that limited the validity of the results. However, the study stands as one of the earliest medical adherence trials to challenge the accepted hierarchical approach to disease management.

The primary roles of health providers were initially construed as those of educators and treatment providers, exemplified by one researcher who operationally
defined the successful provider-patient relationship solely by the efficiency of transferred knowledge (Hulka, Cassell, Kupper, & Burdette, 1976). In this early exploration of the provider-patient relationship, successful relationships were gauged through self-reports, in which physicians indicated whether or not they had informed patients regarding their condition and related medications, and patients answered a corresponding series of questions to determine whether the information had been transferred.

As hypothesized, overall results suggested that perceived lack of clarity in communication was related to increasing errors of understanding, but the quality of that communication was not determined. Since it is likely that the same information, presented in different ways, may have impacted how that information was interpreted, it would have been valuable to look at specific aspects of communication style that appeared to promote patient understanding.

In a subsequent examination of the determinants of hypertension treatment adherence, Stanton (1987) utilized the above definition of successful provider communication. This researcher examined positive factors that contributed to patient satisfaction with health providers, and how the quality of patient satisfaction related to treatment adherence. Indicators of adherence included percentage of kept appointments over the previous three months, pill counts, blood pressure measurements, and self-reported adherence. Beyond factors of general satisfaction with health care providers, Stanton included questions regarding expectation for internal control over health and hypertension. Structural modeling revealed that expectancies for internal control positively affected satisfaction with the healthcare provider, a finding that was part of an increasing research interest in positive motivational factors underlying health decisions.
It is unfortunate that Stanton did not comprehensively define the concept of “provider satisfaction” so that specific elements of the relationship that helped or hindered adherence could have been identified.

Although Stanton’s study evidences some early awareness of the need for individuals to have control over their health care, moving beyond the traditional hierarchical approach has proved to be a slow process. Vermeire, Hearnshaw, Van Royen, and Denekens (2001) commented on the minimal advances towards patient centered medicine in a thirty-year review of medical adherence studies. Observing that hypertension has served as a model for medical compliance research, the authors summarized the 1970s and 80s research as focused on patient-related factors such as individual health beliefs and biopsychosocial influences, noting that it was only in the 1990s that research began to examine psychological aspects of the professional relationship that may impact treatment adherence. In acknowledging that patients vary in the degree to which they may wish to participate in their health related decisions, Vermeire and his colleagues concluded that there is a need for “a form of relationship where the patient’s autonomy and fundamental right to self-determination is acknowledged …and the patient’s participation in the decision-making must be invited” (Vermeire et al., 2001, pp. 337-338).

Psychological research supports the above conclusion, suggesting that promoting collaborative relationships and autonomous health decisions may lessen the likelihood of resistance to recommended health actions. For example, the relationship between an empathic versus a directive confrontational style and resistance to change was demonstrated in a study of a sample of self-identified problem drinkers (Miller,
Benefield, & Tonigan, 1993). Participants were randomly assigned to one of three
groups: directive-confrontational counseling, client-centered counseling, or a wait-list
control group. Personal feedback by therapists to clients’ responses in pre-intervention
questionnaires differed between groups only in the style in which the feedback was
presented in subsequent interviews.

Clients in the directive style were more likely to argue with or interrupt the
therapist, and to deny problems or go off task. Furthermore, despite the fact that client
resistance behaviors constituted less than 3% of total client responses, clients’ alcohol
consumption at 12 months was predictable from any one of four resistance behaviors
demonstrated in sessions. These included interrupting \( (r = .65, p < .001) \), arguing \( (r =
.62, p < .001) \), off-task responses such as inattention, silence, or side-tracking \( (r = .58, p
< .001) \), and negative responses such as disagreeing or minimizing \( (r = .45, p < .001) \).
The study findings raised the ethical concern that the confrontational approach may itself
have negatively impacted outcomes. However, an alternative interpretation of the results
is that the resistance seen in participants in the directive group may have adversely
affected their self-reporting. Although it can be argued that these findings may not
generalize to broader medical populations, they do indicate some value in health
providers looking for signs of resistance as a warning, that their approach is not being
well received, and may therefore not achieve its intended goal.

Evidence of a broader recognition by the medical community of the need to move
towards more patient-centered approaches is demonstrated in the fact that medical
programs now offer communication skills training that promotes collaborative
approaches to patient care. For example, Martino, Haesler, Belitsky, Pantalon, and Fortin
(2007) described the development of a curriculum for third-year Yale medical students, based in a semi-structured style of counseling known as Motivational Interviewing (MI; Miller, 1983; Miller & Rollnick, 1991, 2002). The goal was described as teaching a practical patient-centered approach in time constrained medical settings, to encourage self-management for the increasing numbers of patients coping with long-term diseases.

The quality of the provider-patient relationship has been demonstrated as related to treatment adherence behaviors. In a study assessing different dimensions of the provider-patient relationship, in relation to adherence to retroviral medications, the concept of patient empowerment was described as involving “active provider-patient relationships that nurture the knowledge, skills, attitudes and self-awareness necessary to influence their own behavior… in order to improve their quality of life” (Molassiotis et al., 2007, p. 371). Using the Patient-Provider Relationship Scale (Galassi, Schanberg, & Ware, 1992), a 15-item scale measuring the quality of the relationship between patient and provider, the aspect of the relationship found to be most strongly associated with both short-term and long-term adherence was the patient’s perceived ability to initiate communication regarding their illness ($r = 0.36, p < .05$). Although this finding may serve to remind providers of the need to give patients time to communicate their concerns, generalization is limited by a small primarily Caucasian sample, and by the unique problems related to HIV treatment adherence.

Hypertension

In a 2003 national report on the status of hypertension in the US, committee members commented that “the most effective therapy prescribed by the most careful
clinician will control hypertension only if patients are motivated…Empathy builds trust and is a potential motivator” (Chobanian et al., 2003, p. 19).

The Provider’s Role in Hypertension Treatment Adherence

In acknowledging the provider’s role in motivating behavior change, irrespective of the existence or removal of other health-related barriers, the medical profession is now incorporating therapeutic principles suggested over 50 years ago. Rogers (1959) proposed a direct relationship between an accepting egalitarian therapeutic setting and the client’s ability to find the best solution to the problem under discussion. Today, the importance of the relationship between therapist and client is acknowledged as the basic building block for any therapeutic intervention. Collaborative, empathic, and non-judgmental approaches are shown to increase productive client involvement and commitment in sessions (Catley et al., 2006; Moyers, Miller, & Hendrickson, 2005), lower resistance to change (Moyers & Rollnick, 2002), and improve overall treatment outcomes (Miller et al., 1993; Patterson & Forgatch, 1995).

In a subsequent review of hypertension studies evaluating the role of healthcare providers in facilitating medication adherence, Harmon et al. (2006) noted the many patient specific, environmental, and disease-related barriers associated with hypertension treatment adherence, including medication side-effects, younger age, complex dosing schedules, and limited access to care. These researchers concluded that “actively engaging patients in their treatment decisions and health care” was one of the most modifiable ways forward in improving outcomes (Harmon et al., 2006, p. 310).

Research specific to hypertension treatment in African American populations has also identified components of the provider-patient relationship that appear related to
adherence. In a survey study of 295 individuals with hypertension (88.8% African American), findings indicated that lower comfort in asking questions, and the wish to have more time with one’s provider were related to poorer antihypertensive medication adherence (Hyre et al., 2007). It is of note that there was no significant association between knowledge and medication adherence, of relevance in the current study in that time spent listening to patients may be of greater value than providing health education.

Ravenell and colleagues (2006) identified positive motivational factors that they termed self-empowerment, in a qualitative study of 71 inner-city low-income African American men. Focus groups lasting about 90 minutes, incorporated open-ended questions to explore factors considered by participants to influence their health behavior. Qualitative analysis was based on constant comparative analysis of data between groups, generating preliminary concepts and subsequent categories and subcategories. The category termed self-empowerment included being involved in one’s own healthcare decisions, and this was frequently cited as a facilitating strategy of health maintenance. Findings further suggested that the primary negative influences on health maintenance were stress related, self-identified as lack of income and experiences of racism.

One of the strengths of this study was its use of trained African American male moderators, which may have facilitated discussions in the focus groups. In a similar study based on analysis of semi-structured interviews, 19 inner-city African American males identified further positive elements of the provider-patient relationship related to hypertension treatment adherence. These included feeling cared for by the healthcare provider, as well as the experience of empathic and non-judgmental assistance from providers (Rose et al., 2000). However, reliance on self-report and group format
interviews limits the validity of the findings in both these studies. Beyond the concern of socially desirable responding, especially in a group setting, provider elements identified as important to adherence may not capture the less conscious aspects of motivation underlying health behavior changes. Despite such limitations, the above studies suggest that both African American and Caucasian populations value collaborative provider-patient relationships, in which they feel listened to, cared for, and encouraged to take active roles in their own healthcare decisions.

*Lifestyle Factors and Hypertension Outcomes*

The meteoric rise in chronic diseases such as hypertension and diabetes, shown to be directly related to increasingly sedentary lifestyles and suboptimal diets (Chobanian et al., 2003), has contributed to the urgency of developing medical programs and interventions that encourage health behavior changes in culturally acceptable ways. Exemplifying the problem, it is of note that the term “metabolic syndrome” emerged only in the last decade as a new medical category, defining the now common comorbidity of hypertension, adult onset diabetes, and obesity. The observed relationship between lifestyle factors and the current epidemic of hypertension has changed the face of hypertension research, moving beyond early concerns with low adherence to medications to a focus on interventions designed to increase relevant lifestyle behavior changes.

Studies documenting limitations in the relationship of medications to outcome highlight the relevance of focusing on other factors shown to contribute to hypertension management. For example, in a population-based study evaluating the relationship between medication compliance and blood pressure control, level of adherence was determined by the ratio of medications collected over one year to the amount prescribed.
over that same interval (Bramley et al., 2006). Unexpected results showed that, based on this categorization, 74% of the sample of 840 patients met the study’s criteria for target blood pressure. Higher numbers of medications for comorbid diseases were found to be related to even less likelihood of reaching blood pressure goal.

While collecting a prescription may not accurately reflect actual medication taken, the above findings suggest that medications alone are limited in their ability to control high blood pressure. Given the poor correlation between medications and blood pressure control, promoting health behavior changes that have the potential to impact long-term health outcomes is even more vital. Increasing numbers of studies are focusing on relevant lifestyle changes to address the underlying contributing factors to hypertension, demonstrating not only improved hypertension control, but also overall improved longer-term cardiovascular health outcomes (Bray et al., 2004; Elmer et al., 2006; Mant & McManus, 2006).

Support for the focus on lifestyle changes to combat the epidemics of chronic diseases comes from a meta-analysis of three decades of adherence studies (DiMatteo et al., 2002). These researchers found the relationship of adherence to outcomes, in diseases such as hypertension, was strongest in non-medication regimens. Such findings are supported by national guidelines for the prevention and management of high blood pressure; a major part of the report focused on the need for modification of contributing lifestyle factors such as weight, daily activity levels and sodium intake (Chobanian et al., 2003).

Although a focus on the overall negative impact of our current dietary patterns on the incidence of hypertension was beyond the scope of the current study, one particular
aspect, namely our dietary sodium intake, present at high levels in fast foods and in many of our processed foods, is shown to be a primary factor in hypertension management. It is now well documented that high sodium intake contributes to raised blood pressure, and that the reduction of dietary sodium, without any other hypertension intervention, reduces high blood pressure (e.g., He et al., 2002; Obarzanek et al., 2007; Svetkey et al., 2004; Whelton, Chin, Xin, & He, 2002). It has further been shown that encouraging lower sodium intake may have long-term effects on dietary choices that impact overall health outcomes.

In a ten-year follow up of a study of 774 participants randomly assigned to a short-term sodium reduction or control group, risk of a cardiovascular event was shown to be 25% lower among those in the intervention group (Cook et al., 2007). Similarly, results from a data analysis of a representative sample from over 19,000 persons in the US supported the promotion of health related lifestyle changes such as sodium restriction. Those individuals reporting dietary and activity related lifestyle modifications were five to eleven times more likely to have their hypertension controlled than those using medications alone (He et al., 2002).

While the recommendation of lifestyle adaptations, often in addition to medications, has become a recognized part of hypertension treatment, the relationship between medications, lifestyle recommendations and blood pressure control is unsatisfactory. For example, in a four year observational study of 2125 adult patients (59% female, 80% white, 84% high school graduates), examining the relationship of provider characteristics and health systems on patient health outcomes, medications and lifestyle changes in chronic diseases were found to be only minimally associated with
outcomes (Hays et al., 1994). In patients with hypertension, those recommendations included adherence to medications, a low salt diet, weight loss diet, and an exercise program, with only just over 10% of those who reported treatment adherence showing positive effects on outcome. In their discussion of the results, the researchers postulated that differences in the intensity and style of the recommendations between physicians likely contributed to the tenuous relationship between adherence and outcomes, contending that the time had come for health research to focus on such factors as provider-patient relations that have the potential to promote positive health outcomes.

Resistance to Change

For both providers and patients, the current emphasis on lifestyle changes in hypertension treatment is causing problems. Coleman et al. (2000) examined the problems of managing this disease, in a survey related to blood pressure management presented to both medical providers and to 181 patients with hypertension, in a university-based clinic. The greatest barriers to hypertension control, apart from medication costs, were identified by both patients and providers as those related to lifestyle changes. Although it has been suggested that a health change can only occur when the individual believes that such change is both valuable and achievable (Rollnick, Mason, & Butler, 2000), it is also reasonable to assume that most of us are at least somewhat ambivalent about health change recommendations that challenge our current lifestyle choices. Thus, even when individuals recognize the value of making lifestyle health changes, resistance to actual change and to the efforts of well-intentioned professionals to promote those changes is perhaps to be expected.
Beyond adherence to a medication schedule that requires some degree of
adjustment, recommendations by health providers to make lifestyle changes may impact
individuals at deeper psychosocial levels. Aujoulat and colleagues (2007) proposed that
such recommendations often conflict with existing values and behaviors and can leave
patients feeling distressed and powerless in their life choices. In reviewing studies that
support the relationship between patient empowerment and improved health outcomes,
these authors defined empowerment as the patient’s ability to make choices and accept
responsibility for those choices. It was suggested that the goals and outcomes of patient
empowerment should not be predetermined, but instead negotiated with every patient
according to his or her own situations, needs, and unique values. From the patient’s
perspective, these authors proposed that empowerment involves

“a complex experience of personal change...guided by the principle of self
determination and may be facilitated by health care providers if they adopt a patient-
centered approach of care which acknowledges the patient’s experiences, priorities and
fears” (Aujoulat et al., 2007, p. 18).

The principle of self-determination, as mentioned above, is apparent in
collaborative approaches that encourage patient involvement and autonomy in treatment
decisions, at levels that are culturally and individually comfortable for each individual.
Conversely, the recommendation of lifestyle changes can easily be interpreted as
criticism of an individual’s personal choices, increasing the potential for defensiveness
and rejection of the medical advice.

African Americans and Hypertension

The disproportionate number of African Americans with uncontrolled
hypertension, and its potentially fatal outcomes, has given rise to many research
questions regarding how to promote adherence to recommended lifestyle changes in
culturally acceptable ways (Hertz et al., 2005; Mensah et al., 2005). Beyond the overall barriers to treatment adherence documented earlier, additional factors serve to add to the difficulty in managing hypertension in African Americans. These include genetic vulnerability (Nesbitt & Victor, 2004), cultural norms related to diet and activity levels (Bosworth et al., 2008), system-related barriers such as poor healthcare access (Hyre et al., 2007) and suboptimal provider approaches (Becker et al., 2005; Flack et al., 1995).

It is now recognized that African Americans are overall more prone to hypertension, with poorer long-term outcomes than any other ethnic group in the US population (Williams et al., 2007). However, there is ongoing debate regarding the balance of genetic and environmental causes of this disparity. For example, evidence that African Americans are at higher risk for the development and adverse consequences of hypertension (Douglas et al., 2002), contrasts with research showing that foreign born Black Americans are healthier, in terms of cardiovascular related diseases, than their US born counterparts (Lucas, Barr-Anderson, & Kington, 2005).

Further, studies have found that Africans living in African nations are less likely than African Americans to develop hypertension (Cooper et al., 1997; Williams, Neighbors & Jackson, 2008). While it is possible that environmental factors in the US interact with currently unknown genetic influences, such discrepancies highlight the probability that environmental factors in the US play a more significant role in maintaining the disparity in hypertension prevalence than was previously recognized (Schneider et al., 2005). In an issue of the *Journal of the American Heart Association* devoted entirely to cardiovascular care disparities, it was acknowledged that “the
underlying causes for health care disparities are deeply rooted in our society and are not merely medical issues” (Bonow, 2005, p.1206).

Rather than categorizing any particular social or ethnic group as noncompliant, Betancourt, Carillo, and Green, (1999) pointed to the multitude of social and cultural barriers that have been shown to impede health status improvements in low-income African Americans. These researchers argued that the focus of concern has to be the evaluation of culturally-sensitive interventions to improve medical adherence with at-risk minority groups. Furthermore, attempting to single out any specific environmental contributor such as healthcare access was suggested as being of little value. For example, in a comparative data analysis of 569 hypertensive patients in a Veterans Administration hospital, results showed significantly lower blood pressure control and adherence in African Americans versus Whites (41% versus 59%), yet all patients had equal access to health care resources (Bosworth et al., 2008).

Although the role society plays in these disparities is now undisputed, genetics researchers have uncovered a unique physical characteristic that may further increase the risk of hypertension in African Americans. Beyond the link between sodium intake and hypertension documented in all populations, salt sensitivity (defined as an increase in blood pressure of 10 mm Hg over baseline after a brief salt loading) is now shown to be twice as prevalent in African Americans as in Caucasians matched for age and blood pressure (Kearney et al., 2005; Nesbitt & Victor, 2004). Lower socioeconomic status adds to the problem, with one urban study of 1003 participants finding that people with low incomes are more likely to purchase grocery foods high in salt, as well as in sugar and fat (Turrell, Hewitt, Patterson, Oldenburg & Gould, 2002). Compounding the dietary
limitations associated with poverty, food preferences in all African American populations tend to include seasonings with high sodium content (Douglas et al., 2002; Williams et al., 2007). While within-population differences in sodium susceptibility suggest sodium reduction may not affect all individuals with hypertension equally (Obarzanek et al., 2007), research examining the effects of reducing dietary sodium levels on blood pressure, across race and ethnicity, reported the greatest reductions in blood pressure were in hypertensive African Americans (Bray et al., 2010). The above weight of evidence highlights the importance of promoting dietary sodium reduction in all individuals with hypertension, and in particular in low-income African Americans, both for immediate hypertension control, and for overall improved cardiovascular outcomes.

A second lifestyle factor identified as related to blood pressure control is daily activity level, with a positive relationship between amount of regular exercise and blood pressure control demonstrated across all racial groups. In a meta-analysis based on 54 controlled studies, Whelton et al. (2002) reported an average systolic blood pressure reduction of between 3.8 and 5.0 mm Hg. in previously sedentary adults across all major ethnic groups.

The need to promote exercise in hypertensive African Americans has been reinforced in national guidelines for hypertension control (Cutler et al., 2008). However, health providers need to approach this issue with the caveat that exercise patterns vary cross-culturally, with minority American populations including African Americans, reporting lower leisure time activity than their Caucasian counterparts across variables such as employment, education, socioeconomic status, and social support (Crespo, Smit, Anderson, Carter-Pokras, & Ainsworth, 2000). Given the difficulties discussed earlier
with making lifestyle changes that challenge one’s cultural values and personal choices, it follows that in a low-income, African American, hypertensive population, where both cultural activity patterns and limited dietary choices may be negatively impacting blood pressure control, resistance to changes in those areas may be high. Yet, the value of regular exercise, in a study specific to newly diagnosed hypertensive African Americans, supports the value of promoting culturally relevant exercise in a population that historically has not pursued exercise for health or leisure purposes. Following advice to walk 30 minutes a day, with the use of a pedometer to record daily steps taken, an average of 9.0 mm Hg drop in systolic and 7.42 mm Hg drop in diastolic blood pressure was recorded at six months (Sohn, Hasnain, & Sinacore, 2007). In noting that the risk for coronary disease doubles with each 20 mm Hg increment in systolic blood pressure and 10 mm Hg increment in diastolic blood pressure (Lewington et al., 2003), the clinical significance of these findings is difficult to dispute. It is of note that blood pressure reduction through exercise is not significantly associated with body mass index (BMI), suggesting exercise is equally valuable in those individuals whose hypertension is unrelated to obesity (Whelton et al., 2002). This is relevant to the current study in that exercise is often undertaken as a way to lower blood pressure through the pathway of weight loss, whereas the above results suggest that increased daily walking, a culturally appropriate activity in this population, is directly related to blood pressure reduction. Despite the described difficulties in promoting health changes that challenge individuals’ cultural preferences and personal choices, the adherence literature suggests that collaborative and culturally relevant approaches to working with hypertensive African American populations have the potential to contribute, not only to the immediate control
of hypertension, but also to the long-term goal of reduction of cardiovascular health disparities.

Motivational Interviewing

Motivational Interviewing is one such collaborative intervention style promoting the concept of autonomy as fundamental to health behavior change (MI; Miller, 1983; Miller & Rollnick, 1991, 2002). Employing the empathic processes from Rogers’ (1959) therapeutic approach, MI was founded on principles of experimental social psychology in its application of processes such as attribution, cognition dissonance and self-efficacy. MI conceptualizes motivational development as an interpersonal process. Within a nurturing and autonomy-supportive environment, it is proposed that health providers can harness individuals’ intrinsic motivation to make healthy choices regarding their health actions (Miller & Rollnick, 2002; Rollnick et al., 2000).

Autonomy-supportive intervention techniques are designed to lower natural resistance to health behavior changes, putting the onus of responsibility for change on the individual. The authors of MI contend that resistance is most likely to occur when an individual perceives a potential loss of choice or control; experience of these freedoms being challenged results in resistance to the proposed change (Miller & Rollnick, 2002; Moyers et al., 2005). Conversely, promotion of an individual’s perception of control and choice encourages self-motivational statements known as change talk, with subsequent ownership and internalization of both the problem and its solution.

Over the past decade, MI has become an increasingly popular collaborative approach to the management of chronic diseases such as hypertension (Knight et al., 2006). Early MI applications involved repeated sessions over weeks or even months.
These time-consuming and labor-intensive interventions were impractical in primary care settings such as understaffed city health centers, where attendance for follow-up was often less than optimal. MI has therefore adapted to meet these demands through developing shorter opportunistic interventions that retain the core principles of MI, but can be applied in as little as one intervention (e.g., Woollard et al., 2003). Britt and colleagues (2004) summarized adapted motivational interviewing as consisting of a menu of techniques that follow the spirit and practice of motivational interviewing, but can be applied in a single session in a primary health care setting. Applying the spirit of MI involves the use of an empathic non-judgmental approach to support patients’ preferred level of autonomy in health decisions, encouraging the exploration of ambivalence, expecting resistance and avoiding confrontation, and respecting the client’s choices at the end of that exploration (Markland et al., 2005; Miller & Rollnick, 2002).

Results of a meta-analysis of studies incorporating these principles support the long-term value of this approach. Burke et al. (2003) identified thirty adapted MI studies that targeted problem areas including alcohol and drug abuse, HIV-risk behaviors, diet and exercise problems, treatment adherence, and eating disorders. With regard to long term efficacy, nine studies that generated significant effect sizes both immediately post treatment and at one other follow-up point were examined. Effect sizes at 20 weeks post treatment ($d = 0.13, N = 1,519$) were found to be approximately equal to those at an average of 67 weeks of follow up ($d = 0.11, N = 1,479$) with no significant difference between these two time points. Only one adherence study looked specifically at hypertension treatment adherence, comparing standard treatment (low-intervention group) with the addition of a single MI intervention to promote lifestyle changes in diet
and exercise (Woollard et al., 2003). The primary outcome measure was blood pressure, recorded at 18 weeks post intervention, with significant falls in the systolic and diastolic blood pressure for the high-intervention group only (systolic: -6mm Hg, adjusted $r^2 .39$, $p < .05$; diastolic: -5 mm Hg, adjusted $r^2 .38$, $p < .05$). Although this one hypertension study did not examine outcomes beyond 18 weeks, the overall findings of the meta-analysis demonstrated that changes remained stable over time without ongoing external reinforcement. Proponents of MI argue that such maintenance of behavior change gives credence to the proposal that MI promotes integration of the value of the behavior change, but there is no theoretical evidence in these studies to support the proposition that qualitative changes in motivation are the basis for the observed efficacy of MI interventions. Empirical support is needed to further our understanding of the processes underlying the success of MI interventions.

In examining, how counselor adherence to the principles of MI impact resistance, Catley et al. (2006) looked at the frequency of change talk (defined as client statements favorable toward changing behavior). Eighty-six participants (64% female) were a subset of a sample of 600 African Americans enrolled in a double-blind, placebo-controlled trial, of a medication to help smoking cessation. All participants received an additional seven individual 30 minute sessions of MI-consistent counseling over the seven weeks of the trial. Audiotaped sessions were independently coded and rated, regarding counselor adherence to the underlying principles of MI. With regard to resistance behaviors, analysis supported the centrality of freedom of choice and self-direction, with a negative association demonstrated between client resistant talk and providers’ emphasis of client control (parameter estimate = -.46, $p < .05$). Giving advice without permission was
further related to less frequent change talk (parameter estimate = -.66, \( p < .05 \)). It is possible that even when individuals recognize the need for change, evidenced by entering a voluntary smoking cessation program, perception of any loss of that control can re-ignite ambivalence about that change.

Although it can be argued that responses related to smoking cessation do not necessarily generalize to other health problems, the findings do support the overall utility of MI in an African American population. They further suggest the onus of responsibility is on the provider to listen more than to give advice, encouraging open discussion rather than attempting to push for change. However, the clinical utility of the above findings is limited by a failure to evaluate any direct relationship between change talk and behavioral outcome. It is possible, therefore, that MI merely promotes expression of intention to change but not the behavior change itself.

One of the problems, in evaluating the relationship of MI interventions to outcomes, has been in separating the effects of the MI components from those of behavioral elements of intervention studies. Resnicow et al. (2009) examined the direct relationship between MI and outcome in a culturally-tailored intervention to promote healthy food choices in a sample of 906 African Americans recruited from their local churches. Participants were assigned either to a control group receiving standard nutrition and exercise intervention material, or to one of two focus groups that offered culturally-tailored intervention material; an additional telephone-based MI component designed to enhance intrinsic motivation for change was added to one of the two intervention groups.
Analysis of pre- and one-year post-intervention self-report measures demonstrated significant improvement in healthy food intake and exercise in both intervention groups over the control group, with a clear additive effect for the MI component in dietary outcome alone. For example, pre-post change scores for daily servings of fruit and vegetables were 1.13 for the MI group compared with .44 for the non-MI intervention group and .17 for the control group. A strength of the study was in its use of culturally salient and previously validated material, but the researchers’ interpretation of results as evidence that MI enhances autonomous motivation for engaging in and maintaining a recommended health behavior is questionable. Beyond the possibility of social desirability bias in the researchers’ reliance on self-report measures, it is also possible that benefits of the motivational component were due to the variety of extrinsic behavioral reinforcement strategies, including the personal contact through four MI phone calls delivered through the year of the study. An empirically validated measure of qualitative changes in motivation would have been necessary to support the above interpretation.

Further difficulty in evaluating the impact of behavioral components of MI interventions is demonstrated in a weight loss study with 44 African American women. Befort and colleagues (2008) examined the addition of four MI sessions to a culturally targeted behavioral weight-loss program versus a control group who received four standard health education sessions. Counselors were extensively trained and all counseling sessions were recorded with 25% of tapes randomly selected and reviewed for treatment fidelity. Unexpected results showed that although both groups did equally well in terms of weight loss, they also both reported significant reduction of motivation and
exercise self-efficacy. The researchers concluded that MI was not effective with this population, but it is also possible that external reinforcement negated the value of the MI component in the short term. It would have been helpful to have added an MI only group focusing on weight loss, as well as looking at long-term outcome in groups. If the observed outcome was due only to behavioral reinforcement, effects would be expected to diminish equally in both groups over time.

The difficulty in evaluating MI techniques was further highlighted in a longitudinal multifocus hypertension trial to promote lifestyle changes (Hyman, Pavlik, Taylor, Goodrick, & Moye, 2007). A total of 289 African Americans with uncontrolled hypertension (67% female) were randomized into one of two intervention groups, or to a standard care control group. Targeted behaviors included dietary sodium intake, smoking, and physical activity. Participants in both groups also participated in three individual counseling sessions on all behaviors over the 18 months of the study, supplemented by two weekly telephone sessions of MI for the first six months. Difference between the two interventions was related only to how many behaviors were addressed at any one time. It is of concern that while there were initial beneficial effects for two of the three behaviors, sodium intake and activity levels, these diminished in all participants across intervention groups over the 18 month period of the study. For example, 29.6% of the simultaneous group adhered to the sodium reduction activity at six months, but this decreased to 9.5% of the group at 18 months. This suggests the phone calls employing MI techniques may have played an important role in reinforcing the behavior, but that the behavior had not become sufficiently internalized to be stable once that reinforcement ceased at six months. Outcome for the third targeted behavior,
smoking, did demonstrate steady improvements over the 18 months of the study. However, an ongoing behavioral component in this intervention makes it difficult to determine if there was any separate motivational impact of the MI components. Consistent with the difficulties in interpreting results of the previous studies, a pre-post measure of qualitative changes in motivation might have helped to clarify the underlying processes of MI.

Initially proposed as the theoretical context to explain the processes underlying MI, The Transtheoretical Model of Change (TTM; Prochaska & DiClemente, 1983) has experienced diminishing support in recent years. This developmental model of change assesses five stages of self-perceived readiness to engage in a behavioral action. In incorporating MI within the TTM framework, it was initially suggested as optimal to match appropriate MI techniques with self-reported stage of change, but a meta-analysis of 49 studies using the TTM found that the sequencing of processes was inconsistent across health problems, limiting the utility of the stage model as the basis for determining specific MI strategies (Rosen, 2000).

In a systematic review of the effectiveness of stage-based interventions in promoting behavior change, Bridle et al. (2005) examined 37 major controlled trials across different healthcare settings in different countries, averaging over 500 participants in each trial. Studies included preventive health interventions, those targeting multiple lifestyle changes such as diet, exercise, smoking cessation, as well as those promoting treatment adherence. Twenty of the trials compared a stage-based with a non-stage-based intervention, with ten reporting no significant difference, five reporting mixed effects between groups, and five reporting significant effects in favor of the stage-based
intervention. The researchers concluded that there was little evidence to suggest that stage-based interventions were more effective than non-stage-based interventions.

It is of note that the large sample sizes in the trials examined would be more likely to result in significant findings, and it is of particular relevance to the current study that low-income participants tended to show no favorable effects for the stage-based interventions. Beyond these findings, the model gives no support for the underlying MI assumption that its autonomy-supportive interventions work through promoting autonomous motivation to change behaviors (John, Yudlin, Neil, & Ziebland, 2003; Whitelaw, Baldwin, Bunton, & Flynn, 2000). As a result of the limited support for the effectiveness of stage-based interventions in promoting change, MI researchers are now looking beyond the TTM for comprehensive theoretical backing to explain how and why its techniques are effective (Adams & White, 2005; John et al., 2003; Markland et al., 2005).

**Self-Determination Theory**

Self-Determination Theory (SDT; Deci & Ryan, 1985a, 2002) is one candidate for such explanations. According to SDT, motivation refers to the underlying energy that propels a person towards a specific goal. Every action is represented by a continuum of perceived locus of causality. At one end of the spectrum, extrinsically regulated behavior corresponds to tenets of behaviorism, where actions occur in response to external reinforcement. At the other end of the spectrum, autonomous regulation of a behavior is seen as being congruent with one’s values and is synonymous with volition (Williams et al., 2006). Thus, from an SDT perspective, reaching the stage of autonomous regulation of a health behavior, that was initially externally recommended, involves finding personal
meaning and a sense of choice in that action. Originally developed as a theory of general motivation, SDT increasingly is being applied to a variety of health behaviors, with the proposal that integrated motivation to engage in, and persist with, a recommended health behavior change can be facilitated in an autonomy-supportive health care environment that meets innate needs for autonomy, competence, and relatedness (Deci & Ryan, 2000).

Acknowledging that behavioral reinforcement interventions may initiate a behavior, Williams et al. (2006) contended that internalized regulation of a behavior is essential for maintaining that behavior over time. Furthermore, if the health environment does not support innate needs for autonomy, competence, and relatedness, it is posited that self-protective behaviors or resistance will occur, with the potential to hinder progress towards the proposed health change (Ryan & Deci, 2000). The previously described study by Catley et al. (2006) indirectly supports this last assumption, in demonstrating a negative relationship between client control and resistance behaviors. In recent years, SDT’s focus on autonomous regulation of behavior has begun to gain momentum in the treatment of psychological problems, with the authors of SDT contending that supporting clients in their autonomous resolution of their own health problems is central to sustaining the process of change (Ryan & Deci, 2008). For example, the utility of SDT has been demonstrated as improving outcomes in the treatment of individuals with eating disorders, a problem where issues of control are seen as fundamental to the problem (Vandereycken & Vansteenkiste, 2009).

In applying SDT to medical issues, satisfying the need for competence requires that patients understand their options in attaining health-related goals, and have the confidence to believe they can carry out those requirements. Relatedness involves
feeling respected and cared for by health providers, and satisfaction of the need for autonomy refers to feeling that one is acting from a sense of choice and volition in a health-related action (Ryan & Deci, 2000). The authors of SDT have suggested that utilizing an empirical theory based in social-psychological principles, to focus on patients’ needs for autonomy, competence, and relatedness, offers a validated and comprehensive approach to promoting patients’ onus of responsibility for their own health care decisions (Ryan & Deci, 2008).

In exploring the effects of autonomy support on the smoking behaviors of 336 adult outpatients (63% female, 19% non-White), Williams, Gagné, Ryan, and Deci (2002) tested a model of SDT incorporating the hypotheses that an autonomy-supportive intervention style would promote perceived autonomy support, and that this would predict autonomously-regulated reasons for smoking cessation. Additionally, autonomous regulation was expected to predict perceived competence, and both autonomous regulation and perceived competence were expected to predict continuous abstinence at 6, 12, and 30 months. Perceived autonomy support was measured using the Health Care Climate Questionnaire (HCCQ; Williams, Grow, Freedman, Ryan, & Deci, 1996). Questions include such items as my provider listens to how I would like to do things and my provider conveys confidence in my ability to make change. The model was mainly supported, with the intervention significantly predicting ratings of autonomy support (robust parameter estimate \( rpe = .62, p < .001 \)), and autonomy support predicting autonomously-regulated reasons for not smoking \( rpe = .11, p < .05 \) and continuous abstinence \( rpe = .13, p < .001 \). However, autonomous regulation of smoking behaviors did not predict perceived competence, and perceived competence was
unrelated to outcome. This raises the question as to whether the relation of perceived competence to other SDT constructs is partially dependent on the complexity of the behavior in question.

The utility of SDT in activity related lifestyle behaviors has been supported in several studies. Silva et al. (2010) demonstrated the benefits of an autonomy-supportive intervention over a standard health education group in a controlled study of physical activity and weight loss. Participants were 239 overweight females, with both groups receiving an equivalent amount of face-to-face contact with treatment providers over a one-year intervention. At follow up, participants in the autonomy-supportive group reported significantly greater weight loss than those in the health education group (-7.29%), and higher levels of physical activity ($p < .001$). Large effect sizes of between 0.80 and .96, favoring the intervention group, were reported in autonomous regulation for treatment and exercise ($p < .001$). It appeared that the autonomy-supportive intervention promoted higher internalized reasons for exercise, and that these were related to higher subsequent weight loss. However, generalization of the study findings to other health problems is limited by the sample, namely a university-based female population, with no details given by the authors of racial or ethnic breakdown.

In a smaller, though similar controlled SDT study with 56 female university students, researchers examined leadership styles in exercise promotion, with autonomy support demonstrated to be significantly related to behavioral outcome (Edmunds et al., 2006). An independent samples $t$-test revealed significantly higher attendance in the autonomy-supportive intervention group over the regular exercise group, reflecting a medium effect size. In a separate study, these same authors reported a positive
relationship between satisfaction of the three psychological needs and self-reported exercise behavior in 369 participants (52% female, 88% Caucasian) recruited from a prescribed exercise program (Edmunds et al., 2008). A moderate correlation was observed between perceived autonomy support and autonomous regulation of exercise behaviors ($r = .36$), with a subsequent hierarchical multiple regression analysis showing that autonomy support from providers was a significant predictor of autonomous regulation for exercise, after controlling for demographic and psychological need satisfaction variables ($t = 2.30, p < .01$). A hypothesized mediating role in the relationship between perceived autonomy support and motivational regulations was also supported, with perceived autonomy support predicting the satisfaction of needs for autonomy ($\beta = .28, p < .01$), relatedness ($\beta = .46, p < .01$), and competence ($\beta = .28, p < .01$) via exercise.

Generalizing of the findings in this study to those with chronic medical problems, however, is restricted by the nature of the sample, with participants primarily young Caucasians (average age 31) many of whom were recruited at fitness and sports clubs in one area of the UK. In particular, the relationship of perceived autonomy support to relatedness and competence need satisfaction may depend not only on the health behavior in question but also on who initiated that behavior change. It would have increased the potential generalization of the findings if the researchers had reported the underlying reasons that prompted individuals to initiate and maintain exercise programs. It is possible that those who feel external pressure to exercise due to medical health problems may respond very differently to perceived autonomy support from those who perceive they have more control over that initial decision.
The utility of SDT in a population where perception of options may be minimal was examined in a study of 205 HIV positive patients (85% male, 55% Caucasian, 38% African American) regarding adherence to medication (Kennedy et al., 2004). Participants completed brief structured adherence interviews in addition to measures of perceived autonomy support and perceived competence, all specific to anti-retroviral therapy (ART). Kennedy and colleagues postulated that treatment self-regulation might be especially relevant in this population, contending that individuals who are HIV+ often choose not to disclose their status to others. With little external support for their health choices, it was postulated that autonomous regulation for demanding medical regimes would likely be strongly related to outcomes. Structural equation modeling supported the proposed SDT model of adherence, with perceived autonomy support predicting treatment self-regulation (standardized coefficient = .65, \(p < .01\)), and treatment self-regulation predicting perceived competence (standardized coefficient = .51, \(p < .01\)). In turn perceived competence predicted self-reported ART adherence (standardized coefficient = .24, \(p < .01\)). In contrasting this positive association of perceived competence to other SDT variables with results from the previously described smoking cessation study (Williams et al., 2002), it is possible that the complexities of HIV status and the side effects of ART treatment contribute to the significant relationship demonstrated between treatment self-regulation and perceived competence. This would further support the previous suggestion that the relationship of perceived competence to both autonomous regulation and outcome is situation dependent. While acknowledging a potential limitation, in that self-reported adherence over the previous three days might not represent overall levels of adherence, Kennedy and her colleagues did not consider the
likelihood of social desirability bias. It is possible that patients who felt greater allegiance to their providers were also more likely to report higher adherence to their treatment.

Williams, Rodin, Ryan, Grolnick, and Deci (1998) addressed the issue of whether the relation with one’s provider impacted long-term adherence to medications in a study of 123 outpatients (77% female), with various medical problems, including 23% of the total who were diagnosed with hypertension. No information was available regarding race or ethnicity of the sample. Beyond the use of the HCCQ to measure perception of autonomy support, a clinical psychologist conducted structured interviews with each patient, including questions regarding relationship with the patient’s health provider, health status, medication, regimen, and adherence. Participants also completed questionnaires regarding perceived health, perceived barriers to taking medications (based on the HBM), and health locus of control. To test whether treatment self-regulation mediated the relationship between perceived autonomy support and adherence to medications, two alternative models were proposed. The first model predicted a direct relationship between perceived autonomy support and adherence, which was supported (parameter estimate = .21, \( p < .05 \)). The alternative model specified that perceived autonomy support would predict both treatment self-regulation and adherence directly, and treatment self-regulation would predict adherence directly. In this second model, autonomy support did not directly predict adherence, after the influence of treatment self-regulation was accounted for, thus supporting the mediation hypothesis. A further direct association between treatment self-regulation and adherence was also reported (parameter
estimate = .78, \( p < .05 \), indicating that autonomous regulation was strongly related to taking medications as prescribed in this sample.

Although there are limitations in obtaining valid measures of medication adherence, these results were validated by the use of a composite measure of objective and subjective adherence, a more reliable indicator than the use of either method alone. The relationship between perceived autonomy support and adherence was mediated through autonomous regulation, with treatment self-regulation accounting for 68% of the variance in adherence. Generalization from this sample to other hypertensive populations is limited by the lack of indication of participants’ racial or ethnic background and the primarily female sample, in addition to the low percentage of participants with hypertension. However, overall, the results give weight to the SDT proposal that supportive healthcare environments promote autonomous regulation for extrinsically initiated health behaviors, and that increased autonomous regulation is in turn related to improved health outcomes. It is of interest for future research in this area that although perceived barriers to adherence correlated with adherence as anticipated, they were nonsignificant in a logistic regression model with treatment self-regulation, and further negatively correlated with autonomy support. While this cannot be interpreted as a causal relationship, it is possible that those who perceive autonomy support from their health care providers, and are more autonomously regulated for recommended health behaviors, may also perceive fewer barriers to adherence. This may be of particular relevance in populations dealing with higher than average environmental stressors shown to impact adherence, such as the sample in the current study.
It is noted that SDT research in the field of education, over the past two decades, has supported the proposition that autonomously regulated tasks are associated with greater task enjoyment (Oliver, Markland, Hardy, & Pletherick, 2008), higher subjective well-being (Ryan & Connell, 1989), and higher academic achievement (Miserandino, 1996). Taken together, the educational and health research in SDT supports the value of autonomous regulation of behaviors in relationship to improved outcomes, in both students in the classroom, and adult patients in healthcare settings.

**MI and SDT**

In suggesting a relationship between the principles underlying MI interventions and the constructs of SDT, Markland et al. (2005) argued that SDT offers a comprehensive rationale for understanding the efficacy of MI. These authors noted that both MI and SDT are based on the proposition that autonomous regulation of health behavior is promoted in autonomy-supportive environments, where there is an absence of any external coercion to change. Both MI and SDT define autonomy support by health providers as acknowledging and respecting the perspective of the individual, providing choices, and allowing the individual to make decisions regarding those choices. The innate need for competence, as proposed in SDT, is facilitated through the application of MI principles, offering information and advice only when requested, helping individuals set self-selected goals, and using nonjudgmental, positive feedback. The SDT innate need for relatedness is further suggested by Markland and colleagues as facilitated in MI by empathic and non-contingent support for individuals’ choices. These authors noted the similarity in MI and SDT in describing personal growth, in terms of movement towards a place of internal harmony between one’s behavior and one’s core values. In
discussing the clinical application of SDT to health problems, Sheldon, Williams, and Joiner (2003) examined the autonomy-supportive principles underlying MI, contending that “other research-supported treatments are not as uniquely compatible with self-determination theory as is motivational interviewing” (Sheldon et al., 2003, p. 141).

The applicability of MI, within the framework of SDT, has also been recently proposed in the context of treating suicidal ideations. Britton et al. (2008) contended that developing empirically testable strategies, to increase motivation for treatment, is critical for individuals with acute suicidal ideation. These authors commented that while case studies, where individuals expressed suicidal ideation, suggest the value of providers’ autonomy support in increasing motivation for treatment, and improving treatment outcomes, SDT further offers an empirically validated way of examining this relationship. As previously described, SDT constructs have been supported in relation to diabetic management which, as with hypertension, requires dietary and exercise modifications (Williams et al., 2006). Additionally, there is empirical support for the direct association between perceived autonomy support and improved adherence to medications across various chronic diseases including hypertension (Williams et al., 1998). However, at the current time, there are no reports of SDT being utilized in studies promoting lifestyle modifications in the management of hypertension. Motivational Interviewing has been validated in promoting lifestyle changes relevant to hypertension control (Burke et al., 2003), and has furthermore demonstrated specific cultural validity in promoting lifestyle changes in hypertensive African American populations (Befort et al., 2008; Resnicow et al., 2005). However, while the success of MI based interventions is postulated as working through the raising of autonomous regulation for health
behaviors, which in turn promotes those successful outcomes, the lack of a validated theoretical basis for these assumptions limits its utility, both in clinical and research settings. Self-Determination Theory thus provides the opportunity to increase our understanding of the psychological processes underlying the assumptions, and successes, of MI interventions.

Summary

The burden of hypertension on our society today is indisputable (Chobanian et al., 2003; Chockalingam et al., 2006; Fields et al., 2004). The literature reviewed in this chapter illustrates the increasing difficulties seen over the past four decades in managing a disease with few symptoms and complex treatment recommendations (Adler, 2006). Beyond the difficulties for both providers and patients caused by low medication adherence, research suggests that medication adherence alone is not directly associated with good health outcomes (Bramley et al., 2006). Lifestyle changes are now recognized as the main contributor to the health of the 70 million Americans with hypertension, of whom a disproportionately high number are African Americans (Bosworth et al., 2008; DiMatteo et al., 2002). Furthermore, African Americans are especially vulnerable to the long-term cardiovascular and renal problems that are associated with hypertension (Wong et al., 2007).

Successful long-term outcome from this disease is now accepted as being closely related to changes in contributory lifestyle factors, in particular reduction in dietary salt intake, increased daily exercises levels, and overall weight management (Cook et al., 2007; He et al., 2002). However, such lifestyle behavior changes have proved to be even more difficult to accomplish than adherence to medication regimes (Coleman et al.,
Research over the past two decades suggests that health providers have a vital role in promoting adherence to such changes, in ways that encourage patients to make choices that resonate with their own unique values and lifestyle choices (Molassiotis et al., 2007; Patterson & Forgatch, 1995; Stanton, 1987). Without such an approach, individuals may feel disempowered with the increased likelihood of resistance to providers’ recommendations (Aujoulat et al., 2007).

Research involving complex, tailored, behavioral interventions to promote lifestyle changes generally demonstrates some short-term benefits, but overall the effects of behavioral interventions appear to diminish over time, unless they are continually reinforced (Orleans, 2000). In over-stretched inner-city health centers, such as the setting for this study, such ongoing labor-intensive interventions are not a viable option. Instead, there is a need for culturally appropriate low cost interventions that encourage patients to take the onus of responsibility for their own health behaviors, without the need for ongoing behavioral reinforcement to maintain those health behaviors over time (Bellg, 2004).

Following well-established psychotherapeutic principles, medical research has demonstrated that individuals in both Caucasian and African American populations are less resistant to health recommendations when they feel listened to and cared for by their health providers (Hyre et al., 2007; Ravenell et al., 2006). Similarly, individuals are shown to be more willing to internalize responsibility for making informed health decisions when they perceive that their concerns are being acknowledged, and that they have freedom of choice, as opposed to being given directives regarding what they need to do (Catley et al., 2006; Miller & Rollnick, 2002).
Deci and Ryan’s Self Determination Theory (SDT; 1985, 2002) is a general theory of motivation that addresses these issues, and may be useful in designing effective interventions to assist clients to achieve lifestyle changes. In discussing its recent application to health behaviors, the authors of SDT proposed that autonomy-supportive health environments are prerequisite to satisfying persons’ innate needs for autonomy and competence, which in turn predict positive health changes that are likely to remain stable over time (Ryan, Patrick, Deci, & Williams, 2008). Self-Determination Theory has been tested in relation to several health problems that necessitate lifestyle changes, with support for the relationship between the constructs of perceived autonomy support and autonomous self-regulation, and the relationship of both these constructs to positive health outcomes (Edmunds et al., 2008; Kennedy et al., 2004; Williams et al., 2002). However, this same research suggests that the construct of perceived competence is less well supported, with the possibility that its value may be situationally dependent.

Although SDT has been used to examine the effect of perceived autonomy support on medication adherence in chronic diseases, including hypertension, and separately applied to recommended dietary and exercise modifications for diabetes, this theory has not yet been tested in the area of lifestyle changes with a hypertensive population.

In proposing that an autonomy-supportive health environment is fundamental to optimal health outcomes, SDT is in accordance with the increased emphasis on collaborative approaches to health care, where individuals are encouraged to take active roles in their own health care (Molassiotis et al., 2007; Vermeire & Hearnshaw, 2001). Motivational Interviewing is an intervention style that exemplifies this collaborative approach to health care (Miller, 1983; Miller & Rollnick, 1991, 2002). Based on well-
established principles of psychology, MI focuses on increasing individuals' perception of autonomy and choice in their healthcare decisions. Brief adaptations of MI are shown to be ideal in health settings such as the one in the current study, where short opportunistic interventions are both appropriate and necessary (Britt et al., 2004). Adaptations of MI have been validated as culturally appropriate across populations including low-income African Americans with hypertension, the primary group of interest in the current study (Woollard et al., 2003). However, much of this research has been atheoretical, and the psychological processes underlying MI remain unclear. Thus, empirical research is warranted to validate the assumption that MI based interventions result in qualitative changes in underlying motivation.

Utilizing SDT as a conceptual lens, in which to examine the processes underlying an autonomy-supportive intervention based in MI, affords the opportunity to test the assumption that MI increases autonomous regulation of health behaviors. The current intervention thus attempted to support the utility of MI within the framework of SDT. The specific goal of this research was to identify an empirically supported, culturally validated approach, that offered an effective option in addressing hypertension management, in an African American, hypertensive, Free Clinic population. It is hoped that results from this study are of value in adding to the general body of research utilizing SDT in the management of chronic diseases.

In conclusion, this study aimed to determine whether an intervention based in MI would promote greater autonomous regulation of hypertension-related lifestyle changes, and greater health changes, than would a standard educational intervention. The rationale for this project originated in the SDT literature supporting the theory’s relevance to
health-related behavior change. Figure 1 illustrates the conceptual framework for this research, the SDT constructs involved, and their related measures.

![Conceptual Framework Diagram](image)

**Figure 1** Self-Determination Theory (SDT) Constructs and Related Measures in Current Study.

**Hypotheses**

Based on a review of the relevant literature, the following hypotheses were proposed:

*Hypothesis 1: Perceived Autonomy Support*

Given that the MI literature assumes that MI interventions are autonomy-supportive, differences are expected between HCCQ scores (perceived autonomy...
support) of participants exposed to an MI intervention (MI) and HCCQ scores of participants in a standard educational intervention (SE).

H1a: Participants in the MI group report higher HCCQ scores than are reported by participants in the SE group.

*Hypothesis 2: Autonomous Motivation*

Given that the literature establishes that perceived autonomy-supportive environments promote autonomous regulation of recommended health behaviors, differences are expected between TSRQ scores (autonomous regulation) of participants exposed to an autonomy-supportive intervention and participants exposed to a standard educational intervention.

H2a: Participants in the MI group report higher TSRQ scores than are reported by participants in the SE group.

*Hypothesis 3: Perceived Competence*

Based on the SDT proposition that perceived autonomy-supportive environments predict perceived competence, differences are expected between PCS scores (perceived competence) of participants exposed to an autonomy-supportive intervention and those exposed to a standard education intervention.

H3a: Participants in the MI group report higher PCS scores than are reported by participants in the SE group.

*Hypothesis 4: Relationship between SDT Measures*

Given that the SDT literature generally supports the relationship between the autonomy-related measures of SDT, the following relationships are expected between these measures.
H4a: Scores on the HCCQ (perceived autonomy support) are positively related to scores on the TSRQ (autonomous regulation).

H4b: Scores on the HCCQ are positively related to scores on the PCS (perceived competence).

H4c: Scores on the PCS are positively related to scores on the TSRQ.

Hypothesis 5: Health Behavior Change
Given that the literature supports positive changes in health behaviors resulting from MI based interventions, differences are expected in reported levels of positive health behaviors between participants in the MI and the SE groups.

H5a: Participants in the MI group report more positive changes in health behaviors, namely sodium intake and exercise behaviors, than are reported by participants in the SE group.

Hypothesis 6: Autonomy Related Measures and Health Behavior Change
Given that the literature generally supports the relationship between SDT autonomy-related constructs and positive health behavior change, a relationship is expected between the following SDT constructs and self-reported health behavior.

H6a: Greater perceived autonomy support (as measured by the HCCQ) is related to more self-reported positive health changes in sodium intake and exercise participation.

H6b: Greater autonomous regulation of health behaviors (as measured by the TSRQ) is related to more self-reported positive health changes in sodium intake and exercise participation.

H6c: Greater perceived competence (as measured by the PCS) is related to more self-reported positive health changes in sodium intake and exercise participation.
Exploratory analyses will consider perceived competence (PCS) as a mediator of the relationship between perceived autonomy support (HCCQ) and autonomous regulation of health behaviors (TSRQ), as theory and research have suggested that this should be the case (Deci & Ryan, 2002; Williams et al., 2002; Edmunds et al., 2008). In addition, depression and social desirability will be considered as possible covariates impacting outcomes.
CHAPTER III

METHODOLOGY

Participants and Procedures

Participants were recruited from an inner-city low-income population attending their routine medical follow-up visit at a Midwest Free Clinic, following approval from the Institutional Review Board at The University of Akron, and the Director of the Free Clinic involved in the study. The Free Clinic sees patients without reference to insurance or ability to pay for services. The absence of literature exploring ways of improving treatment outcomes in this population was one reason for choosing this setting. The subpopulation of adult patients eligible to participate in this study included all African American patients diagnosed and treated for hypertension at the clinic for at least the preceding three months. This period ensured that patients newly diagnosed with hypertension were, at minimum, attending their first three-month follow-up visit subsequent to diagnosis, and thus had been given the opportunity to work on any recommended lifestyle changes, an essential foundation to the intervention. The other inclusion criterion was that potential participants had not previously worked with the
researcher on lifestyle issues related to the management of any chronic disease, including hypertension.

The target sample size for this study was 70 participants. To determine sample size, an a priori power analysis for two groups was conducted using GPower software (Faul, Erdfelder, Lang, & Buchner, 2007). The relatively small number of previous controlled studies in this area has demonstrated a range of medium to large effect sizes (e.g., Edmunds et al., 2008; Milne, Wallman, Gordon, & Courneya, 2008; Silva et al., 2010). To detect a significant finding for a one-tailed alpha at the 0.05 level with a large effect size (.80) and a power level of .95, a minimum of 35 participants was required in each of the two groups. Given that some attrition was expected between the two sessions of the intervention, sampling continued until the goal of 35 participants or more with completed second session, in each group, was attained.

Potential participants were identified at the start of each clinic from the charts of patients due for medical appointments on that day. All of those charts were taken from the records office on the evening prior to each clinic, and placed in a locked room that was accessible to all members of the on-duty medical team. This included the researcher, who was an established member of the medical team working under an RN license. A note was attached to the front of each identified chart, enabling front desk staff to inform the researcher when potential study participants signed in for their appointments.

The researcher approached each potential study participant once he or she was seated in the waiting area. It was explained that the researcher was conducting a study on how people manage their high blood pressure, and that, if they were interested in participating, this would involve meeting with the researcher in one of the clinic offices.
to answer questions related to their blood pressure care, with a follow-up interview two weeks later. It was also explained that, in consideration of patients’ wait time at the clinic, they would not need to return to the general waiting area but would be taken straight back into the medical clinic after the interview. Potential participants were informed that both interviews would be confidential and data obtained would not be available to any other health provider. They were also informed that, if they chose to participate, they would be offered a bus pass to facilitate follow-up, and compensated for their time at follow-up interview by a $20 grocery coupon. If a patient gave verbal consent to participate in the study, they then accompanied the researcher into one of the individual interview rooms in the medical clinic. See Figure 2 for Time 1 flow chart.
Once in the interview room, consent to participate in the study was provided in both written form and orally to each participant (Appendix A). Information included that participation was voluntary, that there would be no identifying information included on any of the questionnaires, and that the medical staff at the clinic would not have access to

Figure 2  Flow Chart of Study Sample Formation, Randomization and Intervention

*Time 1*

Once in the interview room, consent to participate in the study was provided in both written form and orally to each participant (Appendix A). Information included that participation was voluntary, that there would be no identifying information included on any of the questionnaires, and that the medical staff at the clinic would not have access to
completed research material. After giving written consent, participants were provided with a copy of the consent form with additional contact information in case they had any questions subsequent to the research intervention.

Once recruited into the study, each participant was assigned to either the motivational interviewing intervention group (MI) or to the standard education control group (SE), using a randomly generated number in a sealed envelope within an envelope containing a packet of questionnaires. Each envelope was identified only by an identification number (sequential from 1-100) with all questionnaires within each packet assigned that same number. All anonymous data, identifiable only by these numbers, was kept in a locked filing cabinet within a locked office at the data collection site. The researcher further documented each participant’s name and corresponding identification numbers in a file that was kept separate, in a locked research cabinet in a separate locked medical facility.

Individuals who consented to participate in the study were randomly assigned to the MI or the SE group, and interviewed by the researcher according to the protocol for that group. Both interventions were conducted by the researcher, whose primary role in that medical clinic setting was working with patients on recommended lifestyle changes for chronic disease. It is acknowledged that having only one researcher/interventionist limits the validity and replicability of the study. However, the researcher was the only clinic member trained in MI, using it on a regular basis in working with this population. Consideration of employing a separate member of the medical team to administer the SE intervention was not practical, due to understaffing of the clinic.
The purpose of the MI intervention was to provide an autonomy-supportive environment based on the four guiding principles of MI as applied to healthcare (Rollnick, Miller, & Butler, 2008). These included:

1. Resisting the temptation to persuade, thereby opening the way for exploration of ambivalence.

2. Understanding and demonstrating interest in patients’ motivations for change: listening to their concerns, ambivalences, and motivations. Encouraging exploration of ambivalence in a non-judgmental manner.

3. Supporting patients’ preferred level of autonomy and choices.

4. Empowering patients by affirming their freedom of choice concerning how they can positively influence their own health status. Promoting self-efficacy by encouraging patients to identify one or more specific steps that resonate with their own values and readiness. Demonstrating respect for those choices at the end of the exploration. Supporting patients’ hopes that improved health outcomes are possible.

See Appendix B for examples of questions and statements that were used to apply the guiding principles of MI. These statements provided the underlying structure and guidance in standardizing the intervention to the greatest extent possible.

The SE intervention served as the control for the MI intervention. Following the standard practice of the Free Clinic where the study took place, the researcher offered educational material specifically designed to meet the needs of patients with hypertension in this setting. Over the 12 months prior to the start of the current study, this material had been given to patients routinely when they were diagnosed with hypertension, or when
providers were discussing ongoing lifestyle changes, and included clear and simple instructions regarding the restriction of dietary salt and the value of increasing daily activity levels. The researcher first enquired whether the participant already had a copy of the clinic’s hypertension package to help manage his or her high blood pressure. The researcher then stated that she would like to go through this same information with the participant, to ensure that everything was clear. Participants were informed that if they had any questions about the reading material they should feel free to ask them at any time. The researcher summarized the material on each page of the material, focusing on the relevant pages that referred to sodium restriction and increased activity, and emphasizing that these were the most important things for the participant to work on at that time. All participants in the SE group were offered copies of the hypertension material to take home after the initial interview. In the MI group, however, this same material was placed on a desk in the interview room, and was given to participants only if they requested the information.

After completion of either intervention, each participant was given a 14-day follow-up date to complete questionnaires, with a window of between 13 and 18 days as necessary to accommodate individual schedules. All participants gave the researcher a contact telephone number for a reminder call, and were given contact information where they could leave a message for the researcher if they needed to change their appointment. They were then taken for routine weight and blood pressure measurements, prior to being taken into an examination room for their regular medical appointment.
Time 2

The researcher gave a reminder phone call to every study participant the day before their follow-up appointment. At that time, each participant was also reminded to bring reading glasses if required, to facilitate completing the questionnaires.

Participants were met in the waiting area by the researcher, thanked for returning for the research follow-up, and taken into the interview room. It was explained that this meeting would consist of answering some questions related to their previous meeting with this researcher, and to their blood pressure management. The researcher explained that there were nine questionnaires, briefly going through each one and emphasizing the instructions at the top of each page. Each participant was then asked if they preferred to have the questionnaires read to them or to read the questionnaires for themselves. The clinical instruments were then presented in the following order. Specifically, the Health Care Climate Questionnaire (HCCQ; Williams et al., 1996) was presented first, with specific reference to participants’ perception of autonomy support by the researcher regarding their hypertension management. This was followed by two health behavior questionnaires related to current sodium intake and daily activity levels. The health questionnaires were followed by two SDT measures, namely the Treatment Self-Regulation Questionnaire (TSRQ; Williams et al., 1996) and the Perceived Competence Scale (PCS; Williams & Deci, 1996). The Patient Health Questionnaire (PHQ-8; Spitzer, Kroenke, & Williams, 1999) was then presented. To address the concern of social desirability bias in self-report measures, a short form of the Marlowe-Crowne Social Desirability Scale (MCSDS; Strahan & Gerbasi, 1972) was then presented, followed finally by a brief demographics questionnaire.
After the questionnaires were completed, each participant was debriefed with regard to the purpose of the study, thanked for their participation, and received reimbursement for their time and participation in the form of a $20 grocery coupon. Participants were given additional contact information for making an appointment with a nurse at the clinic, regarding any subsequent questions regarding their blood pressure care.

Measures

The following section describes all measures administered to all participants in both the MI and the SE groups.

_Treatment Self-Regulation Questionnaire (TSRQ; Williams et al., 1996)._ Items for the adapted TSRQ items are presented in Appendices C and D. The Treatment Self-Regulation Questionnaire consists of several subscales designed to assess the degree to which a person’s motivation for a specific behavior is relatively extrinsically or autonomously regulated. Based in cognitive evaluation theory (CET; Deci, 1975), the TSRQ was first developed as a general measure of “Perceived Locus of Causality” (Ryan & Connell, 1989) which refers to whether the individual perceives the source of initiation and/or regulation of a behavior as within or extrinsic to oneself. The TSRQ measures controlled and autonomous regulation on a continuum from amotivation (least self-determined) through external, introjected, identified, and integrated, to intrinsic regulation (most self-determined), with qualitative differences in regulation found to be related to different health outcomes.

The TSRQ was initially validated in a study with 128 outpatients (73% female), to assess their reasons for enrolling in and following the guidelines of a prescribed weight
loss program (Williams et al., 1996). The average age of participants was 44 years (range 20 to 77 years), with no details about the racial or ethnic breakdown for the sample given in the study. The nine-item TSRQ was completed at baseline, six, and 23 months into the program. Additionally, at baseline, participants also completed the Health Locus of Control measure (Wallston, Wallston, & DeVillis, 1978) which assesses one’s beliefs about the relationship of internal versus external control to outcomes. Principal components analysis of the TSRQ indicated two clear components, Controlled Reasons, and Autonomous Reasons, with all item loadings greater than .50 on their primary component, and no items demonstrating cross loading of more than .24. Cronbach’s alphas were computed as a measure of internal consistency, with values of .79 for the Controlled Reasons and .58 for the Autonomous Reasons component at Time 2. Autonomy orientation was significantly related to behavioral outcome (attendance, exercise follow-up, and follow-up changes in body mass index). Discriminant validity of the TSRQ was supported, in that three subscales of the Health Locus of Control measure, including the internal subscale, failed to relate significantly to any of those same dependent variables.

In a study involving lifestyle factors similar to those in hypertension, Williams, Freedman et al. (1998) adapted the TSRQ, using eight items to examine autonomous and controlled regulations of recommended health behaviors (following a diet and exercise plan) in 149 diabetic patients (56% female). The sample was 86% Caucasian, with an average age of 54 years, with all participants completing data at three points of time over a period of one year. Cronbach alphas ranged from .81 to .85 on the autonomous subscale, and from .80 to .86 on the controlled subscale. More recently, Levesque et al.
(2007) examined the factor structure of the TSRQ across three different behaviors, namely tobacco, diet, and exercise. Data were obtained from participants across four different university sites ($N = 2731$), of which three samples were primarily Caucasian, and one was African American. A series of exploratory factor analyses with oblimin rotation supported a four-factor structure in a 15-item measure across all samples, with integration and identification forming one factor, the autonomous motivation factor. The other three factors consisted of introjections, external motivation, and amotivation. Internal consistency for all but amotivation was acceptable, with 0.85 to 0.93 for autonomous motivation and from 0.73 to 0.9 for external motivation. Confirmatory factor analysis (CFA) was conducted in each sample to confirm the factorial structure of the TSRQ individually, with factor loadings all found to be significant across samples.

Specific evidence of validity of the measure with an African American sample was demonstrated in that the only university site providing TSRQ data for an African American sample reported CFA and incremental fit indexes (IFI) that confirmed the hypothesized four-factor structure of the TSRQ. Further, there were equivalent fit indices across diet and physical activity ($\chi^2 [179, n = 909] = 1017.29, P < 0.05; \text{CFA and IFI = 0.97}$).

Most versions of the TSRQ used today include only two subscales, with one subscale incorporating all aspects of external or controlled regulation, and the other subscale incorporating all aspects of internalized or autonomous regulation. Behaviors that are primarily externally reinforced, performed to obtain a reward or to avoid negative consequences are considered controlled, while externally initiated health behaviors, that become valued and positively endorsed by the individual, are considered autonomously
regulated. There are various versions of the TSRQ dependent on the behavior that is being addressed, but in all versions, responses to each item are made on a seven-point Likert type scale ranging from *not at all true* to *very true*. Scores on each of the two subscales are averaged, so that participants have a score for each style that reflects levels of controlled and autonomous regulation for the target behavior.

The TSRQ is designed so that wording can be adapted to relate to a specific health problem. For the present study, the TSRQ was based on the 19-item version of the TSRQ, validated for the management of diabetes (Williams, Freedman et al., 1998), which examined autonomous and controlled regulation for taking diabetic medications, following a diabetic diet, and for exercising regularly. There are two stems in this 19-item measure, the first stem related to reasons for taking medications, and the second stem related to reasons for following a diabetic diet and exercising regularly. With permission from one of the authors (E. L. Deci, personal communication, June 17, 2010), the wording on the TSRQ subscale stem *I take my medications for diabetes*... was replaced in the current study with *I take my medications for high blood pressure*... followed by eight reasons of which five are controlled and three are autonomous. Similarly, the wording was adapted, for the eight reasons following that subscale stem, to reflect the current study’s focus on hypertension. An example of an autonomous reason for taking medications *I personally believe that controlling my diabetes will improve my health* was altered to *I personally believe that controlling my high blood pressure will improve my health*. However, some of the items were more general and did not need adaptation. For example, a controlled regulation reason for
taking diabetic medications *I want my health provider to think I’m a good patient* needed no adaptation in the current study.

For the current study, one of the two authors of SDT, contacted by the current researcher, suggested that wording on the second stem and items referring to “diet” could simply be replaced with “salt or sodium reduction” to reflect the specific dietary issue relevant to hypertension control (E. L. Deci, personal communication, June 17, 2010). Thus the wording on the second subscale stem *The reason I would follow my diet and exercise regularly* was replaced in the current study with *the reason I would reduce my salt intake and exercise regularly* followed by 11 reasons of which six are controlled and five are autonomous.

**Perceived Competence Scale (PCS; Williams & Deci, 1996).** Items for the adapted PCS items are presented in Appendix E. The Perceived Competence Scale is a questionnaire designed to assess the SDT competence construct, purported to mediate the relationship between the impact of situational factors on motivation. Items on the questionnaire are face valid, and written to be specific to the relevant behavior or domain being studied. All questions are answered on a seven-point Likert-type scale that concerns the degree to which participants feel confident about their ability to start or maintain a particular health behavior change.

The PCS originated in the five-item Interviewing Competence Scale, a measure developed to assess medical students’ self-assessment of their interviewing skills (Williams & Deci, 1996). Based on this scale, Williams and colleagues (1998) developed the four-item Perceived Competence Scale to assess patients’ perception of their skills in self-management of their diabetes, with measurements at three times over a period of one
year. Alpha measures of internal consistency for the perceived competence items were .85, .87, and .84 at baseline, four months, and 12 months respectively. In a more recent examination of the PCS, with a sample of 1006 adults (82% Caucasian) in a smokers’ health program, the four-item PCS was used to assess the degree to which participants believed they would be able to successfully stop smoking. The items demonstrated good internal consistency with alphas of .91 at baseline, and .93 at one-month follow up (Williams et al., 2006). The four items were used separately in the SEM analyses, at each time point, as indicators of the latent variable for perceived competence. Each of the indicators loaded significantly on its respective latent variable (βs = .87, .87, .82, and .89 at baseline, and .91, .90, .86, and .94 at one-month follow up).

Validity data on the PCS is limited, with no reported studies to support its cross-cultural validity. Furthermore, while SDT studies using SEM support the relationship of perceived competence to other SDT measures related to outcome (e.g., Kennedy et al., 2008; Williams et al., 2002), the ability of the PCS to predict behavioral outcomes, independent of autonomy, has varied across studies (e.g., Kennedy et al., 2004; Milne et al., 2008; Williams et al., 2006). This suggests it is a weaker factor than is perceived autonomy, in its relation to long-term health changes (Sheldon et al., 2003).

The PCS is designed so that wording can be adapted to relate to a specific health problem. For the present study, the PCS was adapted to reflect participants’ confidence in their ability to make lifestyle changes related to controlling their high blood pressure. For example, the PCS item *I feel able to meet the challenge of controlling my diabetes* from the study of diabetic management (Williams, Freedman et al., 1998) was changed to *I feel able to meet the challenge of controlling my high blood pressure.*
*Health Care Climate Questionnaire (HCCQ; Williams et al., 1996).* Items for the modified HCCQ are presented in Appendix F. The HCCQ is one of four climate questionnaires developed to assess individuals’ perception of autonomy-supportive environments. All questionnaires support the central tenet of SDT that the quality of a social context influences motivation and performance of individuals who operate within that environment. The HCCQ evolved from similar questionnaires in non-healthcare environments (Deci, Connell & Ryan, 1989). It was developed to assess participants’ perception of the degree to which they experience a health care provider (or providers) to be autonomy supportive versus controlling, in respect to general or specific health care issues.

In a study described earlier with 128 outpatients (73% female) in a prescribed weight loss program, a principal components analysis of the 15-item measure yielded a single component solution measuring perceived autonomy support. Cronbach’s alpha of .96 supported internal consistency of the measure (Williams et al., 1996).

In modifying the HCCQ to address specific health issues, the authors of the HCCQ selected five items that they judged to be most representative of the concept of autonomy support (Williams, Rodin, et al., 1998). Using data from 1,183 outpatients with chronic health problems (56% female, 86% White) who had previously completed the full questionnaire in various health studies, factor analysis of these five items yielded a one-factor solution with factor loading greater than 0.74. Cronbach’s alpha for the five items was 0.84, with a correlation of 0.95 between the five selected and the original 15 items, indicating that the modified scale was an adequate version of the longer scale. The HCCQ has been adapted to address specific health issues, with variants to the
questionnaire depending on the issue to be addressed. The version used in the current study contained six of the 15 items from the original measure, designated by the authors as the six items from the original 15 that are most appropriate for use with specific medical concerns such as hypertension. The authors have given no explanation of the additional item beyond the five originally selected. Sample items from this questionnaire include *My provider tries to understand how I see things before suggesting a new way to do things* and *My provider listens to how I would like to do things*. Participants respond to each item on a seven-point scale ranging from one (*I strongly disagree*) to seven (*I strongly agree*). Scores on the modified form range from 6 to 42, with higher scores indicating a greater level of perceived autonomy support.

It is acknowledged as a limitation in the current study that there has been no cultural validation for the HCCQ with African American samples, and prior analysis of the measure has been based on primarily Caucasian, middle income samples. In that the HCCQ, as used in this study, reflected participants’ perception of autonomy support by the interventionist, the measure served to some extent as a manipulation check, with the expectation that average HCCQ scores would be higher in the MI group than in the SE control group.

*Patient Health Questionnaire (PHQ; Spitzer, Kroenke, & Williams, 1999).* Items for the PHQ-8 are presented in Appendix J. In relation to chronic disease management, depression in particular is shown to be a risk factor for non-compliance with medical recommendations (e.g., Bane et al., 2006; DiMatteo et al., 2000). For this reason, depression was examined as a possible covariate that might impact outcome.
The Primary Care Evaluation of Mental Disorders (PRIME-MD) was a screening instrument developed and validated in the early 1990s to diagnose common mental disorders in primary care (Spitzer et al., 1994). A self-administered version of the PRIME-MD diagnostic instrument known as the Patient Health Questionnaire (PHQ) was subsequently developed as a brief diagnostic and severity measure to assess those same mental health diagnoses (Spitzer et al., 1999). The PHQ-9 is the nine-item depression module of the Patient Health Questionnaire, and is based on the nine diagnostic criteria for major depressive disorder in the Diagnostic and Statistical Manual Fourth Edition (DSM-IV; American Psychiatric Association, 1994). The PHQ-9 demonstrates evidence of both reliability and validity across a variety of medical conditions.

The initial PHQ validation sample of 3,000 patients in primary care clinics (Spitzer et al., 1999) included 25% with hypertension (66% women, 79% White, 13% African American). In this sample, internal reliability estimates for the PHQ-9 were .89. Construct validity as a measure of depression severity was assessed by examining functional status through a variety of methods including the Short-Form General Health Survey (SF-20; Stewart, Hays, & Ware, 1988), self-reported sick days and clinic visits, and symptom-related difficulties. Additionally, in 580 of the total sample, criterion and diagnostic validity was assessed within 48 hours of completing the PHQ-9, by comparing PHQ responses with results of phone interviews by mental health professionals (MHP), blinded to the responses on the PHQ-9. Test-retest reliability was found to be .84, with those 580 participants shown to be similar in terms of demographic profile, functional status, and frequency of psychiatric diagnosis to those who were not re-interviewed. Patients diagnosed by their MHP with a diagnosis of major depression (41 of 580) were
six times more likely to have a PHQ-9 score of nine or greater, and 13.6 times more likely to have a score of 15 or greater, supporting criterion validity of the PHQ-9. The prevalence of PHQ and MHP diagnoses of major depression were found to be nearly identical, supporting diagnostic validity of the measure.

Convergent validity of the PHQ-9 was demonstrated by a strong association between increasing PHQ-9 depression severity scores and worsening function on the SF-20 with increasing PHQ-9 scores correlated with scales shown to be most strongly related to depression (mean correlation 0.73), and lower correlation with SF-20 items related to physical problems such as pain (mean correlation 0.33). Criterion and diagnostic validity was assessed by comparing results of interviews of 580 of the full sample within 48 hours of completing the PHQ, by an independent MHP blinded to the results of the PHQ-9.

The use of the PHQ-9 has also been cross-culturally supported. Huang, Chung, Kroenke, Delucchi, and Spitzer (2006) performed a principal components analysis to derive the structure of the PHQ-9 in each of four racial ethnic groups, including non-Hispanic White (n = 2,520), African American (n = 598), Chinese American (n = 941), and Latino (n = 974) patients. One main component including all PHQ-9 items was found in each group, supporting a unitary concept of depression based on the DSM-IV criteria, with α coefficients ranging from 0.79 to 0.89. Endorsement rates of individual items were also found to be generally similar across the four racial/ethnic groups.

In the current study, the PHQ-8, an alternative form of the PHQ-9 was utilized (Kroenke & Spitzer, 2002). The PHQ-8 omits the DSM-IV question that assesses suicidal or self-injurious thoughts, and was adapted for use in clinical research situations where depression is being assessed as a secondary outcome, in studies of unrelated
medical conditions. Data from the original PHQ validation sample was analyzed to
determine the comparable predictive ability of the two instruments. Results demonstrated
that both instruments similarly predicted each of four levels of depression severity.
Kroenke et al. (2009) used the PHQ-8 to assess depression levels in a US population-
based survey, reporting the prevalence of depression (scores of ten or higher) in about 9%
of the population. Item responses on both the PHQ-9 and PHQ-8 are designed to assess
the frequency of symptoms over the previous two weeks, using a four-point Likert type
scale ranging from 0 (never experiencing that symptom) to +3 (experiencing the
symptom nearly every day). Thus, as an index of depressive symptom severity, PHQ-8
individual item scores range from 0 to 4, with the scores of items summed to produce a
total score of between 0 and 24. A total score of 5 to 9 represents mild depressive
symptoms, 10 to 14 moderate symptoms, 15 to 19 moderately severe symptoms, and a
score of 20 to 24 represents severe symptoms of depression. An additional item If you
checked off any problems, how difficult have those problems made it for you to do your
work, take care of things at home, or get along with people represents the patient’s global
impression of symptom-related impairment and health-related quality of life, but is not
used in calculating a depression score.

Sodium Intake and Exercise Behaviors. Participants were asked to complete two brief
behavior questionnaires related to their sodium intake and their exercise levels. These
items are presented in Appendices G and H. The health behavior questionnaires contain
questions assessing stages of self-perceived readiness to engage in health-related actions
that are based on the Transtheoretical Model of Change (TTM; Prochaska & DiClemente,
1983). The stages represented in the current study include contemplation (thinking about
engaging in the health action), preparing for action (planning to engage in the action within a month), and action (behavior change within the previous month). These questions were modeled on questionnaires used by other researchers in studies of health related behaviors (e.g., Marcus, Rossi, Selby, Niaura, & Abrams, 1992). Thus, no reliability or validity data were available for the current measures.

Marlowe-Crowne Social Desirability Scale- Short Form (M-C Form 2; Strahan & Gerbasi, 1972). The items for the M-C Form 2 are presented in Appendix K. The Social Desirability Scale (SDS) has been the most extensively used social desirability bias instrument in research since its introduction over 50 years ago. The authors of the original 33-item Marlowe-Crowne Social Desirability Scale (M-C SDS; Crowne & Marlowe, 1960) developed the scale specifically to control for the impact of socially desirable response bias in research, conceptualizing the bias as representing a habitual response style that is aroused in situations of self-evaluation. The measure consisted of 33 true-false items, extracted from questions in personality inventories that denote exemplary behaviors that have a low incidence of occurrence. Higher scores indicate stronger motivation to create a good impression and gain approval from others.

Practical difficulties with the length of the scale have resulted in the development of several short forms of the M-C SDS, including the M-C 2 (Strahan & Gerbasi, 1972) one of the most commonly used short forms of the original measure. For the development of the M-C 2 Strahan and Gerbasi gave the 33-item M-C SDS to a sample of 361 students across three university sites in the US and one mixed sample of both university and non-university males in the United Kingdom. A principal components analysis was performed on the 33 items, with the first component found to account for
13% of the total variance (more than double the second largest component). All 33 items loaded in the appropriate direction on the first principal component which became the basis of item selection for two relatively parallel 10-item social desirability measures [(M-C 1 and M-C 2, and a combined 20-item measure (M-C (20).]

Reliability estimates for the M-C 2 [Kuder-Richardson formula 20 (K-R 20)] ranged from .49 for a women’s college sample of liberal arts students, to .75 for a female sample from a private university. This compared with K-R 20 reliability coefficients of from .73 to .83 across samples with the M-C 20, and from .73 to .87 across all samples with the M-C SDS. Validity support for the two 10-item scales consists of correlations between the two short forms and the original MCSDS, reported by the authors as being “in the .80s or .90s” and correlations between the M-C (20) and the original 33-item M-C SDS as being “in the 90s” (Strahan & Gerbasi, 1972, p. 192).

Reynolds (1982) examined and compared the psychometric properties of the 33-item M-C SDS with several short forms of the M-C SDS including the M-C 2. Results of a principal factor analysis supported Strahan and Gerbasi’s (1972) findings, with a single significant factor accounting for 15.9% of the total variance. The reliability coefficient (K-R 20) for the M-C 2 was .66, and it compared with .79 for the M-C 20 and .82 for the 33-item M-C SDS.

Paulhus (1984) conducted a factor analysis of several commonly used desirability scales including the M-C SDS, reporting two major factors that he termed Self-Deception and Impression Management. Comparing scores on desirability scales between public and anonymous conditions in a sample of 100 undergraduates, results demonstrated that the greatest increase in scores from anonymous to public conditions was in scales such as
the M-C SDS (13.25 to 15.51 \( t = 2.35, p < .05 \)) that loaded highest on the Impression Management factor.

One concern in measuring social desirability responding is that cultural norms may impact these responses. Rosenfeld, Booth-Kewley, Edwards, and Alderton (1994) addressed this possibility in examining differences in social desirability responding in a sample of 391 male Navy recruits (285 White, 71 Hispanic (39 Mexican and 32 non-Mexican), and 35 Black). While there were no significant differences between the scores of Black and White participants, Mexican Hispanics scored significantly higher than non-Mexican Hispanics \( M = 21.32 \) versus 18.26 on the M-C SDS, \( F(1,68) = 4.14, p < .05 \). This raises concerns that M-C 2 items may be subject to different types of cultural norms within the heterogeneous African American sample in the current study. However, despite this limitation, reliance on self-reported data, such as in the current study, necessitated an attempt to account for social desirability responding.

Demographic Data. Participants were also asked to complete a brief demographic questionnaire. These items are presented in Appendix L. Racial identification as African American, a criterion for participation in this study, was recorded from each patient’s self-reported demographic form on the front page of their medical charts. Information regarding age and gender was also obtained from this same demographic form in the medical charts. Measurements of height, weight, and body mass index were recorded from routine measures taken at all patients’ medical visits.

Individual Session Data Record. The individual session data record is presented in Appendix M. In an attempt to minimize the limitations of having only one researcher working with participants in both groups, data from individual sessions was recorded
immediately after each intervention to help capture how the experiences differed between the groups. The session record for participants in the intervention (MI) group afforded the opportunity for the researcher to check off intervention questions and statements that were addressed and to summarize participants’ questions, responses, and comments (Appendix B). On the session records of participants in the control (SE) group, the researcher also summarized any questions or comments made by participants, immediately following the intervention.

Statistical Analyses

The following section provides the specific hypotheses, and the statistical analyses used in this study. Hypotheses 1, 2, 3, and 5 were designed to examine any differences between the two intervention groups on the SDT measures of perceived autonomy support, perceived competence, and autonomous regulation, and any differences between groups on measures of health behaviors. Hypotheses 4 and 5 were designed to examine the relations between the constructs of SDT, and between each of those constructs with the two health behaviors focused on in this study.

*Hypothesis 1: Perception of Autonomy Support*

H1a suggested higher perception of autonomy support for MI participants than participants in the SE group. An independent samples t-test was used to test this hypothesis. A statistically significant t-value, with a mean value for the MI group larger than that for the SE group, would support the hypothesis.

*Hypothesis 2: Autonomous Regulation*

H2a suggested more autonomous regulation of health behaviors for participants in the MI group than participants in the SE group. An independent samples t-test was used
to test this hypothesis. A statistically significant $t$-value, with a mean value for the MI group larger than that for the SE group, would support the hypothesis.

**Hypothesis 3: Perceived Competence**

H3a suggested more perceived competence for managing hypertension for participants in the MI group than participants in the SE group. An independent samples $t$-tests was used to test this hypothesis. A statistically significant $t$-value, with a mean values for the MI group larger than that for the SE group, would support the hypothesis.

**Hypothesis 4: Relationship between SDT Measures**

H4a, H4b, and H4c suggested positive relationships between the SDT measures of perceived autonomy support (HCCQ), perceived competence (PCS) and autonomous regulation (TSRQ). Spearman’s Rho correlations were used to test these hypotheses. Correlations significant at the .05 level (1-tailed tests) would support the hypothesis.

**Hypothesis 5: Health Behaviors**

H5a suggested greater frequencies of positive health behaviors for participants in the MI group than participants in the SE group. Independent samples $t$-tests for self-reported medication adherence, and diet/exercise behavior were used to test this hypothesis. Statistically significant $t$-values, with mean values for the MI group larger than those for the SE group, would support the hypothesis.

**Hypothesis 6: SDT Measures and Health Behaviors**

H6a, H6b, and H6c suggested positive relationships between SDT measures and reported health behavior changes. To test these hypotheses, Spearman’s Rho correlations of behavior scores with SDT variable scores were conducted. Correlations significant at the .05 level (1-tailed tests) would support the hypothesis.
Additional exploratory analyses were considered, including mediation analysis using regression procedures, suggested by Baron and Kenny (1986), to examine whether perceived competence mediated the relationships demonstrated between other SDT variables. Additionally, exploratory analysis was performed to examine any moderating effect of depression on the relationship between the SDT variables.
CHAPTER IV

RESULTS

This chapter presents the results of the study. First, demographic data for the research sample are provided. Then psychometric properties of the measures are described. This is followed by a review of the descriptive statistics for the variables of interest and a description of the relations among these variables. Results of the tests of hypotheses are then summarized. Finally, findings of exploratory analyses are presented.

Demographic Data

The demographic data for all study recruits are summarized in Table 1. There were no significant differences between the two groups (MI and SE) on age, BMI, and blood pressure. Of the 122 patients invited to participate (60% female), 78 completed the study (68% female), including 40 in the MI group and 38 in the SE group. Fifteen participants failed to return at Time 2, and 29 declined to enter the study. Of those 29 individuals (55% female), the average age was 51 years for the women and 54 for the men. The primary reasons given for declining included transportation difficulties, inflexible work schedules, and full-time care responsibilities for family members (41%), or more general statements implying that they were not interested in participating (38%).
### Table 1 Demographic Characteristics of all Study Recruits \((N = 78)\)

<table>
<thead>
<tr>
<th></th>
<th>Motivational Interview</th>
<th>Standard Education</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>52.20  40  7.08</td>
<td>54.11  38  8.38</td>
<td>53.13  78  7.75</td>
</tr>
<tr>
<td>BMI</td>
<td>32.45  40  6.22</td>
<td>32.07  38  6.01</td>
<td>32.26  78  6.10</td>
</tr>
<tr>
<td>BP systolic</td>
<td>130.55  40  20.64</td>
<td>129.84  38  16.28</td>
<td>130.21  78  18.53</td>
</tr>
<tr>
<td>Bp diastolic</td>
<td>83.00  40  13.97</td>
<td>82.21  38  13.74</td>
<td>82.62  78  13.78</td>
</tr>
<tr>
<td><strong>Non-returners</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>53.50  4  4.93</td>
<td>51.50  11  9.92</td>
<td>52  15  8.74</td>
</tr>
<tr>
<td>BMI</td>
<td>33.00  4  8.1</td>
<td>37.55  11  8.29</td>
<td>36  15  8</td>
</tr>
<tr>
<td>BP systolic</td>
<td>138.50  4  31.00</td>
<td>136.18  11  17.46</td>
<td>136.8  15  20.61</td>
</tr>
<tr>
<td>Bp diastolic</td>
<td>89.00  4  20.75</td>
<td>84.18  11  14.52</td>
<td>85.5  15  15.74</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>27  67.5%</td>
<td>26  68.4%</td>
<td>53  67.9%</td>
</tr>
<tr>
<td>Male</td>
<td>13  32.5%</td>
<td>12  31.6%</td>
<td>25  32.1%</td>
</tr>
<tr>
<td><strong>Time since diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>2  5.0%</td>
<td>2  5.3%</td>
<td>4  5.1%</td>
</tr>
<tr>
<td>1-2 years</td>
<td>7  17.5%</td>
<td>8  21.1%</td>
<td>15  19.2%</td>
</tr>
<tr>
<td>&gt;2 years</td>
<td>31  77.5%</td>
<td>28  73.7%</td>
<td>59  75.6%</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>19  47.5%</td>
<td>21  55.3%</td>
<td>40  51.3%</td>
</tr>
<tr>
<td>Part time</td>
<td>6  15.0%</td>
<td>10  26.3%</td>
<td>16  20.5%</td>
</tr>
<tr>
<td>Full time</td>
<td>14  35.0%</td>
<td>7  18.4%</td>
<td>21  26.9%</td>
</tr>
<tr>
<td>Retired</td>
<td>1  2.5%</td>
<td>0  0.0%</td>
<td>1  1.3%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12th Grade</td>
<td>1  2.5%</td>
<td>2  5.3%</td>
<td>3  3.8%</td>
</tr>
<tr>
<td>GED</td>
<td>5  12.5%</td>
<td>7  18.4%</td>
<td>12  15.4%</td>
</tr>
<tr>
<td>HSD</td>
<td>10  25.0%</td>
<td>8  21.1%</td>
<td>18  23.1%</td>
</tr>
<tr>
<td>Some college</td>
<td>16  40.0%</td>
<td>17  44.7%</td>
<td>33  42.3%</td>
</tr>
<tr>
<td>BA</td>
<td>6  15.0%</td>
<td>3  7.9%</td>
<td>9  11.5%</td>
</tr>
<tr>
<td>Higher degree</td>
<td>2  5.0%</td>
<td>1  2.6%</td>
<td>3  3.8%</td>
</tr>
<tr>
<td><strong>Diabetic Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>8  20.0%</td>
<td>10  26.3%</td>
<td>18  23.1%</td>
</tr>
<tr>
<td>Pre-diabetic</td>
<td>20  50.0%</td>
<td>12  31.6%</td>
<td>32  41.0%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>12  30.0%</td>
<td>16  42.1%</td>
<td>28  35.9%</td>
</tr>
</tbody>
</table>
Available demographic data for the 15 participants (41% female) who did not follow up are summarized in Table I. One attempt was made to contact each of these participants, with a phone message left offering them the opportunity to contact the researcher if they would like to complete the research within the permitted 18-day window of the study. Six of the 15 participants who did not return (40%) had not received phone reminders for their follow-up appointments, since the telephone numbers given to the researcher were found to be out of service. This compared with eight of the 78 participants (10.3%) who could not be contacted, but still returned to complete the study. Five participants who did not complete had left phone messages to postpone scheduled appointments due to work commitments, but none followed up after a phone message left by the researcher offered them this opportunity. On a reminder call to one participant (female, MI group), the researcher was informed by a family member that the participant had died from causes related to her heart disease.

Preliminary Analysis

One person’s data were eliminated prior to any analysis, due to the initial interview not meeting the study protocol. Session notes (written by the researcher immediately following each interview and follow-up) recorded the fact that the participant (female) had agreed to participate, but had left after only six minutes into the interview, following a phone call which she stated was “bad news about a family member.” It was noted that the participant had appeared distracted, and then asked to take the remaining literature home to read in her own time, rather than having the researcher go through the material. Although this participant returned to complete
questionnaires at Time 2, the overall deviation from the SE protocol resulted in the decision to eliminate this data set from the study analyses.

**Preliminary Scanning Procedures**

To lessen the likelihood of missing data, the researcher visually scanned all completed questionnaires prior to each participant leaving the interview room, referring participants to any questionnaires that had errors, and giving participants the opportunity to review their answers. This brief scanning also enabled the researcher to check the depression inventory of all participants and follow up at that time if the score suggested more than a mild depression (total score greater than 9). The PHQ-8 scores of 14 participants (18% of the total) fell into the moderately severe or severe range of depression symptoms, and these individuals were further evaluated for active suicidal risk. Any participants who reported no current treatment for their depression was offered the opportunity for follow-up in the Behavioral Medicine Department of the Clinic if they would like help managing the symptoms they had described. Although no participants were evaluated as actively suicidal, one participant who scored in the range of major depression was further followed up by the researcher after one week.

**Missing Data Values**

The 77 data sets were first screened for missing data values. According to Schlomer, Bauman and Card (2010), using best practices techniques to deal with missing data includes reporting the percentage and any patterns of missing data, the methods used for both detecting and handling any missing data, and a rationale for the method chosen. Consideration of why the data are missing should also be addressed (Tabachnick & Field, 2007). A missing values analysis through SPSS was conducted to determine the amount
of, and any pattern in, the missing data. This analysis revealed no missing data for 76 of the 77 study participants. One case (male, SE group) was found to have more than 10% missing data and errors in all the primary measures apart from the PCS. After checking for errors in data entry, session notes were examined for any relevant qualitative data that might address possible causes of the missing data. Notations included an apparent difficulty with following topic discussions, as evidenced by the participant asking the researcher to repeat information several times, and asking questions that were irrelevant to the purpose of the interview. A prolonged SE interview time of 37 minutes was also noted (average time for interviews in the SE group was 16 minutes across all other participants, compared with 36 minutes in the MI group). It was further noted that, on accompanying this participant back to the waiting area after completion of questionnaires, his spouse asked the researcher if he had managed okay with the questionnaires and that he had suffered a stroke six months earlier, which had left him with some memory problems. Consideration of using mean imputation to change the large number of missing data points was weighed against the possibility that this data set represented a random subsample of the whole sample. The combined facts that 76 of the 77 participants (98.7%) had completed all questionnaires without errors, the qualitative information from the spouse and session notes, and the percentage of missing data in this one data set, resulted in the decision that this was not a member of the population intended for the sample (Tabachnick & Fidell, 2007). On this basis, mean substitution for the missing data points was not implemented, and the data for this participant were excluded from the study analyses.
Psychometric Properties of the Measures

All analyses were conducted with SPSS Version 20.0 for Windows. Means, standard deviations, and internal consistency reliability estimates for the study variables are presented in Table 2.

Table 2  Coefficient Alphas, Means, and Standard Deviations for Primary Variables

<table>
<thead>
<tr>
<th>Scale</th>
<th>Alpha</th>
<th>Scale Range</th>
<th>Total (N = 76) Mean</th>
<th>SD</th>
<th>MI (n = 40) Mean</th>
<th>SD</th>
<th>SE (n = 36) Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCCQ</td>
<td>.88</td>
<td>6-42</td>
<td>39.16</td>
<td>4.11</td>
<td>40.38</td>
<td>2.84</td>
<td>37.79</td>
<td>4.85</td>
</tr>
<tr>
<td>PCS</td>
<td>.89</td>
<td>4-28</td>
<td>25.38</td>
<td>3.66</td>
<td>25.35</td>
<td>4.03</td>
<td>25.42</td>
<td>3.25</td>
</tr>
<tr>
<td>TSRQB.AR</td>
<td>.59*</td>
<td>4-28</td>
<td>25.52</td>
<td>2.50</td>
<td>25.60</td>
<td>2.38</td>
<td>25.44</td>
<td>2.65</td>
</tr>
<tr>
<td>TSRQB.CR</td>
<td>.89</td>
<td>6-42</td>
<td>23.37</td>
<td>9.54</td>
<td>23.30</td>
<td>8.80</td>
<td>23.44</td>
<td>10.46</td>
</tr>
<tr>
<td>PHQ-8</td>
<td>.88</td>
<td>0-27</td>
<td>5.57</td>
<td>5.32</td>
<td>4.70</td>
<td>4.96</td>
<td>6.53</td>
<td>5.57</td>
</tr>
</tbody>
</table>

Note.  HCCQ = Health Care Climate; PCS = Perceived Competence; TSRQB.AR = Autonomous Treatment Self-Regulation; TSRQB.CR = Controlled Treatment Self-Regulation; PHQ-8 = Patient Health Questionnaire.

*Alpha after correction: see text

Since the SDT construct measures had not been previously tested with a low-income African American sample, and validity of these measures is also very limited, it was especially important to obtain reliability data for their use in the current study. Cronbach’s alphas for the Health Care Climate Questionnaire (HCCQ; Williams et al., 1996), and the Perceived Competence Scale (PCS; Williams & Deci, 1996), were .88, and .89 respectively, which were comparable with the validation sample for the six-item measure, and with previous research findings. Specifically, the modified HCCQ used in the current study has demonstrated good internal consistency reliability ranging from .82 to .95 in previous health-related studies with outpatient samples. Williams and colleagues (2004) reported an internal consistency reliability of .82 in the validation sample for the measure with diabetic outpatients (n = 159), and in a study with cardiac rehabilitation outpatients (n = 52) researchers reported a Cronbach’s alpha of .95 (Russell
& Bray, 2010). The correlation of .88 in the current study demonstrates good reliability of the modified HCCQ with the current sample.

Cronbach’s alpha for the PCS in the current study was .89, comparable with previous internal reliability estimates by the authors of the measure. Specifically, in the 1996 outpatient sample referenced above, Williams and colleagues reported internal reliability coefficients of .83 and .86 at baseline and six months, while in a more recent study for smoking cessation ($n = 1006$), Williams and colleagues (2006) reported reliability coefficients of .91 at baseline and .93 at one month. The Cronbach’s alpha of .89 in the current study suggests good internal consistency reliability with this sample.

For the Treatment Self-Regulation Questionnaire (TSRQ; Williams et al., 1996), researchers generally report separate reliability estimates for the two subscales, namely the subscale measuring controlled and autonomous reasons for taking medications, and the subscale measuring controlled and autonomous reasons for adopting recommended lifestyle changes such as altering diet or exercise patterns. Previous research findings regarding internal consistency reliability for the two subscales generally indicate higher internal consistency reliability for the controlled regulation indices of each subscale than for the two autonomous regulation indices. Reliability estimates pertaining to autonomous and controlled reasons for adhering to dietary and exercise recommendations were first examined. For the six items that constitute the controlled index of this subscale, the internal reliability estimate of .80 in the current study was comparable to the reliability estimate of .79 reported with the sample of 128 diabetic outpatients in the validation study for TSRQ (Williams et al., 1996). The Cronbach alpha of .801 in the current study demonstrates good reliability with this sample.
The low reliability coefficient of .37 for the five items of the autonomous index of this same subscale was inconsistent with previously reported research findings. For example, in the initial validation study described above, the authors of the TSRQ reported a Cronbach’s alpha of .58 for the autonomous reasons for adhering to the program (Williams et al., 1996). In a more recent validation study of the TSRQ at four sites with 2731 undergraduates, including an African American sample (n = 909), Levesque and colleagues (2007) reported internal consistency coefficients ranging from .74 to .93.

After checking for coding errors in the current study, correlations between each item and the total score were examined for low values (Field, 2009). One item had a value of .11, indicating that the item was detracting from the overall reliability of the subscale. There were no other questionable items. Specifically, removing item 19 (it’s a challenge to learn to live with high blood pressure) from the analysis increased the reliability estimate from .37 to .59, which, while still relatively low, was comparable to that of .58 reported with the initial validation sample. It appeared that, with the sample in the current study, item 19 tapped a different underlying component from other items in the subscale, limiting the utility of the measure with this sample. Although removal of an item from an established scale limits the ability for comparison of results with other studies in the future, it was felt that a reliability estimate of .37 raised serious questions regarding the use of the instrument with the current sample. In accordance with recommendations (Field, 2009), it was decided to remove the item from the subscale to facilitate interpretation of the subsequent analyses in the current study.

For the TSRQ subscale for medications, the controlled index in the current study demonstrated good internal consistency reliability of .83. This estimate was within the
range of reported Cronbach’s alphas of .80, .85, and .86 taken at three points in a validation study of the measure with 128 diabetic outpatients (Williams, Freedman, et al., 1998). In that same study, Williams and colleagues reported Cronbach’s alphas of .81, .83, and .85 for the autonomous reasons subscale for medications. However, in the current study the internal consistency reliability estimate for that autonomous subscale for medications was only .25. The scale was found to be free of coding errors. The results suggested very weak overall relationships among the items with correlations ranging from -.05 to .23, and a mean inter-item correlation for the three-item index of .09. These results suggest that the items were capturing different underlying constructs which severely compromised the utility of the measure with this sample. Due to the low alpha of the autonomous index of this measure for medications, only the subscales of the TSRQ pertaining to sodium restriction and exercise were utilized in subsequent analyses.

Internal consistency reliability for the M-C 2 was determined to be .33 which was extremely low. The true-false design of the M-C 2 limits the reliability of the measure, but the present estimate is inconsistent with what would be expected from previously published validation of the instrument, such as the .49 to .75 reliability coefficients reported by its authors (Strahan & Gerbasi, 1972). The presence of some negative values in the inter-item correlation matrix, together with negative values for the correlations between each item and the total score suggested the possibility of incorrectly reversed items (Field, 2009), but all items were found to be correctly scored. Examination of the corrected item-total correlations indicated no individual items unduly influencing this reliability coefficient. The 10 items of the scale demonstrated a mean inter-item correlation of .05, with nine of the items demonstrating correlations of less than .30,
suggesting a weak overall relationship among the items (Field, 2009). With such low reliability, the utility of the instrument is severely compromised. It was concluded that with the current sample, the M-C 2 did not adequately capture the intended underlying construct of the measure, and it was therefore not utilized in the subsequent analyses.

The data retained for the study were examined for outliers, linearity, normality, and multicollinearity, using strategies outlined by Tabachnick and Fidell (2007), and Field (2009).

Outliers

Histograms were utilized to inspect the data for univariate outliers on the variables of perceived autonomy support (HCCQ), perceived competence (PCS), autonomous treatment self-regulation (TSRQB.AR), controlled treatment self-regulation (TSRQB.CR), and depression (PHQ-8). Tabachnick and Fidell (2007) defined univariate outliers as cases with standardized scores on any variable greater than 3.29 ($p < .001$, two-tailed), that are disconnected from the other $z$ scores. Three cases met this criterion.

On the measure of perceived autonomy support (HCCQ), one participant (SE group) had a standardized score of 4.78 ($p < .01$, two-tailed). Inspection of the data and session notes revealed accurate data entry and no unusual intervention processes, suggesting the outlier was likely to be a legitimate part of the sample. To determine the potential impact of this outlier, the mean and 5% trimmed mean for the HCCQ variable (SE group) were first examined (Field, 2009). These were found to be similar, with values of 6.73 and 6.81 respectively, suggesting a low overall impact of the outlier point on the central tendency of the scores. The impact of this outlier, on the distribution of the variable, is discussed later in this section.
On the measure of perceived competence, the standardized score for each of two cases was 3.38 ($p < .001$, two-tailed). The mean and 5% trimmed means were similar with values of 6.34 and 6.47, suggesting that the two outlier points had little impact on the central tendency for the sample (Field, 2009). No univariate outliers were observed for the variables of treatment self-regulation (TSRQ), and depression (PHQ-8).

**Multivariate Outliers**

Tabachnick and Fidell (2007) recommended using both Mahalanobis distances and the Leverage statistic, in combination with Cook’s distances, to screen for multivariate outliers, and to look for values that are consistently identified as outliers across all three different techniques. First, Mahalanobis distance was calculated to measure the distance of each case from the mean of the distribution, using $\chi^2$ with degrees of freedom equal to the number of variables, in this case five (i.e., HCCQ, PCS, TSRQB.AR, TSRQB.CR, and PHQ-8). Seven cases (5 in the ME and 2 in the MI) met the criterion for cut off, $\chi^2 (5) = 20.52$. In Leverage, a measure related to the Mahalanobis distance that gauges the influence of the observed value over the predicted value (Field, 2009), these same seven cases were identified with values three times greater than the average, which is used as a cut-off point for significance (Stevens, 2009). However, Cook’s distance did not reveal any significant multivariate outliers. Since these findings did not overall support the above guidelines for data transformation, all subsequent analyses were conducted on the original data. Stevens (2009) suggested that while a case may not be identified as a significant outlier, it may still be influential, particularly in smaller samples, and in that seven outliers were identified by two of the
three recommended techniques, subsequent analyses with these outliers removed was conducted. Those results are presented in the exploratory analysis section of this chapter.

Normality

Normality of the data was then examined, through a visual inspection of histograms and the calculation of skewness. Histograms for the distributions of perceived autonomy (HCCQ), autonomous treatment self-regulation (TSRQB.AR), and perceived competence (PCS) all appeared to be negatively skewed. The distributions for depression (PHQ-8) appeared to be positively skewed (Figure 3).
Figure 3 Histograms and Distributions of Variables.
Note. HCCQ = Health Care Climate Questionnaire; PCS = Perceived Competence Scale; TSRQB.AR = Autonomous Treatment Regulation; PHQ-8 = Patient Health Questionnaire

Examination of the Shapiro Wilkes statistic suggested violation of the assumption of normality in the HCCQ, TSRQB.AR, the PCS, and the PHQ-8. Therefore, the degree of skewness and kurtosis for each of those variables was statistically calculated and converted into a z-score.
Table 3  Skewness and Kurtosis for Primary Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Skewness</th>
<th>z-score</th>
<th>Kurtosis</th>
<th>z-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCCQ</td>
<td>-2.31</td>
<td>8.24</td>
<td>6.73</td>
<td>11.98</td>
</tr>
<tr>
<td>HCCQ (after transforming single outlier)</td>
<td>-1.65</td>
<td>5.97</td>
<td>2.06</td>
<td>3.78</td>
</tr>
<tr>
<td>PCS</td>
<td>-1.83</td>
<td>3.66</td>
<td>3.21</td>
<td>5.71</td>
</tr>
<tr>
<td>TSRQB.AR</td>
<td>-1.10</td>
<td>3.90</td>
<td>.89</td>
<td>1.59</td>
</tr>
<tr>
<td>TSRQB.CR</td>
<td>-.31</td>
<td>1.10</td>
<td>-.82</td>
<td>1.46</td>
</tr>
<tr>
<td>PHQ-8</td>
<td>.88</td>
<td>3.13</td>
<td>-.09</td>
<td>.16</td>
</tr>
</tbody>
</table>

Note. HCCQ = Perceived Autonomy Support; PCS = Perceived Competence; TSRQB.AR = Autonomous Treatment Self-Regulation; TSRQB.CR = Controlled Treatment Self-Regulation; PHQ-8 = Depression.

As suggested by the histograms, autonomous treatment self-regulation (TSRQB.AR) was negatively skewed, with a z-score of 3.90 ($p < .05$). The perceived autonomy and perceived competence variables (HCCQ and PCS) were also negatively skewed, with z-scores of 3.90 and 3.66 respectively ($p < .05$). Tabachnick and Fidell (2007) suggested that for sample sizes over 100, the significance levels of both skewness and positive kurtosis are less important than the actual size of the value, increasing in impact as the value moves away from zero. For the current sample size of 76, both the significance value and the actual size of the value of skewness and kurtosis were taken into consideration regarding their potential impact on the analyses. While the negative skew of the perceived autonomy support variable is consistent with previous research, the extremely high values for skewness and kurtosis in this sample appeared to be impacted by the one extreme outlier score on the HCCQ, discussed previously. In such a case, where the outlier appears to be a legitimate part of the sample population, Tabachnick and Fidell (2007) recommend that steps should be taken to reduce the impact of that outlier, such as changing the score on the variable to one unit nearer to the next most extreme score in the distribution. Consideration was also given to the fact that, since the
data point was a member of the control group (SE), increasing its value would not inflate any statistical difference between groups in the hypothesized direction. This single data point transformation in the HCCQ distribution reduced the $z$-score for skewness from 8.94 to 5.97, and the $z$-score for kurtosis from 11.98 to 3.78. While the SDT variables remained negatively skewed, there was no cause to believe these sample distributions were not a reflection of the distribution for the population, rather than an artifact of this sample. In addition, the primary SDT variables of interest in the study (HCCQ, PCS, and TSRQB.AR) were all skewed in a similar direction, so that the impact of the non-normal distribution on further analyses of these variables would be reduced (Tabachnick & Fidell, 2007). Thus transformation of the variables was not performed.

Due to the fact that the distributions for all the variables were non-normal, scatterplots were created to check for linearity. Inspection of the scatterplots suggested no evidence of curvilinear relationships between any of the variables. The data were then tested for multicollinearity through examination of Pearson-correlation coefficients. No bivariate correlations exceeded .90, the criteria indicative of multicollinearity (Tabachnick & Fidell, 2007).

To summarize, there was one univariate outlier on the HCCQ that appeared to be unduly influencing the distribution of the variable. As a result, this data point was transformed to bring it closer to the center of the distribution. In general, the distributions of the SDT variables of primary interest in this study were negatively skewed, but since these deviations from normality appeared to reflect the population from which the sample was drawn, the data were not transformed. The distribution of the PHQ-8 was positively skewed which is consistent with previous research with primary
care samples. Two of three recommended statistical techniques identified the same seven multivariate outliers. Although the criteria for transformation were not met, and the data were not transformed, additional analyses were performed to examine the potential impact of those seven multivariate outliers, for the purpose of exploration and discussion.

Descriptive Statistics and Correlations

Scores on the HCCQ (perceived autonomy support) can range from 6 to 42, with the average score in the current sample of 39.16 ($SD = 4.14$). The norm group for the six-item HCCQ consisted of 634 primary care diabetic outpatients (Williams, Freedman, et al., 1998), with reported mean scores of 35.22 ($SD = 4.8$). In the current sample, the average score for perceived autonomy support related to hypertension management was higher than was reported in the norm group in a study related to diabetes.

Scores on the PCS (perceived competence) can range from 4 to 28, with the average score in the current sample of 25.38 ($SD = 3.66$). The diabetic outpatient sample ($n = 634$) used as the norm group for the PCS (Williams, Freedman, et al., 1998), demonstrated average scores of 23.8 ($SD = 4.3$) on the PCS. For this sample, the average score on the PCS indicated higher self-perceived competence to manage the health problem in question, than was reported in the norm group.

Scores on the TSRQ.BAR (autonomous regulation for recommended lifestyle changes) can range from 6 to 42. In the current study, only four of the five items were analyzed, following low reliability of one item, so mean item comparisons were used to compare results with those of the norm sample. The mean item score of the current sample on a 1 to 7 Likert scale was 6.38 ($SD = 0.62$). This compared with a mean item score of 6.13 ($SD = 0.9$) in the norm group for this TSRQ subscale with 159 diabetic
outpatients (Williams et al., 2004). The average score with the current sample indicates slightly stronger autonomous reasons for engaging in recommended lifestyle changes for hypertension than those reported in the norm sample for diabetes management.

Scores on the TSRQB.CR (controlled regulation for recommended lifestyle changes) can range from 6 to 42. In the current study, the average score was 23.37 ($SD = 9.54$). This compares with an average of 18.9 ($SD = 6.8$) reported in the norm sample with 128 diabetic outpatients (Williams et al., 1996). The higher score with the current sample indicates higher controlled reasons for engaging in dietary and exercise modifications than was reported in the norm sample for diabetic management.

Scores on the PHQ-8 can range from 0 to 24. In the current study, the average score was 5.57 ($SD = 5.32$). This compares with a mean scale score of 3.6 ($SD = 3.5$) for the reference group ($n = 1755$) in a cross-sectional survey for anxiety and depression across the US (Löwe et al., 2008). The reference sample was primarily White (8% African American, 8% Hispanic, 2.5% Asian) enrolled from 15 primary care sites in 12 different states ($N = 2091$). Scores in the current study therefore indicate higher levels of depressive symptoms than were found in the reference group for the US cross-sectional survey.

Correlations

Correlational analyses were performed to examine the links between the underlying constructs of Self-Determination Theory, and between these constructs and measures of health behavior changes. Because the self-determination variables were non-normally distributed, Spearman’s rho coefficients were used in this analysis (Table 4).
Where directional relationships had been hypothesized, one-tailed tests were selected; two-tailed tests were selected for all non-specified relationships.

Table 4  Spearman’s Rho Correlations for all Study Variables

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tr>
<td>1 HCCQ</td>
<td></td>
<td></td>
<td>.14</td>
<td>.40**</td>
<td>.16</td>
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<tr>
<td>Significance</td>
<td>.11+</td>
<td>.001++</td>
<td>.09+</td>
<td>.28++</td>
<td>.04+</td>
<td>.23+</td>
<td></td>
</tr>
<tr>
<td>2 TSRQB.AR</td>
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</tr>
<tr>
<td>Spearman’s rho</td>
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<td>.40**</td>
<td>.06</td>
<td>.05</td>
<td>.04</td>
<td>.06</td>
<td></td>
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<tr>
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<td>.30+</td>
<td>.66++</td>
<td>.36+</td>
<td>.30+</td>
<td></td>
</tr>
<tr>
<td>3 TSRQB.CR</td>
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<tr>
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<td>.14</td>
<td>-.01</td>
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<tr>
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<td>.38++</td>
<td>.24++</td>
<td>.24++</td>
<td>.90++</td>
<td></td>
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<tr>
<td>4 PCS</td>
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<tr>
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<td></td>
<td>.05++</td>
<td>.25+</td>
<td>.24+</td>
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</tr>
<tr>
<td>5 PHQ-8</td>
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</tr>
<tr>
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<td></td>
<td>.61++</td>
<td>.73++</td>
<td></td>
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<td>6 Na</td>
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<tr>
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<td></td>
<td>.16+</td>
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</tbody>
</table>

Note.  HCCQ = Perceived Autonomy Support; PCS = Perceived Competence; TSRQB.AR = Autonomous Treatment Regulation; TSRQB.CR = Controlled Treatment Regulation; PHQ-8 = Depression; Na = Sodium Reduction Behaviors; Ex = Exercise Behaviors

Overall, in this sample, correlations were observed to be weak, and the proposed relations between the theoretical constructs of SDT were generally unsupported.

Furthermore, unexpected relations between certain SDT variables were observed. Specifically, perception of autonomy support was positively associated with controlled reasons for making recommended lifestyle changes in the management of hypertension \((r_s = .40, p < .001, \text{two-tailed})\). Autonomous treatment self-regulation for making lifestyle changes was similarly associated with controlled treatment self-regulation \((r_s = .40, p < .001, \text{two-tailed})\). The negative association demonstrated between perceived competence and depression was intuitively in line with the large body of research on depression \((r_s = -.23, p < .05, \text{two-tailed})\).
Tests of Hypotheses

Independent sample t-tests were performed to test Hypotheses 1, 2, 3, and 5 (see Table 5), and Spearman rho correlations were utilized to test Hypotheses 4 and 6 (see Table 4).

Table 5  Independent Samples t-tests for MI and SE Groups

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
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<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>TSRQB.AR</td>
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<tr>
<td>TSRQB.CR</td>
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<td>.27</td>
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<td>PCS</td>
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<td>.69</td>
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<td>.00</td>
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<tr>
<td>PHQ-8</td>
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<td>.42</td>
</tr>
<tr>
<td>Ex.Inc</td>
<td>1.46</td>
<td>.23</td>
</tr>
<tr>
<td>Na.Reduc</td>
<td>11.56</td>
<td>.00</td>
</tr>
</tbody>
</table>

Note.  HCCQ = Perceived Autonomy Support; PCS = Perceived Competence; TSRQB.AR = Autonomous Treatment Self-Regulation; TSRQB.CR = Controlled Treatment Self-Regulation; PHQ-8 = Depression.  Ex.Inc = Increased Exercise; Na.Reduc = Dietary Sodium Reduction

Hypothesis 1

Hypothesis 1 stated that participants in the MI group would report higher levels of perceived autonomy support than those in the SE group.  Miller and Rollnick (2002) suggested that health interventions, based on the underlying principles of motivational interviewing, are perceived as supportive of individuals’ health behavior choices.  Thus, participants exposed to an MI intervention, related to the management of their hypertension, were expected to perceive higher levels of autonomy support for their health choices than those exposed to a standard educational intervention.  To test this
Hypothesis, an independent samples \( t \)-test was conducted to compare the HCCQ scores for participants in the MI and the SE groups. Results of the Levene’s test for equality of variance (.001) suggested that the variances for the two groups was unequal, determining the use of the alternative \( t \)-value to compensate for this difference. The hypothesis was supported, with a significant difference in the hypothesized direction between the two groups, \( M_{MI} = 6.74, SD_{MI} = .47 \) and \( M_{SE} = 6.30, SD_{SE} = .81; t (55.24) = 2.82, p < .01, \) one-tailed. The magnitude of the difference in the means (mean difference = .44, 95% CI: .13 to .74) was moderate (eta squared = .10). Thus, 10% of the variance in HCCQ scores was explained by group identity.

Hypothesis 2

According to Deci and Ryan (2000), autonomy-supportive health environments promote autonomously driven health behavior changes. Thus, Hypothesis 2 stated that participants exposed to an autonomy-supportive intervention were expected to report higher levels of autonomous regulation of recommended health behaviors than participants in the educational control group. To test this hypothesis, an independent samples \( t \)-test was conducted, to compare the autonomous treatment regulation scores related to health behaviors (TSRQB.AR) for participants in the MI and SE groups. Results from the \( t \)-test did not support the hypothesis. There was no significant difference in scores for the MI and SE groups, \( M_{MI} = 6.4, SD_{MI} = .60 \) and \( M_{SE} = 6.36, SD_{SE} = .66; t (74) = .31, p = .38, \) one-tailed. The magnitude of the difference in the means (mean difference = .04, 95% CI: -.24 to .33) was very small (eta squared = .001).
Hypothesis 3

This hypothesis stated that perceived competence for controlling hypertension would be higher in the MI group than in the SE group. To test this hypothesis, an independent samples t-test was conducted to compare the perceived competence scores for participants in the MI and SE groups. Results from the t-test did not support the hypothesis. There was no significant difference in scores for the MI and SE groups, $M_{MI} = 6.34, SD_{MI} = 1.01$ and $M_{SE} = 6.36, SD_{SE} = .81$; $t(74) = -.08, p = .47$, one-tailed. The magnitude of the difference in the means (mean difference = -.02, 95% CI: -.44 to .41) was very small (eta squared = .001).

Hypothesis 4

Hypotheses 4a, 4b, and 4c addressed the relationships between the primary constructs of SDT. In accordance with the proposed theoretical relationships between autonomy support, perceived competence, and autonomous treatment regulation, Hypothesis 4 stated that autonomy support would be positively related to both perceived competence and to autonomous treatment regulation, and perceived competence would be positively related to autonomous treatment regulation. Spearman rho correlations were utilized to test these hypotheses. With the current sample, none of these hypothesized relationships was supported (Table 4). However, perceived autonomy support was found to be positively associated with controlled treatment regulation. Thus, perceived autonomy support was more strongly associated with controlled reasons for engaging in the recommended dietary and exercise behaviors ($r_s = .40, p < .001$, two-tailed) than with autonomous reasons for the health behaviors ($r_s = .14, p = .11$, one-tailed). This had not been reported in previous health research using SDT measures.
Similarly, a strong association between autonomous and controlled treatment self-regulation ($r_s = .40, p < .001$, two-tailed) was an unexpected finding, and had not been reported in previous studies.

**Hypothesis 5**

Hypothesis 5 stated that participants in the MI group would demonstrate higher frequencies of recommended health behaviors (sodium reduction and increased exercise) than would the participants in the education control group. Two independent samples $t$-tests were conducted to test this hypothesis. The hypothesis was partially supported. Although there was no significant difference in scores between the two groups for exercise frequency, greater frequencies of sodium intake related health behaviors were found in the MI group than in the SE group, $M_{MI} = 2.8$, $SD_{MI} = .46$ and $M_{SE} = 2.47$, $SD_{SE} = .81$; $t (54.46) = 2.13, p < .05$, one-tailed. The magnitude of the difference in the means (mean difference = .33, 95% CI: .02 to .63) was moderate ($\eta^2 = .10$).

**Hypothesis 6**

Hypothesis 6 stated that there would be a positive association between each of the SDT variables of HCCQ, PCS, and TSRQB.AR and the two behavior measures for dietary sodium reduction, and exercise. To test this hypothesis, Spearman rho correlational analyses were utilized to examine these proposed relationships. The hypothesis was partially supported. A positive relationship was demonstrated between perceived autonomy support and sodium intake reduction ($r_s = .19, p < .05$, one-tailed). Thus, participants who perceived the intervention as more autonomy supportive reported a greater reduction in dietary sodium. No association was found between perceived autonomy support and exercise behavior. No significant relationships were demonstrated
between perceived competence and either health behavior measure, and similarly, no positive associations were indicated between autonomous treatment regulation and either health behavior.

Exploratory Analyses

It had been proposed that exploratory analyses would examine the mediating role of perceived competence with regard to the relation of perceived autonomy support and autonomous treatment regulation. Baron and Kenny (1986) indicated three necessary conditions to establish mediation. The independent variable must be associated with both the mediator and the dependent variable, and the mediator must be related to the dependent variable. In the current study, no significant relationships were identified between the above SDT variables, thus mediation analysis was not conducted.

Previous research has shown that depression is a risk factor for non-adherence to medical recommendations for chronic disease management (e.g., Bane et al., 2006; DiMatteo et al., 2000). Thus, an exploratory analysis was performed to examine any moderating effect of depression on the relationship between the SDT variables. As noted earlier, 18% of the current sample endorsed symptoms on the PHQ-8 that met the criteria for moderate to severe depression. This compares with between 6% and 10% of participants (N=585) who met criteria for a depressive disorder in the validation study (Spitzer et al., 1999). However, interpretation of any analysis of depression in a moderating role, in the current study, is inhibited by the fact that the measurement occurred after the intervention, and depression could therefore be viewed as an outcome variable. Stevens (2009) warned that if a covariate is measured after a treatment intervention, and the covariate had been affected by that intervention, there is a danger of
confounding treatment effect with a change on the covariate. Tabachnick and Fidell (2007) similarly noted that such analysis risks removing some of the effects of the independent variable, thus limiting interpretation of the results. ANCOVA analysis, with depression as a covariate, was therefore not undertaken in the current situation. Acknowledging that interpretation of any analysis of depression, in the current study, is limited by the post-intervention measure of the variable, a partial correlational analysis was conducted while controlling for depression. Results revealed no differences from the primary analysis in terms of the expected relationship between SDT variables. Additionally, the positive associations between autonomous and controlled treatment regulation \((r_s = .40, p < .001, \text{two-tailed})\), and between perceived autonomy support and controlled treatment regulation \((r_s = .40, p < .01, \text{two-tailed})\) were also retained in this analysis. However, the positive relation between perceived autonomy support and dietary sodium \((r_s = .19, p < .05)\) was eliminated when controlling for depression \((r_s = .15, p = .10)\).

**Chi-Square Analyses**

Hypothesis testing related to health outcomes was based on the sum of three binary questions. For exercise, this included thinking about increasing exercise in the next few months, planning to increase exercise in the next month, and increased exercise over the past month. For dietary sodium, this included thinking about reducing dietary sodium in the next few months, planning to reduce dietary sodium in the next month, and reduction of dietary sodium over the past month. There is some limitation in interpreting correlational analysis between continuous variables and the sum of binary questions. Additionally, although the \(t\)-test analysis demonstrated overall improved health outcomes
related to dietary sodium in the MI group, examination of any differences between groups on specific changes was not possible. For example, the intervention might have been more effective in promoting changes in thinking about making dietary sodium changes, rather than in actual change of dietary sodium behavior. To examine whether there were any specific differences in outcomes, exploratory analyses using Chi-Square tests for independence (with Yates Continuity Correction) were conducted between group identity and each of the three binary questions related to dietary sodium and to exercise behaviors. Where cells were found to contain frequencies of less than ten, Fischer’s exact probability is reported.

Results revealed no significant associations between group identity and any single binary question related to dietary sodium or to exercise. Results of the chi-square analysis between groups and decreased dietary sodium, $\chi^2 (1, n = 76) = .22, p = .1, \phi = .1$, represented a small effect size based on Cohen’s (1988) criteria, with 88% of MI participants and 69% of SE participants reporting lowering their dietary sodium over the previous month. Fischer’s exact probabilities on both thinking and planning (dietary sodium reduction) were not significant (.60 and .14 respectively, both two-tailed). All analyses between groups on the three questions related to exercise behavior similarly revealed no significant associations.

**Outlier Elimination Analyses**

Finally, all analyses were re-run eliminating the multivariate outliers identified by Mahalanobis and Leverage Distances. Correlations in this second analysis were generally a little stronger (Table 6). Specifically, the positive association between perceived autonomy support (HCCQ) and controlled treatment regulation (TSRQB.CR)
was retained in this second analysis ($N = 69$) with ($r_s = .42, p < .001$, two-tailed), compared with $r_s = .40, p < .001$, two-tailed for the total sample ($N = 76$). Similarly, the positive relationship demonstrated between autonomous and controlled treatment self-regulation (TSRQB.AR and TSRQB.CR) was retained in this second analysis ($r_s = .49, p < .001$, two-tailed) compared with $r_s = .40, p < .001$, two-tailed in the primary analysis. However, two significant associations were eliminated after removing the outliers. Specifically, the positive association between perceived autonomy support and sodium reduction was slightly weakened from a significant value to a value approaching significance ($r_s = .18, p = .07$, one-tailed) compared with $r_s = .19, p < .05$, one-tailed, in the primary analysis. Second, the significant negative association between perceived competence and depression was eliminated ($r_s = -.14, p = .24$, two-tailed) compared with $r_s = -.23, p < .05$, two-tailed, in the primary analysis.
The initial finding of higher levels of perceived autonomy support in the MI group was retained in the analysis without the multivariate outliers, $M_{MI} = 6.74$, $SD_{MI} = .49$ and $M_{SE} = 6.42$, $SD_{SE} = .68$; $t (55.02) = 2.22, p < .05$, one-tailed. The magnitude of the difference in the means (mean difference = .32, 95% CI: -.61 to -.03) was moderate (eta squared = .07), with 7% of the variance in HCCQ scores explained by group identity compared with 10% in the primary analysis.

Similarly, greater frequencies of sodium intake related health behaviors in the MI group, demonstrated in the primary analysis, were also retained in the second analysis, $M_{MI} = 2.84$, $SD_{MI} = .44$ and $M_{SE} = 2.44$, $SD_{SE} = .84$; $t (45.37) = 2.42, p < .01$, one-tailed. The magnitude of the difference in the means (mean difference = .40, 95% CI: .06 to .73)
was moderate (eta squared = .08), with 8% of the variance in sodium intake scores explained by group identity compared with 10% in the initial analysis.

Summary

In summary, overall support for the proposed hypotheses was mixed. More specifically, in relation to the treatment group effect, there was support only for the hypothesized increase in autonomy support in the group exposed to the MI approach over the group exposed to a standard educational approach. The hypothesis of more positive health behaviors in the MI group was partially supported (dietary sodium only).

Although there was support for the hypothesized positive relation between the SDT measure of perceived autonomy support and one health behavior change (dietary sodium only), there was no support for the hypothesized relations between the SDT variables of perceived competence or autonomous treatment regulation and either of the health behaviors. More critically, none of the hypothesized relations between the three SDT variables of perceived autonomy support, perceived competence, and autonomous treatment regulation was supported in this study. Beyond the lack of support for expected relations among the SDT variables, two unexpected relations between SDT variables were demonstrated. These included a strong positive relationship between perceived autonomy support and controlled treatment regulation, in relation to a weak association between perceived autonomy support and autonomous regulation, and a strong association between autonomous and controlled treatment regulation.

In exploratory analyses, after controlling for depression, the one significant difference was the elimination of the positive association between autonomy support and sodium-related health behavior. After controlling for multivariate outliers, the positive
association between autonomy support and sodium-related health behavior, and the negative association between perceived competence and depression, were both eliminated.

In the following section, these findings are interpreted in the context of the extant literature, with discussion of the strengths and limitations of the current study. Implications for clinical practice and future research directions will then be discussed.
This chapter begins with an overview of the purpose of the current study. Results of the study are then reviewed in the context of the extant literature. Next, implications and limitations of the present findings are discussed. Finally, future research directions are offered.

*Overview of the Current Study*

The present study was a response to the sparseness of theory-driven literature examining effective interventions to promote stable health changes in the management of hypertension. The disease and its potentially adverse consequences are increasingly disproportionately represented in African Americans (Bonow et al., 2005; Nemetz et al., 2008; Williams et al., 2007), with numerous calls in the medical literature for more culturally-relevant approaches to reverse this trend (Bonow et al., 2005; Mensah et al., 2005; Smith et al., 2005; Williams et al., 2007). One such approach, determined to be both culturally appropriate and effective for chronic disease management in African American populations (Burke et al., 2003), is Motivational Interviewing (MI: Miller, 1983; Miller & Rollnick, 2004).
This autonomy-supportive intervention style has been demonstrated as promoting stable health behavior changes for hypertension (Woollard et al., 2003), but there is no support for the proposition (Miller & Rollnick, 2002) that MI effects health changes by promoting autonomous regulation of the behaviors in question. In applying their general theory of Self-Determination (SDT) to health problems, Deci and Ryan (1985a, 2002) similarly proposed that autonomy-supportive health environments promote recommended health changes through increasing autonomous regulation of the recommended behavior. Empirical findings have supported the underlying constructs and the utility of SDT in a variety of health problems, including chronic disease management for HIV, cancer, and diabetes (Kennedy et al., 2004; Milne et al., 2008; Williams et al., 2004), but to date, SDT has not been applied to the management of hypertension.

The current study, then, was a response to relatively recent suggestions in the health literature that SDT and MI are scientifically compatible (e.g., Britton et al., 2008; Vansteenkiste & Sheldon, 2006). It is an attempt to examine the assumptions and underlying processes of MI, within a theoretical framework that similarly proposes a pathway from autonomy support to health behavior change, through qualitative changes in underlying regulation. Previous health studies have examined SDT constructs with samples taken primarily from middle-income Caucasian populations (e.g., Edmunds et al., 2008; Williams, Freedman, et al., 1998; Williams et al., 2004; Williams, McGregor, King, Nelson, & Glasgow, 2005; Wilson & Rodgers, 2004). In testing the theory’s utility in the current setting, this study not only adds to the literature in empirically examining the underlying processes of MI, but also extends the existing SDT research in chronic disease management to include that of hypertension in a disenfranchised minority sample.
Ninety-three African Americans with hypertension (60% female), were actively recruited into the current study at a Free Clinic in a large Midwestern city. Of the 78 participants who completed the study (68% female), the average age was 53 years. Forty-five percent of participants reported some college experience beyond high school, with 15% reporting graduate degrees. Fifty-one percent were unemployed. The average BMI in participants was 32, with 37% of participants reporting co-morbid diabetes and another 40% reporting a relatively recent diagnosis of pre-diabetes. The mean blood pressure of 130 mm Hg systolic, and 82 mm Hg diastolic was close to meeting the generally accepted target goal of 130 systolic and 80 diastolic. The majority of participants reported their hypertension as diagnosed for more than two years.

Participants were randomly assigned either to an intervention based in Motivational Interviewing (MI group) or to a standard education intervention (SE group). Subsequent independent samples t-tests demonstrated no significant difference between MI and SE groups on any of the above reported demographic variables. In addition to the self-reported demographic information, every participant completed health behavior questionnaires related to dietary sodium and exercise, and measures of perceived autonomy support, perceived competence for managing hypertension, and treatment regulation for recommended lifestyle changes. Measures of depression and social desirability responding were also completed. Correlations and t-test procedures were the primary statistical methods used to analyze the data. Chi square analyses were also utilized to examine specific changes in health behaviors.
Results of the Current Study

Overall, findings from this study provided some limited support for the assumptions of MI, but did not support any of the hypothesized relations between SDT constructs. As expected, the current study found differences in perceived autonomy support between groups. However, a weak and nonsignificant relationship between perceived autonomy support and autonomous regulation of health behaviors, in addition to a strong positive association between autonomy support and controlled regulation for health behaviors were inconsistent with the proposed relations in SDT.

Perceived Autonomy Support

The findings in the current study lent some empirical support to the presumed autonomy-supportive nature of MI interventions. That definition of autonomy support includes the provision of a collaborative, empathic healthcare environment, in which a health provider supports health changes that resonate with the unique values of the individual (Markland et al., 2005; Miller & Rollnick, 2002).

As stated, scores on the HCCQ demonstrated that MI participants perceived their encounter with the researcher as more autonomy supportive than did SE participants. The $t$-value of 2.82, $p = .01$, one tailed, with a mean score difference of .44 between groups, represented a moderate effect size. The present findings are consistent with two controlled SDT exercise studies, one for weight loss (Silva et al., 2010), and the other for improved health status in cancer survivors (Milne et al., 2008) in which participants exposed to autonomy-supportive health environments reported higher scores on the HCCQ than participants in control groups. Results of a large randomized trial to improve
smokers’ health similarly demonstrated higher HCCQ scores in the intervention group at one month, supporting the current study results.

The current findings give some weight to the assumption that MI is autonomy supportive, and more specifically suggest that the application of techniques based in MI may be perceived as more supportive of individuals’ health choices than directive educational approaches, in promoting recommended lifestyle changes in low-income hypertensive populations. The .44 difference in mean scores on a scale of one to seven occurred in a relatively small sample size, and it would be reasonable to conclude that, beyond statistical significance, this might also be of clinical relevance. If a goal of healthcare is to encourage individuals to take more responsibility for their health decisions and actions (e.g., Molassiotis et al., 2007), it follows that interventions that are perceived as supporting autonomous health decisions are worth pursuing. These results also give preliminary support to the proposal that MI and SDT are scientifically compatible, demonstrating that the autonomy-supportive principles of MI can be examined through the Health Care Climate Questionnaire, the SDT measure of perceived autonomy support (HCCQ; Williams et al., 1996).

*Self-Regulation*

Current results did not provide support for the proposed relations between the SDT variables of autonomy support and autonomous regulation of health behaviors. Specifically, although perception of autonomy support was higher in the MI group, this did not appear to be related to increased autonomous regulation for recommended dietary and exercise health changes in the two weeks following the intervention. The $t$-value of .31, $p = .38$, one-tailed, with a mean score difference of .04 between groups, represented
a very small effect size. At follow-up, both groups reported equal degrees of autonomously-regulated reasons for engaging in recommended health behaviors, in endorsing such items as *I feel personally that watching my salt intake and/or exercising are best for me* and *I personally believe that this is important in remaining healthy*.

These results are not supported by comparable controlled STD studies, where autonomy-supportive interventions have generally been related to higher autonomous regulation of health behaviors. For example, Silva et al. (2010) reported large effect sizes of 0.80 and .96 ($p < 0.001$) favoring the intervention group, for autonomously-regulated reasons for exercise, and Russell and Bray (2010) similarly demonstrated higher self-regulated reasons for exercise in a controlled cardiac rehabilitation study. It is possible that underlying motivation for engaging in regular exercise in the above studies was different from participants’ baseline motivation for making lifestyle changes when they entered the current study. Differences in underlying motivation may impact the degree to which autonomy-supportive interventions are effective in promoting autonomous regulation. Perhaps of all the SDT studies with results comparable to those of the current research, the most thought provoking are the findings reported by Williams et al. (2006). In a smoking cessation study ($N = 1006$) with a primarily Caucasian sample with some socio-economic similarities to that of the current study (i.e., incomes more than $10,000 below national average, 11% college educated), measures of self-regulation for taking nicotine-replacement medications and for smoking cessation demonstrated no difference between groups at baseline. As expected, intensive-treatment participants perceived significantly greater autonomy support than those in a community care control group $t(1004) = 6.19, p < .001$. However, a unique finding was reported at one-month follow
up. While autonomous regulation for the taking of nicotine-replacement medications was significantly greater in the intensive-treatment group ($F[1, 988] = 9.42, p < .01$), there was no difference in autonomous regulation between groups for smoking cessation itself ($F[1, 1001], = 1.42, p = .23$). In discussion, these researchers did not offer any explanation for their results, focusing on the facilitation of autonomous use of medications as an important interim goal, which subsequently resulted in greater smoking cessation at six-month follow up.

It may be that internalizing the value of making health-related lifestyle changes, such as stopping smoking or modifying dietary and exercise patterns, is far more difficult than internalizing the value of taking daily medications, which realistically requires far less investment from the individual. Additionally, with few or no symptoms in hypertension, there are even fewer overt health benefits to reinforce one’s efforts, suggesting it may be even more difficult to follow through with making recommended changes in diet and activity levels. This appears to be the case in the current study, with the average blood pressure at goal suggesting relatively good medication adherence, yet participants generally reporting low activity levels and less than optimal dietary sodium intake.

This interpretation is also indirectly supported in the research of Coleman and colleagues (2000) described earlier, who found that the need to modify lifestyle factors for successful hypertension control was identified as a greater barrier to successful control of the disease than the lifetime taking of medications (Coleman et al., 2000). One difficulty in situating the current results within the extant literature is that Self-Determination Theory has not previously been tested in either a hypertensive, or a
completely comparable socioeconomic sample, which limits the value of any interpretations. However, it is also possible that the specific difficulties of managing hypertension may be partially reflected in the current results. A single intervention, perceived as supporting autonomous health choices, may not have been powerful enough to overcome the complex barriers to increasing autonomous regulation for lifestyle modifications that are recommended in hypertension management.

Relations between SDT Variables

A premise of SDT is that autonomy support from providers is related to autonomous regulation of recommended lifestyle changes. The current study finding of a nonsignificant and weak relation between perceived autonomy support and autonomous regulation \( (r_s = .14, p = .11, \text{one-tailed}) \) is generally inconsistent with the extant SDT literature, which has supported the SDT premise in health studies addressing various health issues. This includes smoking cessation (Williams et al., 2006), exercise for cancer survivors (Milne et al., 2008), exercise for cardiac rehabilitation (Russell & Bray, 2010) and chronic disease management for diabetes (Williams et al., 2004), with significant positive relations demonstrated between perceived autonomy support from providers and autonomous regulation in all the above studies. Beyond the previous suggestion that the intervention was insufficient to promote autonomous motivation, the inconsistency of results may partially reflect various sample differences between the above referenced studies and the current study sample. For example, Russell and Bray (2010) demonstrated a significant relationship between autonomy support and autonomous treatment regulation at eight week follow up \( (r = .38, p < .01) \), with a sample who had experienced life-threatening cardiac disease. Milne and colleagues
demonstrated a strong association between autonomy support and autonomous regulation 
($r = .46, p < .01$) in an exercise program for breast cancer survivors.

The provision, by a health provider of autonomy support, to those who already have dramatic evidence of the need to improve their health status, is an additional impetus to take responsibility for recommended health behavior changes. Yet, the current results are also inconsistent with SDT research in the management of diabetes, where individuals may not have such dramatic evidence of the need to internalize lifestyle changes. At a 12-week follow up of an autonomy-supportive intervention for lifestyle changes, Williams and colleagues (2004) demonstrated a strong relationship between perceived autonomy support by providers and autonomous treatment regulation ($r = .33, p < .01$). One further consideration is that socioeconomic status may be a factor in separating the current results from the majority of other SDT findings, with all the above referenced studies based on Caucasian, middle-income samples. It may be that individuals in marginalized populations with fewer healthcare choices respond to collaborative interventions in different ways from those in majority populations who are used to having their voices heard. If such interventions encourage “compliance” with health recommendations in disenfranchised populations, autonomous regulation of those recommended health behaviors may be less likely to occur.

The exploration of the relationship between controlled regulation and other SDT constructs has received minimal attention in the literature. However, based on the assumed relations between the constructs of SDT, the current finding of a strong and significant positive relation between perceived autonomy support and controlled regulation ($r_s = .40, p < .001$, two-tailed) was unexpected. Few studies have reported the
results of correlational analyses between perceived autonomy support and controlled regulation. However, this result is inconsistent with that reported in a weight-loss study, which demonstrated a weak association of .09 between perception of autonomy support and controlled regulation for exercise at a five-week measure, and a negative correlation between these variables at a final six-month measure (Williams et al., 1996).

Although the correlation between perceived autonomy support and controlled regulation was not reported, Milne and colleagues (2008) reported unexpected increases in controlled regulation at a 24-week measure for the intervention group in the exercise study for breast cancer survivors referenced above. However, results also demonstrated significant increases in autonomous regulation, suggesting that the intervention provided external reinforcement for exercise, while simultaneously promoting autonomous reasons for that same activity. Results of the above research by Milne et al. (2008) raised the question of whether the autonomy-supportive intervention in the current study had promoted controlled regulation for the health behaviors of interest. Post-hoc analysis was therefore conducted to examine any differences between groups on controlled regulation.

Results of this analysis, using an independent samples t-test, demonstrated no significant difference in controlled treatment self-regulation scores for the MI and SE groups, $M_{MI} = 3.88$, $SD_{MI} = 1.47$ and $M_{SE} = 3.91$, $SD_{SE} = 1.74$; $t(74) = -.07$, $p = .95$, two-tailed. The magnitude of the difference in the means (mean difference = .021, 95% CI: -.76 to .71) was very small (eta squared = .001). Thus, in the current study, controlled regulation for dietary and exercise behaviors was not differentially impacted by group intervention. While the MI intervention was perceived as autonomy supportive, as measured by the HCCQ, that perception did not appear to impact either autonomous or
controlled regulation for exercise. The implication of these findings is discussed in relation to health behaviors in the following section on health outcomes.

As stated, all hypotheses in the current study related to the perceived competence variable were unsupported. Research support for the role of perceived competence, according to the original SDT model, is very mixed, and some researchers have now chosen not to include a measure of perceived competence in their SDT research studies (e.g., Russell & Bray, 2010; Wilson, Blanchard, Nehl, & Baker, 2006; Wilson & Rodgers, 2004). Self-Determination Theory proposes that perceived competence mediates the relationship between the perception of an autonomy-supportive health environment and qualitative changes in treatment regulation (Deci & Ryan, 2000; Williams, McGregor et al., 2005). The theory also posits a positive association between the perception of autonomy support and perceived competence, and a positive association between perceived competence and treatment regulation. There is some support for these relationships in studies of exercise, smoking cessation, and the management of diabetes (Puente & Anshel, 2010; Williams et al., 2006; Williams, et al., 2004). However, Kennedy et al. (2004) found support for an adapted model, with evidence of an indirect relationship between autonomy support and perceived competence through the mediation of autonomous regulation of HIV treatment behaviors. Other research in the management of diabetes has reported a direct relationship between perceived competence and health outcomes, which is also inconsistent with the original theory (Williams et al., 1998; Williams et al., 2005).

In the current study, correlational analyses failed to support any of the expected SDT relationships described above. These analyses included the association between
perceived competence and autonomy support ($r_s = .16, p = .09$, one-tailed), the association between perceived competence and autonomous treatment regulation ($r_s = .06, p = .30$, one-tailed), and the hypothesized direct relation between perceived competence and health outcomes (dietary sodium: $r_s = -.08, p = .25$, one-tailed; exercise: $r_s = .08, p = .24$, one-tailed). Current findings further indicated no difference between groups on the measure of perceived competence. The $t$-value of -.08, $p = .47$, one-tailed, with a mean score difference of -.02 between groups, represented a very small effect size. The mean score for both groups, of 6.4 on a scale of one to seven, suggests that all participants perceived themselves as highly competent to manage their hypertension. It is possible that, in relation to hypertension management, participants responded to the questionnaire in relation to taking their medications. With no specific reference to lifestyle changes, the four questions of the PCS could easily be assumed to relate primarily to the regular taking of medications, an interpretation indirectly supported by the average blood pressure being at goal in the current study, discussed in a later part of this chapter.

The single significant finding related to the perceived competence variable was an unpredicted but intuitively understandable negative relation between perceived competence and depression ($r_s = -.23, p < .05$, two-tailed). In subsequent analysis controlling for multivariate outliers, this relationship was eliminated. In relation to the mixed support for the perceived competence construct in the literature, and additionally, the current study’s lack of support for proposed relation between the main SDT variables, the overall failure in the current study to support relations involving the perceived competence construct was not unexpected.
Health Related Outcomes

Lifestyle modifications related to dietary sodium appeared to be of more interest than activity modifications in the current study. When first asked the question “could you tell me about anything you’ve been trying to do to help control your blood pressure and how that’s going for you?” almost all participants in the MI group volunteered information regarding dietary sodium reduction, as opposed to talking about increasing activity levels. Subsequent questions and discussions also focused primarily on this topic. Although this may have reflected the clinic’s focus on dietary sodium in hypertension management, many of those same participants also volunteered the information that they needed to exercise more to lose weight, and were validated in this with additional feedback that walking more (the preferred activity in this sample) would also have the direct benefit of lowering their blood pressure.

It was further recorded in the session notes that every participant in the MI group chose to take a leaflet on dietary sodium as they left the interview room, but far fewer picked up leaflets on exercise. Similarly, while SE participants were recorded as asking fewer questions overall, the majority of those questions were noted as being related to dietary sodium rather than to exercise and activity behaviors, even though material on both those topics was presented in the intervention. It appeared that increasing daily activity levels was generally not considered a priority in the management of hypertension in this population.

As stated, perception of the provider’s autonomy support was found to be positively related to dietary sodium changes ($r_s = .19, \ p < .05\text{, one-tailed}$). These results are supported in the MI literature, with significant associations reported between
autonomy-supportive interventions and recommended dietary changes in African American low-income samples (Ahluwalia et al., 2007; Ogedegbe et al., 2008; Schoenthaler et al., 2008). The current results are also supported in previous SDT studies focused on chronic disease management. For example, in research promoting dietary changes in the management of diabetes, significant associations have been reported between the perception of autonomy-supportive health providers and improved blood sugar control (Senécal, Nouen, & White, 2000; Williams, Freedman, & Deci, 1998; Williams et al., 2005). While these results support the current findings, the direct association between autonomy support and dietary sodium reduction in the current study appeared to be tenuous, in that controlling for depression and eliminating outliers weakened the relationship ($r_s = .18, p = .07$, one-tailed).

There are no reports in the extant literature of depression having been examined as a moderator of SDT relations. However, it was noted in a previous chapter that 18% of the current study sample reported symptoms of depression that evidenced the likelihood of depressive disorders. Although there is evidence that depression is negatively related to adherence in low-income African American with hypertension (Siegel et al., 2007), there is no research to suggest that the relation between autonomy support and health outcomes is moderated by depression. In a population that appears to have almost double the level of depression reported in the general US population (Kroenke et al., 2009), these results raise the question of how individual variables such as depression level may affect interpretation of the perception of autonomy, and in turn how that may differentially impact health outcomes.
Contrary to predictions, the current study demonstrated a nonsignificant relationship between autonomy support and exercise behaviors ($r_s = .09, p = .23$, one-tailed) which is generally inconsistent with the SDT literature. There are no reported studies of samples from comparable populations, but Russell and Bray (2010) demonstrated a positive relationship between perceived autonomy support and exercise behavior in a study related to cardiac rehabilitation ($r = .27, p < .05$). Similarly, in a controlled study with high-school students, Chatzisarantis and Hagger (2009) reported a positive association between an autonomy-supportive teaching style and exercise related outcomes ($r = 0.34, p < .001$). Overall, based on the individual session records, it seems reasonable to interpret the differences in health-related outcomes as reflecting the greater interest in dietary sodium reduction, demonstrated across both groups in the current study.

As stated, the proposed relation between autonomous treatment regulation and health outcomes was not supported. Perhaps of more interest, in light of the strong relation demonstrated between perceived autonomy support and controlled regulation, it was observed that controlled regulation demonstrated non-significant relations with reduced dietary sodium ($r_s = .14, p = .24$, two-tailed) and exercise behaviors ($r_s = -.01, p = .90$, two-tailed). Thus, in the current study, neither type of regulation for health behaviors (autonomous or controlled) was related to health behavior changes. It is probable that in a population dealing with basic living issues, health behavior modifications do not take priority. Conversely, it appears that the taking of medications to control blood pressure is important in this population. Baseline demographic information supports this interpretation. There is a well-recognized direct correlation
between weight and blood pressure (Huang et al., 1998; Staessen, Fagard, & Amery, 1988), yet in the current sample, although the mean blood pressure was at goal, the average BMI was 32 (obese range), implying that participants had to be taking their antihypertensive medications regularly to achieve that degree of blood pressure control. It was unfortunate that the TSRQ subscale for measuring autonomous reasons for taking medications could not be used in the current study, due to its low reliability. It would have been interesting to compare those results with the TSRQ results for lifestyle health behaviors, to see if the above interpretations were supported.

Session Record Data

Examination of checked items and notations made on the individual session records (Appendix M) implied that the majority of MI participants were more responsive, and appeared more invested in the interviews, than were participants in the control group. This interpretation is based on regular comments in MI session notes, which included the following: initially quiet - became more involved during interview; open about health concerns; appeared invested; seemed energized by discussion. In contrast, session notes for SE participants regularly included researcher comments such as quiet but attentive; difficult to engage; few questions; appeared interested.” The “appeared interested” SE notation as opposed to “appeared invested” MI notation exemplifies the more passive interactions with SE participants, and more difficulty for the researcher in interpreting how the information was being received by SE participants. Although these differences are subtle, conducting both arms of the current study highlighted, for the researcher, one of the values of collaborative approaches, in that they appear to have more potential than
educational approaches to facilitate interactive discussion in which providers are able to
gauge, and respond to, the immediate health concerns of individuals.

Participants in both groups appeared equally aware of their need to reduce their
sodium intake, as evidenced by the majority of participants in both groups reporting that
they had cut back on salt since receiving their diagnosis of high blood pressure.
However, it was noted that many participants in the MI group reported having few food
choices, being dependent on other family members or on food banks, while several MI
participants additionally reported looking at low-sodium meats in the supermarket but
finding them too expensive compared with “regular” foods. This highlights the
importance of interventions being culturally relevant. Even in the current setting, where
the sodium-restriction literature had been adapted to reflect culturally-relevant food
choices, that literature still assumes that patients have general control over their food
choices.

Overall, examination of session notes revealed that the application of MI
principles was relatively stable across participants, as evidenced by checks against all
items addressed in each MI interview. This included regularly checked open-ended
questions used to promote active engagement in the discussions, questions and statements
chosen to promote self-awareness (asking what had motivated any reported health
changes), and questions that demonstrated confidence in the participant’s ability to
improve their own health status. In particular, towards the end of each MI interview,
encouraging each individual to identify one small step that they felt ready to incorporate
into their daily routine, in working toward identified health goals, appeared to resonate
with participants. Notations indicated that almost every MI participant put some thought into their response to this question, and appeared willing to explore their own choices.

The most common responses to questions about underlying reasons for making any health changes included experiencing the loss of family members to heart disease, avoiding the increasing ill health they saw around them in parents, siblings, or friends, and being around for children and grandchildren. Understanding those underlying reasons is of value to any health care provider if promotion of health changes is to be culturally relevant in the population it addresses. It is of interest that the avoidance of ill health was generally the first reason given for making any hypertension-related changes. Perhaps this external pressure to make changes is reflected in the current study finding that the intervention did not promote increased autonomous regulation of health behaviors. While the positive valuing of health for its own sake may be the ultimate goal in promoting long-term maintenance of recommended health behaviors (Bellg, 2004), this may be unrealistic in some settings. In high-risk African American populations, demonstrated as having poor health outcomes from hypertension (e.g., Hyre et al., 2007; Williams et al., 2007), the regulation of recommended lifestyle changes may continue to be determined primarily, by external pressures and controlled reasons such as I’d feel guilty if I didn’t watch my diet and/or exercise and I would feel ashamed of myself if I didn’t [follow a low salt diet and/or exercise], rather than autonomously-regulated reasons such as exercising regularly and/or following my diet are choices that I really want to make.
Limitations

One of the primary concerns with the design of this study was that one researcher conducted both arms of a controlled trial, with no external raters evaluating either intervention. Even if the design had included a second researcher to administer the SE intervention, as had initially been anticipated, without external rating of the two conditions, interpretation would still have been limited. Although the current study design limits replication and the generalization of its findings, these limitations are mitigated to a small degree in the richness of one researcher being able to observe and compare qualitative differences in responses across the two interventions. However, the above summary of the MI intervention and comparative experience of participants’ responses to the SE intervention is inevitably a subjective interpretation, by a researcher invested in using MI, and utilizing this approach in the promotion of lifestyle changes for chronic disease management for several years. This inevitably made using a more directive, less collaborative approach for the SE participants challenging for the researcher. Several times, a final comment was made by the researcher in the session notes of SE participants such as “MI slipped in!” or “difficult not to focus on support for participant’s previous health change efforts.” This was noted as being especially challenging when the researcher had to change styles within a short time-frame. Thus, beyond the concerns of subjectivity of the researcher, separation between the two intervention styles was far less than intended, making the interpretation of current findings even more limited.

Examination of session notes revealed that MI interventions appeared to promote more frank discussions about healthcare concerns than did the standard education
intervention. However, as previously stated, notations in several MI session records indicated that some participants appeared to need more time than others in their readiness to explore health concerns with the researcher. While the length of the average SE intervention (16 minutes) is realistic in reflecting the time a health provider in the current setting might spend discussing lifestyle modifications, this was less than half the length of the average MI intervention. This difference between groups limits the ability to evaluate any specific impact of the MI intervention. Perhaps if participants in the SE group had also been offered more time, they would have similarly been more willing to share their concerns, which would have altered their perception of autonomy support, with potentially different outcomes.

The potential for selection bias is of concern in this study. As stated, only 64% of individuals approached by the researcher, agreed to participate in the study. Of those, 19% failed to return to complete questionnaires. Additionally, although the examiner was present at every outpatient clinic during the data collection period, fewer than half of those identified each day as meeting the study criteria for inclusion were even approached by the researcher. Several factors contributed to this, including patients who failed to keep appointments, patients who arrived when the researcher was already working with another participant and were put into the system before the researcher could approach them, and the inevitable times when the researcher was not paged when an identified patient checked in for their medical appointment. Beyond the question of what factors influenced participants in their decisions not to return to complete the study, the many patients who failed to attend their outpatient appointments may represent a population with different underlying motivations for treatment adherence, and
subsequently that population might have responded differently to the current intervention. Conversely, those patients who kept both their outpatient appointment and the research follow-up appointment may represent a select group of individuals who were already motivated to make health changes. If this group represented a high-end distribution in terms of motivation coming in to the study, this would suggest a lower variability in the sample that might have mitigated against finding a treatment effect. Overall, the above factors combine to suggest the sample of patients may have been skewed to a certain patient population, biasing the results.

Limitations in the study design are also noted in that the collection of outcome data occurred only two weeks after the intervention. Comparative studies have generally taken first outcome measures no less than four weeks after the initial intervention (Edmunds et al., 2008; Fortier, Sweet, O’Sullivan, & Williams, 2007; Milne et al., 2008; Silva et al., 2010). The short interval time in the current study was partly chosen to minimize rates of attrition. The previous experience of the researcher working in the current study setting was that, despite phone call reminders to every patient due for a medical appointment, many patients did not keep their appointment. It was anticipated that a two-week follow up in the current study might retain the interest and inclination of participants to return to complete the study. However, this limits comparisons with other study findings.

A related design concern was noted earlier, in that the strength of the manipulation may not have been sufficient to increase autonomous regulation for recommended lifestyle changes in this population. Perhaps that insufficiency is related to the short interval between intervention and follow-up. Research suggests the potential
for a single 45-minute intervention based in MI, to promote lifestyle changes for hypertension that remain stable over time (Woollard et al., 2003), but it is of note that autonomous regulation was not measured in that study. If positive outcomes initially result from externally reinforcing aspects of interventions, subsequent changes in autonomous regulation for those behaviors are unlikely to be measurable as early as two weeks after the intervention. Additionally, the average time since diagnosis of hypertension in the current sample was greater than two years. It is possible that this length of time, combined with relatively well-controlled blood pressure, would make it more difficult for individuals to see any value of investing energy in making recommended lifestyle changes. As such, a single intervention may have been even less likely to be effective.

Low reliability in the measure of social desirability responding used in the current study (M-C 2; Strahan & Gerbasi, 1972) indicated that it was not a valid measure of social desirability with the current sample (\(\alpha = .33\)). It was therefore not included in the analyses. However, the inability to account for social desirability factors in a study dependent on self-report data (Heppner, Kivlighan & Wampold, 2008) is a major concern. The HCCQ measure of perceived autonomy support appears to be especially susceptible to social desirability responses, in that it could easily be interpreted as a way of pleasing a provider through giving higher ratings on the scale.

This interpretation is perhaps supported in the session notes of one female participant in the MI group who, after completing the HCCQ (the first questionnaire in the packet), commented to the researcher “well, ten out of ten so far!” Another concern regarding the measures was acknowledged in a previous chapter. Poor reliability of the SDT subscale
for autonomous regulation of lifestyle behaviors suggested that the removal of one specific item was necessary, to increase the measure’s reliability to a reasonable level for use in the current sample. However, as noted, this limits the utility of the current findings related to the measure, in that future studies in similar populations will be unable to use these results in direct comparison to their own findings.

Implications for Practice

Overall, the findings from the present study are inconclusive in supporting the potential utility of incorporating MI techniques into healthcare providers’ work with low-income African Americans in the management of hypertension. However, the qualitative data imply that what may appear a reasonable time for a provider to spend encouraging recommended lifestyle changes may be insufficient to gain patients’ confidence and promote the exploration of patients’ questions and concerns. In session records, the researcher noted that with over a third of MI participants it took “some time” for participants to be comfortable enough to open up about their health concerns. Conversely, the researcher noted that, with the majority of SE participants, the intervention felt “rushed” or “impersonal.” While this interpretation is by nature very subjective, and further, lacks specific information as to whether any specific MI techniques contributed to participants’ willingness to discuss their health problems, there is some research support for the relation between investing time and listening to patients’ unique health concerns and improved health outcomes in a comparable study sample.

Specifically, Hyre et al. (2007) reported that in an African American sample drawn from health practices primarily serving the under-insured, being listened to and feeling cared for by their health providers were the primary factors in reducing resistance
to treatment recommendations. In the current study, the finding that only four of the 15 who did not return were in the MI group was perhaps related to the perception of feeling cared for in that group. Whether the perception of the MI intervention as autonomy supportive could eventually lead to increased self-regulation for recommended health behaviors cannot be determined in the current study. However, in conjunction with the findings of Hyre and colleagues, the current session data suggest some value, in terms of promoting open discussion of relevant health changes, to finding time for listening and supporting patients’ unique concerns related to their health problems, in similar low-income community health settings. The regular trainings in MI offered to a variety of health professionals across the US imply that some health providers are attempting to incorporate MI principles into health-based interventions. Based on the current research findings, it is suggested that health professionals, working in chronic disease management with low-income populations, might consider testing the value of incorporating the autonomy-supportive principles underlying MI into their work. Improving the quality of provider patient relationships may be a valuable step towards increasing the potential for the adoption of recommended health changes in such vulnerable populations.

The implication that an intervention, based in the principles underlying MI, can promote recommended dietary health changes is supported in the literature (Burke et al., 2003; Resnicow et al., 2009; Woollard et al., 2003). However, it is a concern that the positive association demonstrated between perceived autonomy support and dietary health outcomes appeared tenuous in the current setting, as evidenced by its elimination when controlling for the effects of depression. It is suggested that, in settings similar to
that of the current sample, early assessment of depression may be of value in determining the most appropriate approach for every individual to help manage lifestyle modifications for their chronic diseases.

Future Research Directions

The current study found no support for the expected relationships among SDT constructs, and, as described above, offered very limited support for the proposed relations between SDT constructs and health outcomes. These findings raise questions about the overall utility of SDT in certain low-income populations, particularly in marginalized populations such as the one in the current study. Perhaps the most concerning result in the current study was the strong positive relation demonstrated between perceived autonomy support and controlled regulation, in relation to a weak association between autonomy support and autonomous regulation. This finding raises many research questions, including how individual differences in perception of control over one’s environment may be related to the need for autonomy support, and how differences in the need for autonomy support may differentially impact one’s interpretation of such support.

If baseline differences in treatment self-regulation can differentially impact interpretation of providers’ autonomy support, how do those differences in interpretation then impact short-term, and long-term, health outcomes? For internalization of a recommended health behavior to occur, it has been suggested that the value of that behavior needs to resonate with one’s core values and goals (Markland et al., 2005). In the current study population, it is unlikely that the value of making recommended lifestyle changes for a disease with few or no symptoms would take precedence over the
urgency of finding a job or feeding one’s family. As such, it may be that externalized reinforcement from health providers will need to remain the driving force for promoting and maintaining health changes for a long time. Perhaps with ongoing autonomy-supportive interventions by health providers, self-regulation of those health behaviors might occur slowly over time, but this has long-term implications on overstretched inner-city health services.

It is of note that over 75% of participants in the current research had been diagnosed with hypertension for more than two years, with their blood pressure averagely well controlled with medications, but with generally low lifestyle adjustments (high BMIs with self-reported high sodium diets and low levels of exercise). Interventions promoting lifestyle changes may be more effective in those with newly diagnosed hypertension. Perhaps such individuals would be more receptive to the concept that while medications may control blood pressure, ignoring underlying contributing lifestyle factors will lead to the need for more medications to control the disease over time, and overall poorer long-term health outcomes. Longitudinal studies with baseline and repeated measures over time may serve to answer some of the many questions raised in this study.

Retrospectively, including a measure of health locus of control such as the health subscale in the Multidimensional Locus of Control (Wallston, Wallston, & DeVillis, 1978) would have been of value, in examining individual differences in perceptions regarding control of one’s health environment, and how those differences impacted outcomes. A pre-post measure of this instrument would have added to its utility. Self-Determination Theory does offer a related General Causality Orientation Scale (Deci &
Ryan, 1985b) that assesses the relative strengths of different underlying motivational orientations within an individual. However, detailed examination of the measure determined it to be based on a series of vignettes that were primarily achievement oriented, or involved social situations that were not culturally relevant to the current sample, and the instrument was therefore not utilized in this study. It is hoped that, as SDT health research expands to include more lower-income populations with different health problems, a culturally-validated measure of underlying health motivation, related to the SDT treatment self-regulation construct might become available. Further, there is little research to support the validity of any of the SDT measures in populations similar to that in the current study. Of particular concern is that these are primarily face-valid instruments that are subject to social desirability responding, and this may have confounded the results. While a measure of social desirability would have helped to ascertain whether this was a problem, validation of all SDT measures, across low income and ethnic minority populations, would be of value to future SDT researchers.

The current results provided no causal level support for the SDT model, raising questions as to whether proposed relations between SDT constructs, and improved health outcomes (Deci & Ryan, 1985a, 2002) may be differentially affected by variables that have not been considered previously. Specifically, in the current study, interactions of demographic factors such as minority group and economic status may have contributed to the results, which were generally unsupported by previous findings in majority, middle-income samples. The relevance of social and psychological factors in medical outcomes has been described and supported in the psychology literature for more than three decades (Engel, 1977; Suls & Rothman (2004). In the current social milieu, where
economic downturns have differentially impacted majority and minority groups, the need to incorporate psychosocial variables in multisystem approaches by health providers has never been more urgent. This needs to be addressed in health-related research.

The relation between certain socio-contextual variables and poorer medication adherence for hypertension has been demonstrated in low-income African American samples (Rose et al., 2000; Siegel et al., 2007). Additionally, there is some evidence in the literature of an association between depression and hypertension (e.g., Scherrer et al., 2003) which may be of more clinical significance in African Americans than in other populations (Read & Gorman, 2007). In the current study, the positive relation between perceived autonomy support and dietary sodium health behaviors was eliminated after controlling for depression, suggesting that depression may have positively influenced this association. One of the limitations of the PHQ-8 is that the questions do not differentiate between different symptoms of depression in ways that may be relevant to treatment response. For example, a single question asks about feeling down, depressed or hopeless, yet there may be major differences between being down and hopeless in terms of their impact on motivation. Future researchers may like to explore these differences in relation to health behavior outcomes. If the proposed relations between SDT constructs are differentially moderated by psychosocial variables across populations, this would have implications for the future development of the SDT model.

There is no doubt that hypertension management in low-income populations, such as that of the current population, presents complex problems for health providers. The many unanswered questions raised in the current research call for more rigorous studies in the future to address this most complex of medical challenges. The utility of SDT as a
theoretical context for the practical application of MI, at present, remains questionable. While the authenticity of the current MI intervention could not be objectively evaluated, future researchers may find ways of testing this proposition though the utilization of more standardized and robust study designs. The need to find empirical support for MI, demonstrated in a wide range of studies as related to improved health outcomes, is vital if it is to be fully accepted by the scientific community. However, the lack of support in the current study for the theoretical framework used to contextualize the current MI intervention is of even greater concern. It is essential that the constructs of an empirical theory, such as SDT, are validated and tested in a broad range of populations, if that theory is to inform practice.

Overall, this study revealed some provocative findings that warrant further investigation. The surprising finding that the perception of autonomy support was related to controlled and not autonomous regulation of health behaviors raises many questions for future research. Possibly this was simply due to methodological limitations, or alternatively to the complexity of hypertension management. It is also possible that this population may interpret autonomy support from health providers very differently from other populations. If so, more intensive and longer-term approaches may be necessary to promote stable, autonomous regulation of lifestyle health behaviors. In regard to the lack of support for the assumed underpinnings of MI, more research is necessary to either support or refute these assumptions. However, the qualitative data support the value of pursuing a more detailed examination of specific aspects of MI that may be valuable in promoting stable health behavior changes. Perhaps the primary factor with the power to influence outcomes, reflected in the “felt” difference between the two approaches, and
the much higher attrition rate among control group participants, is the relationship itself.

The client-centered approach on which MI is based, rather than any specific strategies or principles laid down in MI, may have the ability to influence health outcomes in its own right, in such vulnerable populations. The continuing case for the intersection of medicine and psychology, in both research and in the field, is strong.
REFERENCES


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APPENDICES
APPENDIX A

INFORMED CONSENT FORM

Autonomy Support and Hypertension: A Controlled Study in an Inner City Sample.

You are invited to participate in a research project being conducted by Lynne Wiseman, a doctoral student in the Department of Counseling, at the University of Akron. The purpose of this study is to investigate how the quality of the relationship, between providers and individuals being treated for high blood pressure at the Free Clinic, may improve health outcomes. It is estimated that 80 individuals will participate in this research project.

Procedure: You will be interviewed by the researcher regarding your blood pressure management on a day that you are attending a medical follow up. It is anticipated that the interview will take between 20 and 40 minutes. You will then be given a follow-up appointment for two weeks after the interview. At that follow-up appointment, you will be asked to complete questionnaires related to the management of your blood pressure, as well as a brief demographic instrument that will ask about the length of time since your diagnosis with high blood pressure, your employment status, and level of education. It is anticipated that it will take you 30 to 45 minutes to complete these questionnaires.

Anonymous Data Collection: Your signed consent form will be kept separately from your data, and nobody will be able to link your answers to you.

Confidentiality of records: The information you give will be used for research only. Any identifying information collected will be kept in a secure location and only the researcher, Lynne Wiseman, and her advisor, Dr. Linda Subich, will have access to this information. Participants will not be individually identified in any publication or presentation of the research results.

Risks and Discomforts: There are no known risks in participating in this research study. If a participant has any questions regarding their high blood pressure care that were raised during the course of this research study, they may call the Free Clinic and request to speak to a Nurse Practitioner (216) 721-4010.

Benefits: It is believed that participation in this study will directly benefit participants by giving them the opportunity to review how they are currently managing their high blood pressure, in relation to current medical guidelines.
Participation in this study may also assist others in the future. It is hoped that this research may assist clinicians in helping individuals better manage their high blood pressure.

**Compensation:** All participants will be offered a one-day bus pass to assist their return for the two-week follow-up research appointment. Participants will be compensated for their time at this follow-up appointment with a $20 grocery coupon.

**Right to Decline or Withdraw:** Participation in this study is voluntary. Refusal to participate or withdrawal from the study, at any time, will in no way affect the care you are entitled to at the Free Clinic.

**Who to contact with Questions:** If you have any questions about this study, you may call Lynne Wiseman at (216) 707-3500 x1655, or Dr. Linda Subich at (330) 972 8379. If you have any questions about your rights as a research participant, you may call the University of Akron IRB at (330) 972-7666.

I have read the information provided above and all of my questions have been answered. I voluntarily agree to participate in this study. I understand I will receive a copy of this consent form.

__________________________________________________________________________          _________________
Participant’s Signature      Date
APPENDIX B

SAMPLE INTERVENTION QUESTIONS AND STATEMENTS

Principle 1. Resisting the temptation to persuade: Opening the way for exploration of ambivalence.

☐ I know you’ve been given a lot of information about things you can do to help control your blood pressure. Sometimes that can feel overwhelming. How are you managing?

☐ Could you tell me about anything you’ve been trying to do to help control your blood pressure and how that is going for you?

☐ However much we want to be healthier, it’s really hard for most of us to make changes in our diet / activity levels.

Principle 2. Understanding and demonstrating interest in patients’ motivations for change: asking why they would want to make a health change, listening to their concerns, ambivalences, and motivations. Encouraging exploration of ambivalence regarding changes in a non-judgmental manner.

☐ You seem to be really thinking about lowering your salt intake, and/or starting to exercise more regularly.

☐ It sounds like you really want to take control of your blood pressure better, but it’s difficult for you at this time to eat lower salt foods / walk regularly.

☐ What, for you, are the most difficult things in cutting back salt in your diet / walking regularly that you mentioned?

☐ You’ve already really cut down on your salt intake. What motivated you to make those changes / what made you want to make those changes?

Principle 3. Supporting patients’ preferred level of autonomy in making health decisions. Empowering patients by affirming their choices and readiness to move forward.
Everyone is unique and there is not just one way of moving forward. The good thing is that you can make choices that are workable / OK for you.

You mentioned several things that would help in controlling your blood pressure. You could choose any one of those that would work for you / that you feel ready to take on at this time.

All of the changes you said you would like to make are good ones, but it would be difficult for any of us to make such a lot of changes all at once.

Only you can know which of these things is possible for you at this time. Taking one small step is often more likely to succeed than trying to make too many changes all at once.

Principle 4. Promoting self-efficacy in health behaviors by encouraging patients to identify one or more specific steps that resonate with individual values. Demonstrating respect for those choices at the end of the exploration. Supporting patients’ hope that health changes and improved health outcomes are possible.

There are many choices for you here, each of which would help keep your blood pressure under control and help keep you healthy thirty or forty years down the line.

You can tell better than I can what would work for you and what you feel ready to take on at this time. Is there any one thing that we’ve talked about today that you are thinking you would like to try at this time?

You mentioned wanting to be more active. That sounds a really good idea. Have you thought of any small change in your daily routine that would help you in that goal?

You said that you like salty foods, but you would also like to cut back a bit on your salt intake. Is there any one food in particular that concerns you / that you have been thinking about changing?
APPENDIX C

TREATMENT SELF REGULATION QUESTIONNAIRE (TSRQ)

Part A – Medications for Hypertension

There are a variety of reasons why patients would take their medications for high blood pressure. Please indicate how true each of these reasons is for you.

*Use the scale to guide your answers:*

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<tr>
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<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all true</td>
<td>Somewhat true</td>
<td>Very true</td>
<td></td>
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</table>

I take my medications for high blood pressure because:

1. Other people would be mad at me if I didn’t.  
2. I find it a personal challenge to do so.  
3. I personally believe that controlling my blood pressure will improve my health.  
4. I would feel guilty if I didn’t do what my doctor said.  
5. I want my doctor to think I am a good patient.  
6. I would feel bad about myself if I didn’t.  
7. It’s exciting to try to keep my blood pressure in a healthy range.  
8. I don’t want other people to be disappointed in me.
APPENDIX D

TREATMENT SELF REGULATION QUESTIONNAIRE (TSRQ)

Part B - Low Salt Diet and Exercise for Hypertension

There are a variety of reasons why patients with high blood pressure would follow a salt restricted diet, or exercise regularly. Please indicate how true each reason is for you.

Use the scale to guide your answers:

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<th>4</th>
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<tbody>
<tr>
<td>Not at all true</td>
<td>Somewhat true</td>
<td>Very true</td>
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</tbody>
</table>

The reason I would follow a low salt diet and/or exercise regularly is that:

9. Other people would be upset with me if I didn’t. 1 2 3 4 5 6 7

10. I personally believe this is important in remaining healthy. 1 2 3 4 5 6 7

11. I would be ashamed of myself if I didn’t. 1 2 3 4 5 6 7

12. It’s easier to do what I’m told than to think about it. 1 2 3 4 5 6 7

13. I’ve carefully thought about my diet /exercise and believe it’s the thing for me to do. 1 2 3 4 5 6 7

14. I want others to see that I can follow my diet and stay fit. 1 2 3 4 5 6 7

15. I just do it because my doctor said to. 1 2 3 4 5 6 7

16. I feel personally that watching my salt intake and/or exercising are best for me. 1 2 3 4 5 6 7

17. I’d feel guilty if I didn’t watch my diet and/or exercise. 1 2 3 4 5 6 7

18. Exercising regularly and/or following my diet are choices that I really want to make. 1 2 3 4 5 6 7

19. It’s a challenge to learn to live with high blood pressure. 1 2 3 4 5 6 7
APPENDIX E

PERCEIVED COMPETENCE SCALE (PCS)

Please respond to each of the following items in terms of how true it is for you with respect to dealing with your high blood pressure.

Use the scale to guide your answers:

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<th>7</th>
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<tbody>
<tr>
<td>Not at all true</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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<tr>
<td>Somewhat true</td>
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<tr>
<td>Very true</td>
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1. I feel confident in my ability to manage my high blood pressure.
   1  2  3  4  5  6  7

2. I am capable of handling my high blood pressure now.
   1  2  3  4  5  6  7

3. I am able to do the routine things that help me manage my blood pressure.
   1  2  3  4  5  6  7

4. I feel able to meet the challenge of controlling my high blood pressure.
   1  2  3  4  5  6  7
APPENDIX F

HEALTH CARE CLIMATE QUESTIONNAIRE (HCCQ)

This questionnaire is related to your last visit with this provider. Providers have different styles in working with patients and we would like to know more about how you have felt about your encounter with this provider. Your responses are confidential. Please be honest and candid.

Please respond to each of the following items in terms of how true it is for you with respect to dealing with your high blood pressure.

I feel that this provider has given me choices and options.

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<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Neutral</td>
<td>Strongly Agree</td>
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I feel understood by this provider

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<tr>
<td>Strongly Disagree</td>
<td>Neutral</td>
<td>Strongly Agree</td>
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My provider conveyed confidence in my ability to make changes.

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<tr>
<td>Strongly Disagree</td>
<td>Neutral</td>
<td>Strongly Agree</td>
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My provider encouraged me to ask questions.

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<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Neutral</td>
<td>Strongly Agree</td>
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My provider listened to how I would like to do things.

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<th>7</th>
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</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Neutral</td>
<td>Strongly Agree</td>
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<td></td>
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</tr>
</tbody>
</table>

My provider tried to understand how I see things before suggesting a new way to do things.

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<th>7</th>
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<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Neutral</td>
<td>Strongly Agree</td>
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APPENDIX G

HEALTH BEHAVIOR (Dietary Sodium)

Please indicate your salt/sodium use by circling the ONE number in each question that is most like you.

A. Adding Salt at the Table

1. I usually add salt to my food at meal times.
2. I occasionally add salt to my food at meal times (twice a week or less).
3. I never add salt to my food at meal times.

B. Adding Salt in Cooking

1. I usually add salt to cooking
2. I occasionally add salt to cooking (twice a week or less)
3. I never add salt to cooking.

C. Grocery and Fast Foods

I eat one or more of these: fast foods, deli meats, bacon, canned soups and vegetables, salad dressings or sauces, pickles, salty snacks, or ready to eat foods:

1. Three or more times a week.
2. Twice a week or less.

Please Circle the Answer in each Item that Applies to You

I am thinking about decreasing my salt intake YES NO
I am planning to decrease my salt intake in the next month YES NO
I have decreased my salt intake in the last month YES NO
I choose lower salt foods when I go grocery shopping than I used to YES NO
I add less salt to my cooking than I used to YES NO
I add less salt to my food at meal times than I used to YES NO
APPENDIX H

HEALTH BEHAVIOR (Exercise)

Please circle the one number that most applies to you regarding how often you exercise (for example walking for 15 minutes or more at a time) and also please specify the average number of minutes exercising at one time)

1. Less than once a month

2. 1 to 3 times a month. Average minutes at one time _________

3. Once or twice a week. Average minutes at one time________

4. 3 or more times a week. Average minutes at one time________

TYPE OF EXERCISE
1 = Walking

2 = Other (Please specify the type of exercise) ___________________

Please circle the answer in each statement that apply to you

I am thinking about increasing my daily activity level in the next few months. YES NO

I am planning to increase my daily activity level in the next month. YES NO

I have increased my daily activity level in the past month. YES NO
Over the past 2 weeks, how often have you been bothered by any of the following problems?

Please use the following scale to guide your answers

<table>
<thead>
<tr>
<th></th>
<th>Not at all (0)</th>
<th>Several Days (1)</th>
<th>More than half the days (2)</th>
<th>Nearly every day (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little interest or pleasure in doing thing:</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Feeling down, depressed, or hopeless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Trouble falling asleep, staying asleep, or sleeping too much</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Feeling tired or having little energy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Poor appetite or overeating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Feeling bad about yourself – or that you’re a failure or have let yourself or family down</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Trouble concentrating on things, such as reading the newspaper or watching television</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Moving or speaking so slowly that other people could have noticed. Or, the opposite – being so fidgety or restless that you have been moving around a lot more recently</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

If you checked off any problems, how difficult have those problems made it for you to do your work, take care of things at home, or get along with other people?

☐ Not difficult at all    ☐ Somewhat difficult    ☐ Very difficult    ☐ Extremely difficult
Listed below are a number of statements. Please read each item and indicate how true each statement is for you.

Use the scale below to guide your answers:

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<thead>
<tr>
<th></th>
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<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Strongly Disagree</td>
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<tr>
<td>Neutral</td>
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<tr>
<td>Strongly Agree</td>
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</table>

I never hesitate to go out of my way to help someone in trouble.

1 2 3 4 5 6 7

I have never intensely disliked anyone.

1 2 3 4 5 6 7

I sometimes feel resentful when I don’t get my own way.

1 2 3 4 5 6 7

There have been times when I felt like rebelling against people in authority even though I knew they were right.

1 2 3 4 5 6 7

I can remember “playing sick” to get out of something.

1 2 3 4 5 6 7

When I don’t know something I don’t at all mind admitting it.

1 2 3 4 5 6 7

I am always courteous, even to people who are disagreeable.

1 2 3 4 5 6 7

I would never think of letting someone else be punished for my wrong-doings.

1 2 3 4 5 6 7

There have been times when I was quite jealous of the good fortune of others.

1 2 3 4 5 6 7

I am sometimes irritated by people who ask favors of me.

1 2 3 4 5 6 7
APPENDIX L

DEMOGRAPHICS QUESTIONNAIRE

1. **Time since first diagnosis of high blood pressure** (please circle one)
   A. Less than 1 year
   
   B. 1 to 2 years
   
   C. More than 2 years.

2. **Current Employment Status** (please circle one)
   A. Unemployed
   
   B. Part Time Employed
   
   C. Full Time Employed

3. **Highest Level of Education Completed** (please circle one)
   A. 8th grade
   
   B. High School Diploma
   
   C. GED
   
   D. Some College
   
   E. BA
   
   F. Advanced Degree
   
   G. Other (Please specify) _______________________________
APPENDIX M

INDIVIDUAL SESSION RECORD

Participant Identification Number:

AMI Intervention  Yes / No

Interview Start Time
Interview End Time
Interview Duration

Literature Distribution
Literature  Requested (AMI)  Accepted (SE)  Declined (SE)
Dietary Sodium
Activity and Exercise

I.  AMI Intervention Group:
   Statements / Questions / Responses
   ☐  I know you’ve been given a lot of information about things you can do to help control your blood pressure. Sometimes that can feel overwhelming. How are you managing?  
      Response if addressed and percentage of intervention time:

   ☐  Could you tell me about anything you’ve been trying to do to help control your blood pressure and how that is going for you?  
      Response if addressed and percentage of intervention time:

   ☐  However much we want to be healthier, it’s really hard for most of us to make changes in our diet / activity levels.  
      Response if addressed and percentage of intervention time:

   ☐  You seem to be really thinking about lowering your salt intake, and/or starting to exercise more regularly.  
      Response if addressed and percentage of intervention time:

   ☐  It sounds like you really want to take control of your blood pressure better, but it’s difficult for you at this time to eat lower salt foods / walk regularly.  
      Response if addressed and percentage of intervention time:
What, for you, are the most difficult things in cutting back salt in your diet/walking regularly that you mentioned? 
Response if addressed and percentage of intervention time:

You’ve already really cut down on your salt intake. What motivated you to make those changes/what made you want to make those changes? 
Response if addressed and percentage of intervention time:

Everyone is unique and there is not just one way of moving forward. The good thing is that you can make choices that work for you. 
Response if addressed and percentage of intervention time:

You’ve mentioned several things that would help in controlling your blood pressure control. You could choose any one of those that you feel ready to take on at this time. 
Response if addressed and percentage of intervention time:

All of the changes you said you would like to make are good ones, but it would be difficult for any of us to make such a lot of changes all at once. 
Response if addressed and percentage of intervention time:

Only you can know which of these things is possible for you at this time. Taking one small step is often more likely to succeed than trying to make too many changes all at once. 
Response if addressed and percentage of intervention time:

The good thing is that you have many options to help keep your blood pressure under control and help you be healthy thirty or forty years down the line. 
Response if addressed and percentage of intervention time:

You can tell better than I can what you feel ready to take on at this time. Is there any one thing that we’ve talked about today that you are thinking you would like to try at this time? 
Response if addressed and percentage of intervention time:

You mentioned wanting to be more active. That sounds a really good idea. Have you thought of any small change in your daily routine that would work for you? 
Response if addressed and percentage of intervention time:

You said that you like salty foods, but you have also been thinking that you ought to cut back a bit on your salt intake. Is there any one food in particular that you have been thinking about changing? 
Response if addressed and percentage of intervention time:

Other MI Participant Questions/Responses:
II. Standard Educational Control Group (SE)

- I’d like to check that you have our clinic literature to help you manage your high blood pressure.

- These (pointing to the relevant pages) are the most important things for you to focus on at this time (sodium restriction and increased activity).

- I’d like to go through these with you. If you have any questions please feel free to ask them as we go along.

SE Participant Questions / Responses:
APPENDIX N

INSTITUTIONAL REVIEW BOARD NOTICE OF APPROVAL

May 2, 2011
Lynea B. Wiseman
7055 History Lane
Gates Mills, Ohio 44040

From: Sharon McWhorter, IRB Administrator

Re: IRB Number 20110405 "An investigation of how to improve Communication between Patients and Providers in the Management of Hypertension with a free clinic sample"

Thank you for submitting an IRB Application for Review of Research Involving Human Subjects for the referenced project. Your protocol represents minimal risk to subjects and has been approved under Expedited Category #7.

Approval Date: May 2, 2011
Expiration Date: May 2, 2012
Continuation Application Due: April 18, 2012

In addition, the following is/are approved:
☐ Waiver of documentation of consent
☐ Waiver or alteration of consent
☐ Research involving children
☐ Research involving prisoners

Please adhere to the following IRB policies:

☐ IRB approval is given for not more than 12 months. If your project will be active for longer than one year, it is your responsibility to submit a continuation application prior to the expiration date. We request submission two weeks prior to expiration to ensure sufficient time for review.
☐ A copy of the approved consent form must be submitted with any continuation application.
☐ If you plan to make any changes to the approved protocol you must submit a continuation application for change and it must be approved by the IRB before being implemented.
☐ Any adverse reactions/incidents must be reported immediately to the IRB.
☐ If this research is being conducted for a master's thesis or doctoral dissertation, you must file a copy of the letter with the thesis or dissertation.
☐ When your project terminates you must submit a Final Report Form in order to close your IRB file.

Additional information and all IRB forms can be accessed on the IRB website at:
http://www.ualr.edu/research/irb/compliance/IRBforms.php

Cc: Linda Subich – Advisor
Cc: Stephanie Woods – IRB Chair

☐ Approved consent forms enclosed

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