6-2003

Cultural and Psychological Influences on Diabetic Adherence

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Cultural and Psychological Influences on Diabetic Adherence

by

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A Thesis submission in partial satisfaction of
the requirements for the degree of
Master of Arts in Psychology

June 2003

Each person whose signature appears below certifies that this thesis in his/her opinion is adequate, in scope and quality, as a thesis for the degree Master of Arts.

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ACKNOWLEDGEMENTS

I would like to express my appreciation to all the participants in this study. Without their time and willingness to participate this project would not have been possible. I am very grateful to the Loma Linda Diabetes Treatment Center, especially Scott Lee, M.D., Debbie Clausen, R.N., and Angie Gonzales who helped to coordinate the database from which this sample of patients came. Additionally, I would like to thank Kelly R. Morton, Ph.D. and Leslie Martin, Ph.D. for their time, guidance, and patience while this project matured. Finally, I wish to thank Hector Betancourt, Ph.D., for his unwavering support and encouragement as my mentor and advisor.

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ABSTRACT OF THE THESIS

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Loma Linda University, June 2003
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Diabetes mellitus is a serious disease that poses a particular healthcare challenge because progression is considered controllable (Cox, et al, 1985; Vinicor, et al, 1996) yet treatment adherence, and thus outcome, is very poor (Gonder-Frederick, Cox, & Ritterband, 2002; Goodall, 1991). Culture is a lethal risk factor for diabetic contraction and treatment maintenance. Latinos within the United States are two-to-three times more likely to develop complications and die than non-Latinos (Haffner et al, 1996; Rubin, Peyrot, & Saudek, 1991) and are less likely to adhere to treatment (Lipton, Losey, Giachello, Mendez, & Girotti, 1998). Efforts to eliminate health disparities have yet to address how cultural variations may contribute to adherence and diabetic outcomes. The present study examined relationships among cultural value orientations, health beliefs, attribution processes and emotions that may account for variance in adherence. A model demonstrating these relationships was tested using Bentler's (1995) analysis of structural equations (EQS) program.

Eighty-one (41 Latino, 40 Anglo) Type II diabetics self-selected to participate. Measures included demographic and blood glucose (Hb1Ac) information from medical records and self report ratings on culturally relevant value orientations (fatalism and

mastery), disease/treatment related beliefs (Harris, Linn, Skyler, & Sandifer's Diabetes Health Beliefs Scale[1985]), attributions regarding disease controllability (Revised Causal Dimension Scale; McAuley, Duncan, & Russell [1992]) and related emotions.

A test of the model resulted in a good fit of the data; CFI = .98, χ^2 (56) = 24.39, p = .33 thus, confirming adherence is in part a function of the relationships among cultural influences and psychological processes. More proximal components of behavior, such as cognitive processes and emotions, mediated the negative effect that cultural value orientations (fatalism and mastery) may have on adherence. Particularly, negative emotions (fear, anxiety, and worry) played a fundamental role in buffering the influence of cultural values.

The discussion further addresses how the application of similar models may provide a better understanding of cultural components that underlie health disparities as well as guide intervention strategies at the individual (e.g. treatment and professional patient interactions), as well as the social (e.g. public health policy and intervention) level.

Introduction

Cultural and Psychological Influences on Diabetic Adherence

The medical community continues to battle issues surrounding chronically ill individuals who inadequately utilize resources during prolonged and complicated medical treatments (Brannon & Feist, 1996; Center for Disease Control [CDC], 2002; Koop, 1983). Chronic diseases like diabetes mellitus pose a particular treatment challenge because even though progression is considered controllable (Cox, et al, 1985; Vinicor, et al, 1996; Wing, Epstein, Norwalk, & Lamparski, 1987), treatment adherence, and thus outcome, is very poor (Diabetes Control and Complications Trial Research Group [DCCTRG], 1993; Gonder-Frederick, Cox, & Ritterband, 2002). Treatment efficacy enhanced by greater adherence can be fostered by considering the patient's cultural values and cognitive processes regarding health (Barsky, Cleary, & Klerman, 1992; Becker & Janz, 1985). Performing adherence behaviors requires individuals to value good health outcomes, believe adherence will promote their health, and that they are capable of performing the necessary behavior.

Culture is a known risk factor for the contraction and treatment maintenance problems of chronic diseases such as diabetes mellitus (Harris, et al., 1998; Lipton & Fivecoat, 1995; Zaldivar & Swolowitz, 1994). Epidemiological research shows that in the United States diabetes disproportionately affects ethnic minorities (CDC, 2002; Haffner, Hazuda, Mitchell, Peterson, & Stern, 1991). Currently, 2 million Latino/Hispanic Americans (Latinos) are diagnosed with diabetes. The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDKD, 2000) reports this is a higher percentage than for the Anglo American population: 10.6% of Latinos compared to 7.8%

of Anglos. On average, Latinos are 1.9 times more likely to have diabetes than Anglos of similar age. Additionally, Latinos demonstrate a two to three times greater risk of developing severe complications and dying from diabetes than the mainstream population (Haffner et al, 1996; Lipton, et al, 1998; Rubin, Peyrot, & Saudek, 1991). These cultural disparities are further complicated by the increase of Latinos within the United States. According to California census reports (see Ruppenstein, 2002) the Latino/Hispanic population grew by 42.6% from 1990 to 2000 whereas all other ethnicities combined (Anglo/White, Black, Native American, Asian, and others) increased by only 3.8% in that same time period. With the significant differences in the disease process and dramatic expansion of the Latino American population, it is essential to learn how variations in cultural elements relevant to Latinos may influence factors associated with diabetic outcomes.

One of the problems with the study of ethnic disparities in health research, policy, and intervention is that research attempting to investigate cultural factors more often than not involves serious methodological confounds such as inappropriate ethnic classification systems, as well as a lack of appropriate cultural assessment tools and theoretical models to guide research and intervention (Betancourt & Fuentes, 2001; Hayes-Bautista, 1992; Zambrana, 1995). Current studies attempting to provide logical links between preventative health behaviors, such as adherence, and ethnic disparities in disease outcomes often attribute observed variations to broad grouping variables (e.g., race or ethnicity) and ignore a more specific question: What are the cultural factors that underlie these differences? To answer this question, the influences of cultural elements should be

considered in conjunction with mediating psychological factors that may determine how performance of health behaviors and adherence, is really influenced by culture.

The present study was designed to examine the possibility that diabetic treatment adherence may be a function of cultural elements (value orientation) and psychological processes (attributional thinking) relating to motivation and emotions. According to attribution theory (for review see Weiner; 1986, 1995), these psychological processes are significant determinants of motivated behavior and have been found to be influenced by culture (e.g., Betancourt, Harding, & Manzi, 1992; Betancourt & Lopez, 1993; Betancourt & Wiener, 1982). It is therefore proposed that variations in adherence are a function of cultural elements, diabetes related health beliefs, cognitive processes and related emotions. Specifically, adherence behaviors are influenced directly by cultural antecedents (e.g., mastery versus fatalistic value orientations) and diabetic health beliefs as well as indirectly via emotions and attribution-emotion processes concerning the causes and consequences of diabetes and its progression that mediate these cultural factors.

In the following sections, a brief review of the behavioral aspects of chronic illness, treatment adherence, and diabetes mellitus is presented. Then, culturally related outcomes and assumptions regarding elements of Latino culture believed to contribute to a more comprehensive understanding of cultural disparities in diabetic outcomes will be reviewed. Specifically, fundamental aspects of Latino culture not adequately examined in current models are addressed. Finally, the theoretical foundations pertinent to the role of cultural values, beliefs, and attribution-emotion processes as determinants of motivation and health behaviors will be discussed from a cross-cultural perspective.

Chronic Disease and Need for Treatment Adherence

In the last century, morbidity and mortality patterns have shifted from infectious to chronic diseases (Brannon & Feist, 1996; Matarazzo, 1982; McGinnis, Richmond, Brandt, Windom, & Mason, 1992). With the advent of managed care, treatment of chronic diseases presents the medical community with the challenge of recurring symptoms and slow illness progression (Kehoe & Katz 1998; Koop, 1983). Efficacious treatment requires patients to perform recommended behaviors that ameliorate symptoms, prevent complications, and maintain long-term health (DCCTRG, 1993; Redeker, Stretcher, & Becker, 1988). Therefore, efficient cooperation between the patient and medical staff is essential in the current health care environment (Sherbourne, Hays, Ordway, DiMatteo, & Kravitz, 1992).

Nonadherence is highest among patients with chronic conditions that face long-term care (Kaplan, Sallis, & Patterson, 1993) and for those whose treatment plans involve lifestyle changes (Becker & Janz, 1985, Kaplan, Sallis, & Patterson, 1993; Taylor, Helgeson, Reed, & Skokan, 1991). DiMatteo and DiNicola (1982) report 50% of patients with mild conditions and 70% of those with severe chronic conditions fail to adhere to medical recommendations. Furthermore, nearly all chronically ill patients fail to recognize some symptoms and/or carry out one or more treatment elements (Gonder-Fredrick, Cox, & Bobbitt, 1986; Kehoe & Kats, 1998; Redeker, 1988; Rosenstock, 1988).

Inconsistent health behaviors defeat the purpose and benefits of treatment regimens (Cox et al, 1985; Unger, 1983; Wysocki, Green, & Huxtable, 1989) and increase the patient's risk of developing complications and secondary disorders (DCCTRG, 1993; NIDDKD, 2000). Furthermore, improvements in treatment adherence

would reduce the financial and physical cost of chronic diseases. For example, diabetes mellitus currently accounts for $98 billion in health care costs annually; $44 billion in direct treatment and $54 billion for indirect costs (e.g., disability, work loss, and premature mortality) (American Diabetes Association's Cost of Disease study, 1998; CDC, 2000). Treatment regimens designed to maintain disease progression and prevent further complications reduce the direct cost of treatment and eliminate the indirect cost (DCCTRG, 1993).

Diabetes Mellitus. Diabetes mellitus is a group of disorders characterized by defective glucose metabolism resulting from insulin deficiency (Type I) or insulin resistance (Type II) that slowly affects all bodily functions. Diabetes is one of the most prevalent and lethal chronic illnesses: Adequately described as a "piecemeal autopsy – a series of deaths of parts until the owner succumbs to 'no more parts'" (Rood, 1996). Currently, diabetes affects seventeen million Americans with an additional million adults diagnosed per year (NIDDKD, 2000). Damage resulting from the progression of diabetes is the leading cause of renal disease, non-traumatic amputations, blindness, and impotence (Fishbein & Palumbro 1995; Geiss, Herman, & Smith, 1995; Klein& Klein, 1994; United States Renal Data System [USDRS], 2001). Furthermore, one American dies every three minutes from related complications, making diabetes the 7th leading cause of death in the United States (ADA, 2000; CDC, 2000). The multi-system health effects of diabetes have led to it becoming the single most costly disease in the United States (CDC, 2000).

According to the National Center for Health Statistics, Type II diabetes accounts for 90 to 95 percent of all diagnosed cases of diabetes. This form of diabetes is associated

with older age, obesity, family history of diabetes, prior history of gestational diabetes, impaired glucose tolerance, physical inactivity, and race/ethnicity (NIDDKD, 2002). Type II diabetes usually begins as insulin resistance, a disorder in which cells fail to utilize insulin properly. As the need for insulin rises, the pancreas gradually loses the ability to produce insulin resulting in the need to administer glucose. Many with Type II can control their own blood glucose levels, thereby slowing diabetes progression and preventing complications, by following a careful diet and exercise program, losing excess weight, and taking oral medication. Further, research demonstrates that adherence to such treatment regimens can prevent or delay the onset of Type II diabetes among high-risk adults. For both sexes and all age and ethnic groups, the development of diabetes was reduced 40 to 60 percent during these studies that lasted 3 to 6 years (NIDDKD, 2002; DCCTRG, 1993).

It is assumed that maintaining regimens to regulate glucose is motivated by a desire to alleviate the pain, progression and disabilities associated with this disease. Yet, approximately 50%–85% of patients do not follow their prescribed treatment plan (Amir & Rabin, 1990). At least 50% lie or cheat on adherence behaviors (Dorchy & Roggemans, 1997); such as, indicating all of a medication was consumed when several doses remained. Subsequently, poor diabetic adherence is responsible for 39% of single and 32% of multiple hospital admissions (Fishbein, 1985) and increases a patient's risk for complications such as kidney disease, retinopathy, limb amputation, heart disease, and even premature death (Cox et al, 1985; Skyler, 1979; Wysocki, Green, & Huxtable, 1989; Unger, 1983; USDRS, 2001; Klein& Klein, 1994; Geiss, Herman, & Smith, 1995; Fishbein & Palumbro 1995).

As diabetes progresses, the complexity and intensity of treatment regimens necessary to control blood glucose also increases. Subsequently, any tendency for non-adherence is exacerbated by increased demands for behavioral control (Sherbourne, et al., 1992). Patient behavior regarding adherence, like any other behavior, is presumably dependent upon the cognitive processes made regarding disease contraction, progression, and treatment (Friend, Hatchett, Schneider, & Wadhwa, 1997; Weiner, 1986). For example, if a diabetic believes the course of diabetes is out of his or her control (e.g., attributing the contraction, progression and outcome to causes perceived as stable and uncontrollable by them), he or she will be less likely to adhere or engage in preventative or maintenance behaviors (e.g., strict diet, more daily injections, finger pricks, and exercise). Psychological processes regarding the cause and controllability of diabetes are thought to be influenced by culture. Therefore, understanding defining characteristics of the patient (e.g., value orientations and beliefs) and how these elements relate to psychological processes that affect adherence behavior will help researchers, policy makers, and practitioners better serve the needs and address challenges in a multicultural society.

Diabetes among the Latino American Population

Culture can be a lethal risk factor in the contraction and uncontrolled progression of diabetes for Latinos in the United States (see Betancourt & Fuentes, 2001; NDDKD 2002; Williams & Collins 1995). Research by Lipton and Fivecoate (1995) specifically indicates that characteristics of Latino culture (e.g., diet and lifestyle) cultivated genetic predispositions toward higher insulin concentrations and insulin resistance. Compared to the general population, this tendency increases the average incidence of Type II diabetes

by 9.1% for men, 10.2% for women and lowers the age of Type I onset from mid- to early-adolescence. Latinos also experience more severe complications. Compared with Anglos, Latinos have greater incidences of severe retinopathy and are six times more likely to develop end-stage renal disease as a consequence of diabetes (Haffner et al, 1996; Zaldivar & Swolowitz 1994). Additionally, Latinos have a higher rate of diabetes-related amputations (82.7%) than Anglos (56.8%) (Lavery, Ashry, van Houtum, Pugh, Harkless, & Basu, 1996). Furthermore, Lipton et al., (1998) account for the dramatic difference in mortality (2% higher) through lower financial status, as well as emotional, social, and cultural factors ignored in clinical settings. These disparate outcomes stem from more than language differences or ethnic category. Consequently, the question remains: What underlying elements contribute to these cultural health disparities?

Understanding Culture

The study of culture as it impacts health is relatively recent and research efforts have been directed largely at describing the differences between groups of individuals classified by race or ethnic group (Betancourt & Fuentes, 2001; Williams & Collins 1995). This system of comparison, however, is not useful for studying the effects of culture on psychological processes and behavior, as it does not measure the cultural factors responsible for variations in a particular behavior (Betancourt & Lopez, 1993; de Munck, 2001). While race is generally defined in terms of physical characteristics and ethnicity is used in reference to groups that are characterized in terms of a common nationality or language, "culture" according to Traindis can be conceived in terms of social norms, roles, beliefs, and values (see Betancourt & Lopez, 1993). These elements of culture include a wide range of themes such as familial roles, communication patterns,

affective styles, and values regarding personal control, individualism, collectivism, spirituality, and religiosity (Hofstede, 2001). When culture is defined in terms of psychologically relevant elements, such as roles and values, it becomes amenable to measurement. Therefore, it is "culture" and not race, ethnicity, or any other grouping factor that should be the focus of research attention.

Efforts directed at reducing ethnic health disparities must utilize a conceptualization of culture that incorporates those elements identified as having an effect on perceptions and attitudes toward health and related behavior. Moreover, since psychological processes are more proximal determinants of behavior than are cultural elements (Betancourt & Lopez, 1993; Weiner, 1992, 1995), it is important to clarify how the effects of culture on behavior are mediated by psychological processes, such as attributions of causality, motivation, and emotions. By specifying what about a particular culture influences health behaviors and related mediating psychological processes, researchers may then quantify culture as a variable in order to test hypothesized relationships between culture and behavior. In this way, psychological research concerning observed variations in health outcomes may go beyond the observation of group differences. The following section examines specific aspects of Latino culture which may influence psychological processes concerning diabetes and behavioral aspects of diabetes prevention and treatment.

Culture and Latino Health. Currently, models of health behavior fail to account for the striking differences (e.g., percentage afflicted, frequency of complications, and mortality rates) between Latino and Anglo diabetics in the United States (Lipton, Losey, Giachello, Mendez, & Girotti, 1998; Zaldivar & Smolowitz, 1994). Most theoretical

models do not recognize the impact of cultural barriers such as those associated with language, economics, family values, and beliefs have on health behaviors (Engel, Basch, Zonszein, 1995; Oomen, Owen, & Suggs, 1999; Zambrana (1995). Further, research indicates that the worldviews of Latin American groups in the U.S. include complex belief systems about the etiology, symptom expression, and treatment of illnesses that ultimately affect health care utilization (Bagley, Angel, Dilworth-Anderson, Liu, & Schinke,1996; Fishman, Bobo, Kosub, & Womeodu, 1993; Freidenberg & Jimenez-Velasquez, 1992; Pachter, 1993, 1994). For example, values regarding *familia*, maintaining the family's structure and integrity, are a priority for most Latinos (Berger, 1998). The extent to which this value influences health behavior is illustrated by Lipton, Losey, Giachello, Mendez, and Girotti's (1998) research which found family needs to be so important for Latino diabetics (particularly women) that treatment adherence was perceived as self-indulgent. Consequently, diabetic family members were considered selfish for purchasing food contrary to the family's taste and for extending the family budget to buy medication. When the management of a life-threatening illness is considered selfish and to compromise the family unit, it is unlikely that the patient will adhere to their treatment regimen. As a result, such world views pose a complex challenge to the medical community.

Traditional Latino cultures maintain strong religious beliefs which can influence perceptions of health and related behaviors. It is commonly believed that life and health reflect the supernatural balance between mankind and God's will (Ruiz, 1985; Zaldivar & Smolowitz, 1994). Consequently, Latinos often demonstrate a negative resignation that fate and an omnipotent God drive life's outcomes (Perez-Stable, Sabogal, Otero-Sabogal,

Hiatt, & McPhee, 1992). With illness contraction and outcome centered on supernatural causes there is little responsibility left for the patient (Berger, 1998; Ruiz, 1985). In the case of diabetes, perceptions that God has control can demonstrate both positive effects ("God will provide the strength to deal with diabetes") and negative effects ("Diabetes comes from God, and only He can do something about it") (Quatromoni, Milbauer, Posner, Carballeira, Brunt, & Chipkin, 1994). Zaldivar and Smolowitz (1994) report that treatment was overlooked by Latino diabetics because 78% viewed the disease as "God's will", 28% thought that is was punishment from God, and 17% viewed herbal remedies as sufficient. Further, preventative efforts may be considered unimportant because of myths that diabetes is a part of life and not a disease with long-term consequences (Quatromoni et al., 1994). This fatalistic perception of diabetes may negatively impact preventative efforts and thus worsen health status thereby reinforcing the ideology that diabetes is a condition to be endured.

Fatalism and Perceptions of Control. Fatalism is a culturally transmitted value orientation described as being subjugated to Nature. Specifically, this value reflects the primal struggle for balance between man and Nature (Hofstede, 2001; Kluckholn & Strodtbeck, 1961). It is operationalized by a single continuum between mastery ("control over nature") and fatalism ("subjugation to nature"). Fatalism is closely associated with a general dimension of cultural variation identified in cross-cultural studies (Gonzalez-Swafford, & Gutierrez, 1983; Jennings, 1999; Triandis, 1980) and more recently, has been defined as a general outlook on life that views life events as inevitable and suggests that one's destiny is not in one's own hands (Davison, Frankel, & Smith, 1992; Perez-Stable, Sabogal, Otero-Sabogal, Hiatt, & McPhee, 1992). While this orientation

sometimes includes supernatural explanations, fatalism primarily refers to perceived control or mastery rather than supernatural beliefs. Such a fatalistic perspective also promotes a complex psychological cycle distinguished by feelings of fear, predeterminism, pessimism, and the inevitability of death (Chavez, Hubbell, Mishra, & Valdez, 1997; Davison, Frankel, & Smith, 1992; Perez-Stable, Sabogal, Otero-Sabogal, Hiatt, & McPhee, 1992). While not exclusive to Latino culture, Latinos are more likely than Anglos to maintain fatalistic values and beliefs. Specifically, Chavez, Hubbell, Mishra, and Valdez (1997) characterized the Latino life orientations to include: "Negative attitudes and disorientation...with little motivation toward helping themselves," and "orientated toward the present, with little practical concern for the future".

Research by Deyo, Diehl, and Hazuda, (1985) report that Latinos direct little effort to promote and preserve good health unless the cause was readily evident, otherwise sickness is thought to be a matter of destiny. With such a perspective, illnesses that do not follow typical patterns or present tangible symptoms, like pain or bleeding, are often not prevented or go untreated (Gonzalez-Swafford & Gutierrez, 1983). In Latino culture, chronic conditions like diabetes are viewed as one's destiny, normal, and so should be endured (Reinert, 1986; Scheper-Hughes 1983). Health conditions thought to be the will of God or punishment for wrongdoing make early treatment and preventative regimens a low priority for Latinos and therefore increase the risk of complications and poor health outcomes. Thus, cultural elements like fatalistic value orientations and perceptions of control may contribute to noncompliance when health promotional activities focus on preventative behavior.

The majority of literature on fatalism is restricted to cancer yet; it appears higher fatalism decreases the likelihood of preventative health behaviors (Chavez, Hubbell, Mishra, & Valdez, 1997; Laws & Meyo, 1998). According to Perez-Stable, Sabogal, Otero-Sabogal, Hiatt, and McPhee (1992), Latino Americans are more likely than Anglos to believe that illness is God's punishment, due to bad luck, similar to a death sentence, and there is little to be done to prevent it. As a result Latinos present more advanced stages of cancer and delay seeking care for cancer-related symptoms. Unlike cancer, diabetes provides a research paradigm in which there is a greater opportunity to alter the disease outcome because the progression of diabetes is dependent on treatment adherence and so, somewhat controllable. Delays in health promotion behaviors are potentially modifiable if psychological processes related to these cultural factors are targeted in a manner that reduces resignation. For this reason, it is essential to investigate how cultural based elements influence adherence behaviors and thus, health outcome.

The cross cultural approach guiding this research (see Betancourt & Lopez, 1993) centers on understanding the manner in which variations in cultural experiences influence, albeit through direct or indirect mediation, performance of behaviors relevant to cultural disparities in diabetic treatment and outcomes. Although fatalistic value orientations are more prevalent among Latinos (Chavez, Hubbell, Mishra, & Valdez, 1997; Deyo, Diehl, & Hazuda, 1985; Laws & Meyo, 1998; Zaldivar & Smolowitz 1994) that does not imply that simplistic categorization (e.g., Latino and Anglo) is a sufficient distinction for understanding between and within cultural differences in health related behaviors and outcomes. Rather, it is essential to understand how variations in cultural value orientations are relevant to differences in health behaviors and related outcomes

(Betancourt & Lopez, 1993; Betancourt & Fuentes, 2002). Fatalism is likely to relate to psychological factors such as attributions of causality and related emotions, which are essential to the study of motivated behavior in general and thus, likely to affect adherence behavior. The aim of this study is to investigate the manner in which culturally specific value orientations and beliefs, as well as theoretically relevant psychological processes (e.g., attributional thinking and emotions), influence adherence behavior for Anglo and Latino diabetics.

Culture and Psychological Factors in Health Behavior and Outcomes

It is evident that psychological elements play a role in health behaviors (Christiansen, Moran, & Wiebe, 1999; Kirscht, 1983; Redeker, 1988; Taylor, Kemeny, Bower, Gruenewald, & Reed, 2000;) yet, there continues to be a lack of consideration for how such behavior and antecedent psychological processes are influenced by culture (Oomen, Owen, & Suggs, 1999; Ruiz, 1985). In fact, theoretical models employed to explain health behaviors are often criticized for their inability to adequately explain variance within diverse populations (Ashing-Giwa, 1999). Variations in culturally specific values and theoretically relevant psychological processes (e.g., cognition-emotion) may underlie disparities in health behaviors and outcomes. To address some of these limitations, attribution theory will be applied within the context of a cultural framework. The aim is therefore to understand direct influences of cultural elements (e.g. value orientations and related beliefs) and theoretically relevant mediating psychological processes such as attributions concerning the controllability of health and disease.

Attribution Processes and Health Behavior. Perceptions of control are likely at the heart of adherence behavior and therefore health outcomes (Friend, Hatchett,

Schneider, & Wadhwa, 1997; Sensky, 1997; Taylor, Helgeson, Reed, & Skokan, 1991). Additionally, health-promoting behaviors, like adherence, are a function of values and cognitive processes (Kirscht, 1986). Thus, such expectancies are important to the prediction of behavioral change and reflect the important role that motivation, emotion, and psychological processes have in understanding health behavior. For the purpose of the present research, health expectancies and perceptions of causality relevant to adherence behaviors are examined from the perspective of an attribution theory of motivation and emotion (for reviews see Weiner, 1985, 1996).

The systematic study of causal attributions began with Heider. His person-versus-environment perspective provided the foundation for theories of attribution. According to Heider, the relevant causal distinction was whether the result of an action was perceived as dependent on factors within the person or within the environment (Heider, 1958, p. 82). Perceived causality was classified along a continuum of internal-external locus of control and the appropriate behavioral response depended on the according classification. If individuals believe they are responsible for what happens to them (internal locus of control), they are likely to take action to resolve their difficulties. If individuals believe outside forces have more control over outcomes (external locus of control), they tend to be more passive when responding to situational demands (Rotter, 1966).

Weiner, Frieze, Kukla, and Kakihara (1971) further argued that the distinction between the internal and external forces of causation should include a dimension of stability to address perceptions of variance. The expectancy of change concerning ability to perform specific behaviors is influenced by whether the cause is perceived as constant,

or variable, over time (Weiner, 1992). Further distinction between locus (the cause is internal or external to the person) which is relevant to esteem related affects, and control, more relevant to interpersonal judgments and behavior, but also to motivation, resulted in three distinct dimensions. Each of these dimensions is related to distinct psychological effects and is relevant to specific behavior domains. Although not orthogonal, each of these properties is more relevant than the others (because of their specific psychological consequences) in particular behavioral domains. For instance, perception of personal control, or the belief that an individual can overcome barriers effectively and act upon his or her environment, is extremely important in deterring undesirable psychological states and as a result behavioral consequences (see Weiner, 1986; 1995).

Weiner's theory of motivation and emotion holds that attributional thinking influences perceptions and outcome expectations. This implies the extent to which health is perceived as within the patient's control is likely to influence health behaviors and therefore as in the case of diabetes, the disease outcomes. Research with hemodialysis patients found health beliefs (motivational factors related to maintaining positive health) accounted for active changes in adherence behaviors but not general compliance status. Attributions (e.g., perceptions of the relationship between effort and success with past adherence) on the other hand, predicted general maintenance as well as active changes to adherence (Friend, Hatchett, Schneider, & Wadhwa; 1997). Thus, the likelihood of adherence reflected perceptions and outcome expectations of doing so more than the motivation to maintain health.

It is evident that to perform a health-promoting behavior, individuals have to value their health, believe the behavior will promote health, and assume they are capable

of performing that behavior. Individual differences in perceptions of these elements moderate the likelihood of performing health behavior (Ajzen, 1991; Becker & Janz, 1984; Christensen, Moran, & Wiebe, 1999; Redeker, 1988). For example, if an individual highly values his or her health but expects the regimen to be too difficult or believes that it is too late to help, then he or she is less likely to perform the necessary health behaviors. Health expectancies and values are thought to be independent, however, an interrelationship between these antecedents of behavior may affect adjustments and therefore, health outcomes.

Research findings also suggest that perceptions of causality and outcome expectations may be affected by culture (Betancourt, Harding, & Manzi, 1992; Betancourt & Lopez, 1993; Betancourt & Wiener, 1982). As a result, cultural factors (e.g., cultural value orientations and beliefs) may influence individual and group differences in these cognitive processes. The manner in which these expectations, values, and health beliefs influence psychological processes (e.g., attributional thinking and emotion) associated with performing health behaviors is therefore essential to consider. This research investigates the manner in which cultural value orientations and beliefs influence perceptions of health causation and the controllability of health outcomes and, which in turn, may influence the performance of health behaviors.

The first aim of this investigation is to examine variations in cultural value orientations, health beliefs, attributional processes, emotions, and levels of diabetic treatment adherence among Latino and Anglo diabetics. The literature suggests that there are culturally based differences in diabetic adherence; however, the literature to date fails to identify how specific aspects of culture affect such health behaviors. The second aim

is to examine the role of attributions of controllability and related emotions that may mediate the effects of cultural values and beliefs on adherence behavior. It is expected that attributional processes will in part mediate the effects of cultural values and beliefs on adherence behavior. The third aim of this investigation is to further understand the relationships among cultural value orientations, health beliefs, attributions of controllability and emotions as determinants of adherence behaviors. Bentler's (1995) causal modeling techniques for the analysis of structural equations (EQS) will be used to examine these relationships.

Hypothesis

General Hypothesis:

Proposed relationships among cultural value orientations (fatalism-mastery), health beliefs, attribution processes, and emotions will account at least in part for variance in diabetic treatment adherence.

Specific Hypothesis:

1. Attributions of controllability are influenced by the fatalism/mastery cultural value orientations directly and/or through the effect of value orientations on health beliefs concerning diabetes.
2. The fatalism/mastery cultural value orientations and beliefs concerning diabetes directly and/or through effects on attributions of controllability and related emotions influence diabetic treatment adherence.
3. A causal model integrating the hypothesized and other relevant theory based relationships will provide a good fit of the data.

Material and Method

Participants

Eighty-one Latino and Anglo Type II diabetics (33 men and 48 women) participated in the current study. Participants were patients from a local diabetes treatment facility who had diabetes for more than one year, fewer than four disease related hospitalizations in the previous year, and available medical data. Mean age of participants was 53 years (range from 25 to 87) and the average duration of diabetes was 8.6 years (range from 1 to 38 years).

Materials

Demographic and health information was obtained from medical records, followed by a self-report questionnaire administered to all participants. Each part of the instrument was designed to measure demographic information, cultural value orientations, diabetic health beliefs, attributional processes, and emotions, respectfully.

The supplementary demographic survey (see Appendix A) asked participants to provide additional information on their age, gender, education, income, religion, marital status, country of family origin, length of time residing in the United States, number of family members with diabetes, and diabetes-related complications.

Cultural Value Orientations. A value orientation measure was designed to assess two culturally transmitted value orientations considered to be relevant to attributions of controllability, motivation, and health behavior. The Value Orientation Scale (VOS) was based on the constructs developed by Kluckholm and Strodbeck (1961), Betancourt, Hardin, and Manzi (1992), nursing and medical research related to fatalism (Powe, 1989, 1995a, 1995b, 1997), and cross cultural values discussed by Hofstede (2001). The VOS

(See Appendix B) measured two distinct value orientations, Subjugation to Nature (fatalism; F) and Control over Nature (mastery; M) by covering perspectives on Life, science, world affairs, work ethic, fate, and time orientation. These categories were supported by a principle component analysis, oblique rotation that accounted for 75% of the variance.

There are 22 items for the fatalism and 16 items for the mastery subscales. Each item consisted of a statement that participants indicated the degree of agreement on a 5-point Likert scale anchored at extremes from 1= Strongly Disagree to 5=Strongly Agree. The following are sample items from each of the subscales. "I carry my burdens because I must; that's what I am supposed to do" is a specific item from the fatalism subscale and from mastery, "When it comes to life, I play a very active role in what happens to me." High item scores represent higher levels of the corresponding value orientation. A total score for each dimension was obtained by averaging across relevant items (22 for fatalism and 16 for mastery). Cronbach's alphas were calculated for the whole scale and each of its two subscales (i.e., fatalism and mastery) with the expectation that the individual subscales would yield higher coefficients due to greater internal consistency when measuring the same subconstruct than when measuring an overarching construct of a value orientation. The reliability coefficient for the entire scale was .75. As expected, the alphas for the individual subscales were higher; .83 for fatalism and .81 for mastery. These alphas reflect good internal consistency for the overall scale and among each of the two value orientation subscales. Inter-item correlations indicate each fatalism item was more highly correlated with other fatalism items and had either near zero, low, or negative correlations with mastery items. Similarly, mastery items were more highly

correlated with each other than with those of fatalism. This correlation pattern further supports the two-factor structure of the VOS. Therefore, each subscale was considered independently in all subsequent analyses. Within the total population these subscales were negatively correlated, $r(81) = -.23$ $p < .05$. That is, participants reporting higher levels of fatalism value orientations reported lower mastery values.

Diabetic and Fatalistic Health Beliefs. To assess beliefs regarding diabetes and treatment thought to influence adherence behaviors, four subscales totaling 18 items, were used from Harris, Linn, Skyler, and Sandifer's (1985) Diabetes Health Beliefs Scale (DHBS; See Appendix C). Using this instrument, four dimensions of health beliefs were assessed: Severity of diabetes measured the extent to which diabetes was thought to be serious or benign; susceptibility to disease/complications reflecting the beliefs regarding the probability health complications would be experienced; treatment barriers assessed the cost of diabetic treatment to the individual; and benefit of treatment which reflected beliefs that diabetic treatment was worthwhile.

Participants were asked to rate statements on a 5-point Likert scale anchored at extremes from 1= Strongly Disagree to 5= Strongly Agree. Subscale composites were computed by averaging across all relevant items. Higher composite scores represented stronger beliefs relating to that particular domain of diabetes and treatment. For example, a high score on the barrier subscale represented higher levels of beliefs regarding hassles and inconveniences associated with seeking or adhering to treatment.

In addition to the aforementioned subscales, four items were created to assess fatalistic beliefs specific to health not captured by the DHBS subscales. The following is a sample item from this fifth subscale: "How much do you believe that if you have an

illness, it doesn't matter what doctors and nurses tell you to do, you'll get sick anyway?" Using the same scoring format as the DHBS, scores were then averaged to form a composite that represented a subscale for fatalistic health beliefs.

All five measures of health beliefs demonstrated adequate reliability within this population of diabetics and DHBS subscales were consistent with previous research. The Cronbach's alpha for the disease severity subscale (using 3 of the 4 items) was .65; alpha for the susceptibility subscale (4 items) was .77; for barriers (5 items) alpha was .56; for treatment benefits (using 3 of the 5 items) was .61; and for the fatalistic health belief (using 2 of the 4 items) the Cronbach's alpha was .75. Subscale composites were formed by averaging across relevant items and used in all subsequent analysis. An exploratory factor analysis with Verimax rotation on these five subscales revealed benefits did not load strongly with the other 4 subscales. The factor loadings were as follows: Severity = .81; susceptibility = .83; barrier = .72; fatalistic health = .60; and benefit = .48. The subscales for severity, susceptibility, barriers, and fatalism health were used in subsequent analysis.

Attributional Processes. To assess attributional thinking and related emotions, participants were provided a vignette that described an ethnically neutral diabetic who did not follow the doctor's advice and developed complications. This vignette was followed by McAuley, Duncan, and Russell's (1992) 12-item Revised Causal Dimension Scale (CDSII; See Appendix D) and 7 items on related emotions. The CDSII is designed as a series of 5-point semantic differential subscales to assess properties of the participant's perceived attributions regarding the situation and or behavioral outcomes provided in the vignette. Participants read the vignette and then rate the causality of treatment behaviors

and diabetic outcome along the four attributional domains: Personal controllability, whether the cause is controllable or uncontrollable by the person; external controllability, whether the cause is controllable or uncontrollable by others; locus of causality, whether the cause originates within the individual or is external; and stability, whether the cause is static or changeable over time. Each item yields a score between 1 and 5; a composite score was formed by averaging across relevant items for each attributional domain. High scores represent a greater degree of a particular attributional domain as it related to the causality and controllability of the diabetic outcome.

Psychometric properties for the four subscales of the CDSII were consistent with previous research (alphas ranged from .65-.83) with one exception. Personal controllability (3 items) Cronbach's alpha = .82; External controllability using 2 of the 3 items increased the alpha from .65 to .73; Locus of causality using 2 of the 3 items increased the alpha from .78 to .83; and for the Stability subscale Cronbach's alpha = .11. Due to the low reliability of the stability subscale, it was dropped from all subsequent analysis.

Emotions. Seven attribution-related negative emotions relevant to the diabetic disease process were identified based on previous work on attributional thinking and emotions (see Wiener, 1996): Calm/Anxiety, Indifference/Worry, Fearlessness/Fear, Hope/Hopelessness, Certainty/Doubt, Happiness/Depression, Pride/Shame. To assess the strength of these emotions, participants were asked to differentiate on a 7-point Likert scale the degree to which they experienced each of the dichotomously paired emotions while reading the vignette. A higher score indicated a greater degree of negative emotions. For example, a score of 7 on the Calm/Anxiety continuum indicated that while

reading the vignette, the participant felt highly anxious. A score of 1 reflected an absence of anxiety in the same situation.

Adherence to Diabetic Treatment Regimen. To assess adherence, physiological data was obtained from the most recent hemoglobin (HbA1c) measure in medical records and reported by the participant. Levels of HbA1c's found in the bloodstream provide a 10-12 week average of blood glucose. High HbA1c levels (> 7) represented poor adherence behaviors, while lower levels (< 7) reflected adequate adherence to the prescribed diabetic treatment regimen.

Procedure

Participants for this study were self selected from a local diabetes treatment center. The patient database was screened to include potential participants that were Type II diabetics who had not been diagnosed within the previous year and who identified themselves as either Latino/Hispanic or Caucasian/Anglo/White. To address the disproportionate number of Anglo patients, stratified sampling was used to select equal groups based on the number of available Latinos (225). All potential participants were mailed a cover letter (See Appendix E) informing them of the study and asking for their participation, a packet of surveys containing all of the aforementioned measures with individual instructions, and a stamped return envelope. Participants responded by returning a completed survey or marking the decline box and returning a blank survey. Following the initial mailing, potential participants who had not returned a survey packet were sent a duplicate packet at 4 weeks and a follow-up request at 6 weeks (See Appendix F). With each contact, participants were reminded that all information was

confidential and they could terminate their participation at any time, for any reason, without penalty.

Data Screening

Of the original 450 survey packets mailed to potential participants, 107 (25%) responded (6% were undeliverable and 19% participated). Of the 81 participants, 41 were Latino (16 men, 25 women) and 40 Anglo (17 men, 23 women). To ensure no fundamental differences existed between those whom responded and those that did not, comparisons on age, glucose, and gender were made. Those that responded did not differ from non-responders on gender or glucose levels but were significantly older (F (1, 423) = 4.13, $p < .01$; $M = 55.22$) than those not responding ($M = 50.69$). To verify no statistical assumptions were violated, all data on predictor and outcome variables were screened for normality and all skew and kurtosis values were found to be within acceptable limits.

Results

The purpose of this study was to examine variations in cultural and psychological factors that may contribute to adherence behaviors and hence, cultural disparities in diabetic progression and outcomes. The hypotheses of the study were tested using Bentler's (1995) programs for causal modeling techniques based on the analysis of structural equations. Due to the small sample size there may be limitations regarding the definitive nature of causal modeling. However, since the normality of distributions for all of the variables was within appropriate limits, EQS was considered adequate for exploratory structural analysis. Still, more conservative statistics (e.g., t-tests, ANOVAs,

and Pearson correlations) were used in preliminary analyses to examine some key relationships.

Preliminary Analysis. Ethnic groups were compared on demographics and the outcome variable. There were no significant differences between Latino and Anglos on most demographic variables (see Table 1). Participants did not differ on age, gender, income, marital status, religious orientation, or duration of diabetes. There was a significant difference in education, t (72) = 2.61, $p < .01$; Anglos (M = 15.49) reported higher levels of education than Latinos (M = 13.63).

Table 1.

Demographic Variables

	Total		Latinos	Anglos
	M (SD)		M (SD)	M (SD)
Age	53.0 (14.2)		50.2 (14.2)	55.9 (14.2)
Education	14.6 (3.2)		13.6 (3.5)	15.5 (2.6)
Duration of Diabetes	8.6 (10.7)		6.6 (8.9)	10.0 (11.8)
Religious Affiliation				
	Protestant	46.9%	31.7%	62%
	Catholic	29.6%	39%	20%
	Other	12%	17%	7.5%
	None	7.4%	4.9%	10%
Annual Income				
	Less than $15,000	22.2%	29.3%	15%
	$15,000-40,000	17.3%	17.1%	17.5%
	$40,000-65,000	21%	19.5%	22.5%
	$65,000-90,000	12.3%	4.9%	20%
	Over $90,000	19.8%	17.1%	22.5%

In order to test for possible effects of ethnicity, gender, and education, a series of 2 (ethnicity) X 2 (gender) X 3 (education) ANOVAs were performed on glucose, value orientations (fatalism and mastery), health beliefs, attributions, and emotions (see Tables 2 for means and standard deviations). Significant main effects were found for gender on attributions of controllability by others and emotions regarding fear and anxiety. As can be seen in Table 2, men reported attributions higher in controllability by others [$F(1, 75) = 4.23$, $p < .05$] while women reported greater degrees of fear [$F(1, 63) = 10.58$, $p < .01$] and anxiety $F(1, 64) = 7.99$, $p < .01$].

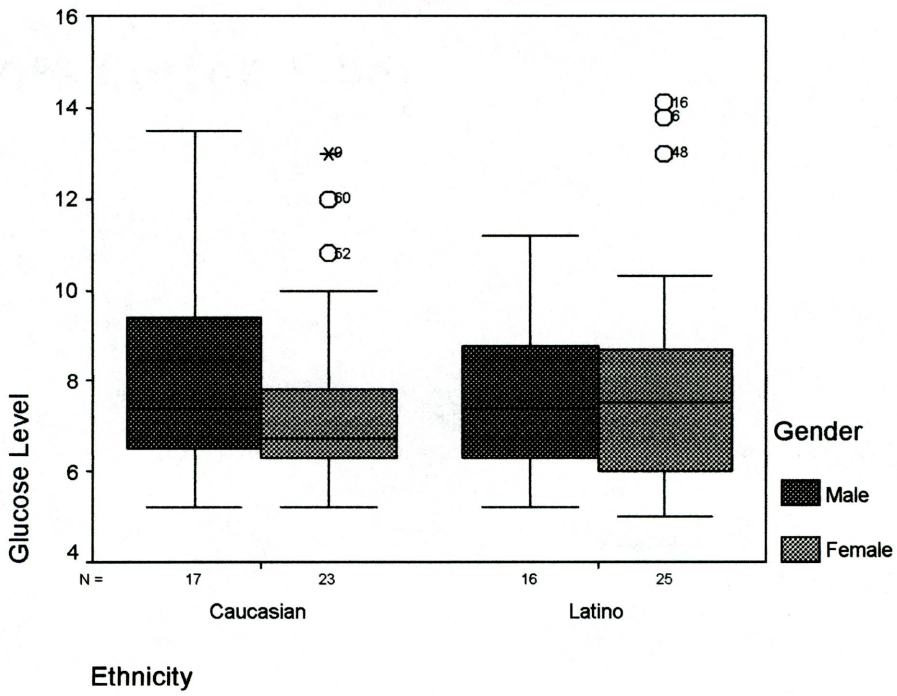
Table 2.

Differences in Predictor and Outcome Variables by Ethnicity and Gender

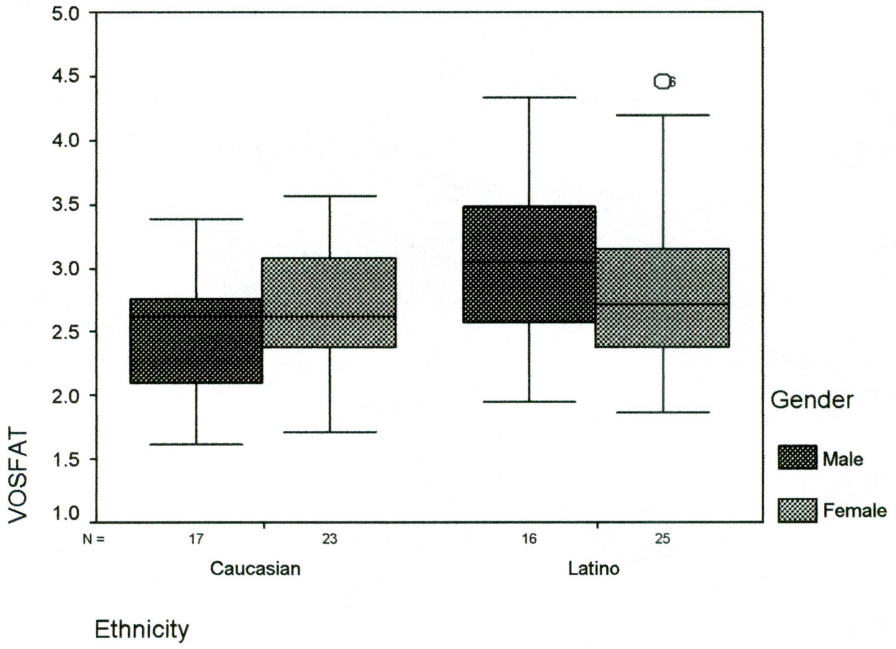
	Ethnic Group					
	Latino			**Anglo**		
	Total M (SD)	Men M	Women M	Total M (SD)	Men M	Women M
Glucose	7.9 (2.4)	7.7	8.0	7.8 (2.2)	8.1	7.5
Fatalism[1]	2.8 (.58)	3.1	2.8	2.6 (.48)	2.5	2.7
Mastery	4.0 (.6)	4.0	4.1	4.0 (.4)	4.1	4.0
Dz Severity [1]	3.8 (1.1)	3.7	3.9	3.3 (1.2)	3.3	3.2
Dz Susceptibility	3.0 (.99)	2.8	3.1	2.8 (.86)	2.6	2.9
Benefits of Tx	4.3 (.86)	3.9	4.6	4.2 (.77)	4.2	4.3
Barriers to Tx	2.7 (1.0)	2.7	2.8	2.4 (.83)	2.3	2.4
Fatal Beliefs	2.0 (1.1)	2.3	1.9	1.7 (.78)	1.5	1.8
LOC	4.1 (.92)	4.2	4.0	3.8 (.69)	3.8	3.8
Control of Others[2]	4.0 (.89)	4.2	4.0	4.2 (.69)	4.6	3.9
Personal Control	3.0 (1.2)	3.3	2.8	3.4 (1.2)	3.7	3.2
Anxiety[2]	3.6 (1.9)	3.3	3.8	3.8 (1.9)	2.6	4.6
Depression	4.0 (1.9)	4.0	4.0	4.3 (1.7)	3.9	4.5
Fear[2]	4.1 (2.0)	3.2	4.5	3.8 (1.8)	3.0	4.4
Hopelessness	4.3 (2.2)	4.3	4.4	4.5 (1.8)	4.9	4.3
Uncertainty	4.4 (1.9)	3.9	4.8	4.4 (1.9)	4.7	4.3
Shame	4.1 (2.2)	4.2	3.9	3.4 (2.1)	2.8	3.8
Worry	4.6 (1.8)	4.4	4.7	4.3 (1.9)	3.8	4.6

[1] = significant ($p < .05$) difference between ethnic groups
[2] = significant ($p < .05$) difference main effect between gender groups

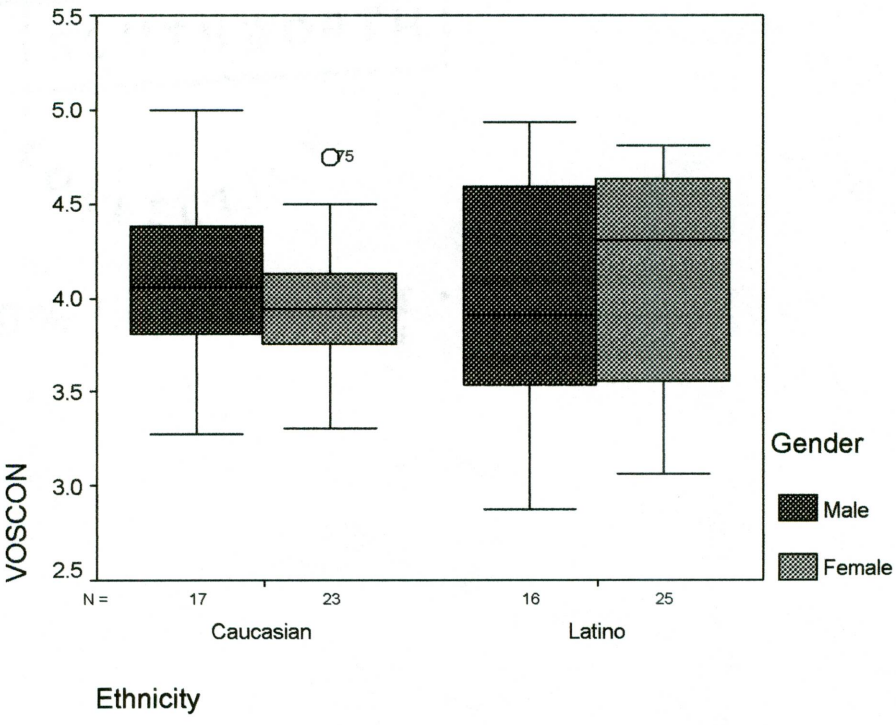
No main effects for ethnicity or interactions between gender and ethnicity were significant at the .05 level. Yet, systematic interaction effects between ethnicity and gender do appear for some variables (see Graphs 1-6). For example, Latino men (M = 3.1) reported the highest levels of fatalism value orientations while Anglo men (M = 2.5) reported the lowest. Similarly, Latino women (M = 3.9) reported the highest levels of beliefs regarding severity of diabetes and Anglo women (M = 3.2) reported the lowest.



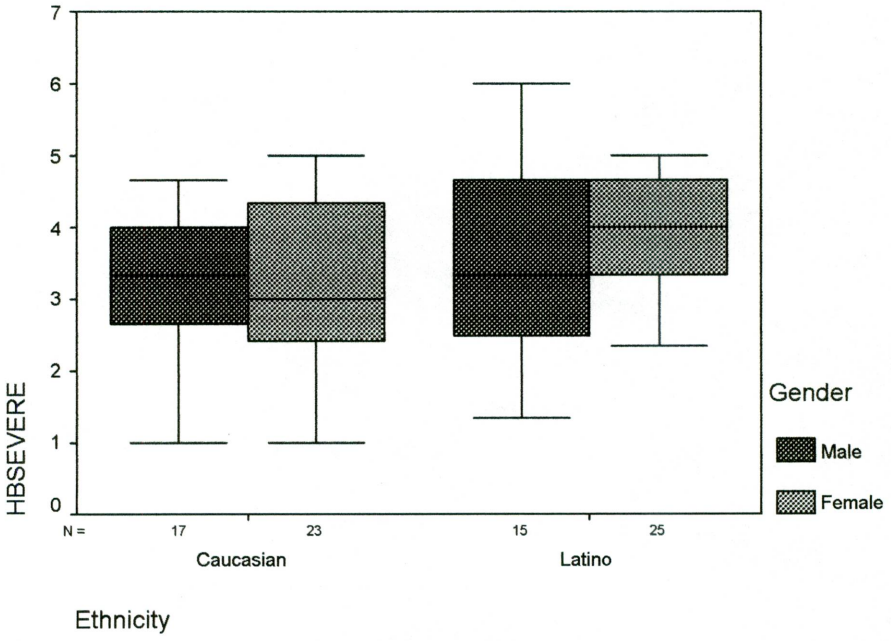
Graph 1. *Glucose Level by Ethnicity and Gender*



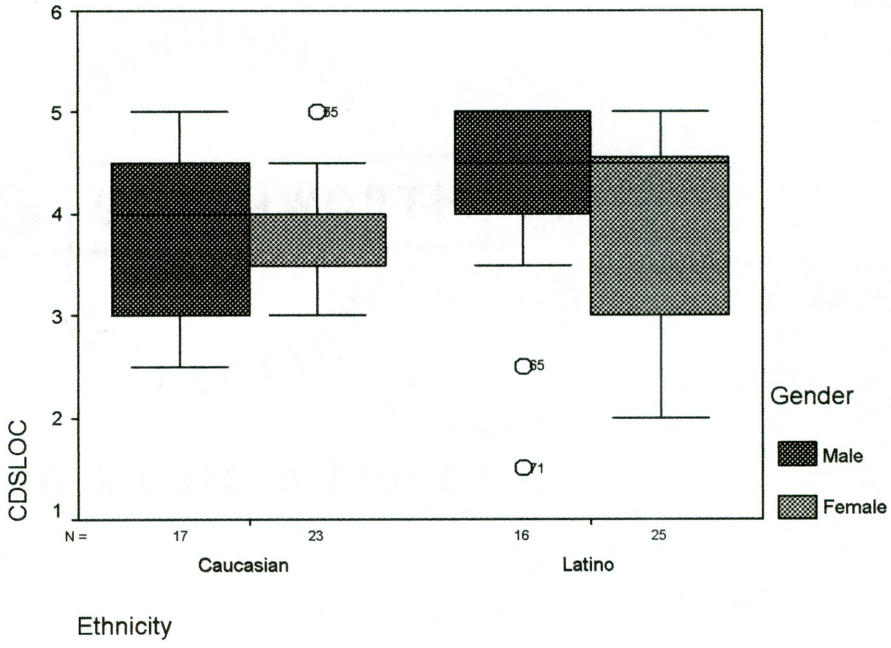
Graph 2. *Fatalistic Cultural Value Orientation by Ethnicity and Gender*



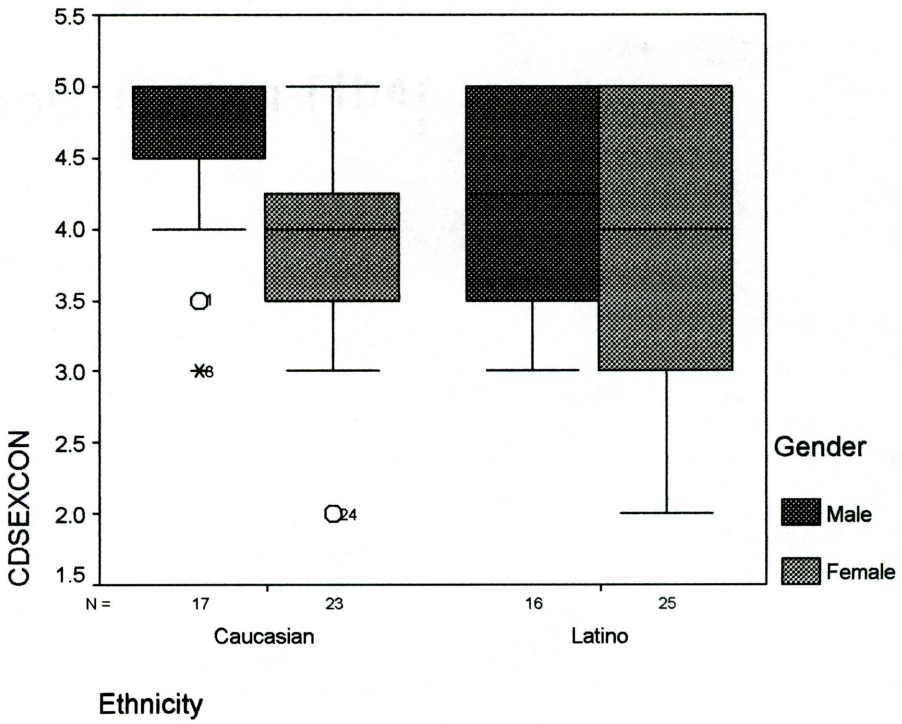
Graph 3. *Mastery Cultural Value Orientation by Ethnicity and Gender*



Graph 4. *Severity of Disease Belief by Ethnicity and Gender*



Graph 5. *Attributions of External Causality by Ethnicity and Gender*



Graph 6. *Attributions of Controllability by Others by Ethnicity and Gender*

Education was found to have a significant main effect on fatalism values [F (1, 75) = 7.14, p < .01], mastery values [F (1, 75) = 4.54, p < .05], fatalistic health beliefs [F (1, 74) = 6.5, p < .01] and glucose [F (1, 75) = 4.73, p < .05]. To further understand the effect of education, Pearson correlations were computed with predictor variables and adherence (glucose levels). These correlations revealed higher levels of education negatively correlated with fatalism [r (73) = -.36 p < .01] and mastery [r (73) = -.24 p < .05] value orientations, fatalistic health beliefs [r (72) = -.32 p < .01], and glucose [r (75) = -.24 p < .05].

Table 3.

Intercorrelational Between Predictors of Adherence Behaviors Controlling for the Influence of Education.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
(1) Glucose	-																
(2) Fatalistic	.03	-															
Values	(72)																
(3) Mastery	.10	-.34*	-														
Values	(72)	(72)															
(4) Barrier	.16	.19	.03	-													
Beliefs	(71)	(71)	(71)														
(5) Benefit	.12	-.15	.44**	.09	-												
Beliefs	(71)	(71)	(71)	(78)													
(6) Fatalist	-.15	.60**	-.22	.09	-.26*	-											
Beliefs	(71)	(78)	(71)	(71)	(71)												
(7) Severity	.17	.18	.00	.43**	.27*	.10	-										
Beliefs	(71)	(71)	(71)	(71)	(71)	(71)											
(8) Suscept	.25*	.29**	-.08	.48**	.29**	.19	.53**	-									
Beliefs	(70)	(70)	(70)	(70)	(70)	(70)	(70)										
(9) External	.06	-.11	.65**	.12	.20	.24*	.04	-.12	-								
Causality	(72)	(72)	(72)	(71)	(71)	(71)	(71)	(70)									
(10) Personal	-.09	-.17	.22	.17	.17	-.05	.10	-.03	.01	-							
Control	(64)	(64)	(64)	(64)	(64)	(64)	(64)	(64)	(64)								
(11) Controled	-.04	-.13	.60**	-.07	.18	-.15	.03	-.06	.42**	.09	-						
by Others	(72)	(72)	(72)	(71)	(71)	(71)	(71)	(70)	(72)	(64)							
(12) Worry	-.08	.33**	-.07	.04	.02	.09	-.12	.05	.06	-.16	-.09	-					
	(60)	(60)	(60)	(60)	(60)	(60)	(60)	(60)	(60)	(59)	(60)						
(13) Fear	-.10	.38**	-.08	-.01	.04	.22	-.06	.03	-.02	-.33**	-.09	.67**	-				
	(60)	(60)	(60)	(60)	(60)	(60)	(60)	(60)	(60)	(59)	(60)	(60)					
(14) Anxiety	-.08	.34**	-.22	.23	-.05	.19	-.00	.17	-.13	-.18	-.21	.68**	.75**	-			
	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(60)	(60)				
(15) Hopeless	-.07	-.23	.17	-.05	.18	-.28	-.10	-.12	.06	.10	.12	-.09	.05	-.14	-		
	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(60)	(61)	(60)	(60)	(61)			
(16) Uncertain	.02	-.22	.26*	-.00	.17	-.19	-.11	-.10	.09	.07	.06	-.18	.04	-.13	.87**	-	
	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(61)	(60)	(60)	(61)	(61)		
(17) Depress	.00	.22	-31**	.11	-.12	.05	-.05	.06	-.17	-.43**	-.08	.42**	.45**	.52**	-.27*	-.42**	-
	(62)	(62)	(62)	(62)	(62)	(62)	(62)	(62)	(62)	(62)	(62)	(60)	(60)	(61)	(61)	(61)	
(18) Shame	-.23	.68**	-.4**	.15	-.15	.30	.22	.17	-.12	-.21	-.26	.27	.36*	.44**	-.62**	-.61**	.42**
	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)	(38)

Partial correlations, controlling for education, were then examined for all predictors of adherence as well as between predictors and glucose levels. As described in Table 3, fatalism values positively correlated with beliefs in susceptibility to diabetic complications, fatalistic health beliefs, and anxiety, worry, fear, and shame. Mastery values positively correlated with beliefs in the benefits of treatment, external causes and controllability but negatively correlated with degrees of uncertainty, depression, and shame. Fatalistic beliefs positively correlated with perceptions of external causes and hopelessness. Perceptions of personal controllability negatively correlated with fear and depression. Susceptibility to diabetic complications positively correlated with glucose levels thereby indicating poor adherence.

General Hypothesis

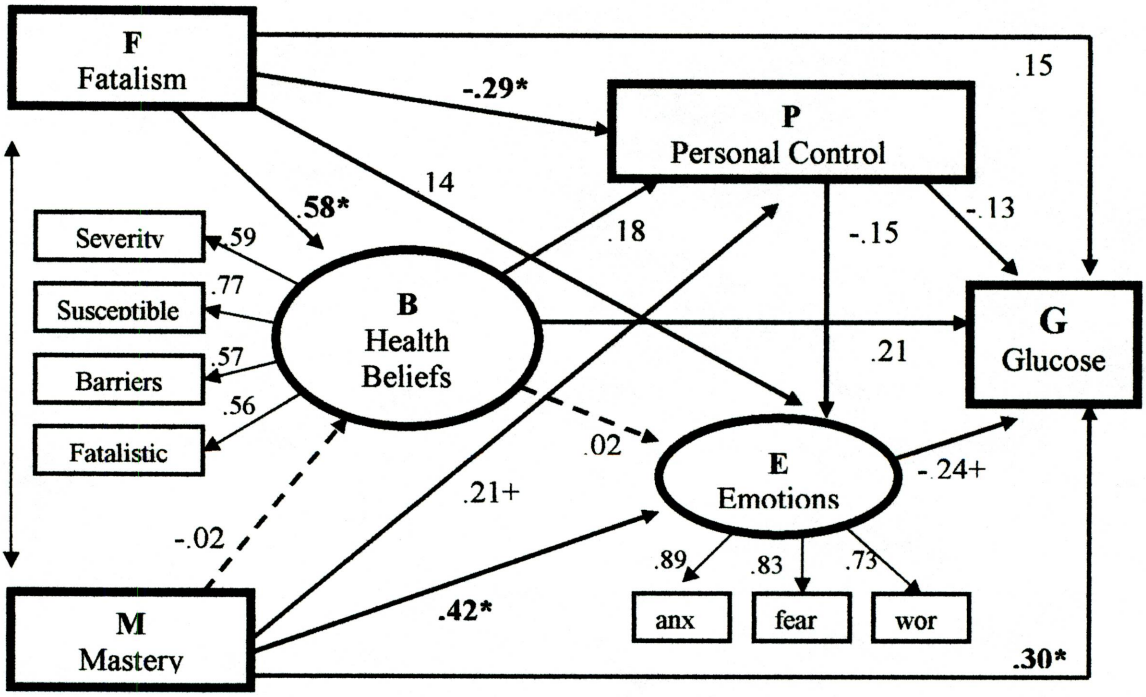
In order to test the general hypothesis, Bentler's (1995) statistical package for the analysis of structural equations (EQS) was used. Given the normality of distributions, all relevant variables were within appropriate limits. Consequently, EQS was considered appropriate for examining the hypotheses of this study, particularly when complemented with the additional analyses reported above.

The EQS program provides the most appropriate statistical tool to test the general hypothesis of this study, as it allows a simultaneous test of all proposed relationships while examining both direct and mediating effects. Using maximum likelihood methods to obtain estimates of the causal relations among variables, EQS provides a chi-square goodness of fit index to determine the degree of discrepancy between the data and the proposed model. This program is designed to test whether or not the set of multiple causal relations in the proposed model are consistent with the observed data. Therefore,

EQS allows for simultaneous analysis of both direct and mediating effects (Bentler, 1995). The consistency between the proposed relations (hypothesized model) and the observed data is evaluated by a comparison of the covariance matrix obtained from the data and the matrix resulting from the parameters of the hypothesized model. Bentler (1992) considers a Comparative Fit Index (CFI) of .90 or higher as an indication of an acceptable fitting model. The significance of the data's fit, in reference to the variance not accounted for, is then assessed using the chi-square distribution. A non-significant chi-square (a probability level larger than 0.05) is desirable.

The model presented in Figure 1 includes all the proposed relations among value orientations, health beliefs, attribution processes and emotions relevant to variance in treatment adherence, as represented by glucose levels. In the model, circles represent latent variables and rectangles represent manifest variables. Specifically, there were four manifest variables and two latent variable constructs. Cultural elements, as indicated by manifest variables representing the fatalism and mastery cultural value orientations and health beliefs, are the first steps in the model because culture is distal and conceptualized as including elements thought to influence attributions concerning health and related behavior. Diabetic health beliefs are thought to be influenced by more fundamental cultural elements and in the model represent a latent variable that consists of beliefs concerning susceptibility to complications, severity of the disease, treatment barriers, and fatalistic health beliefs as indicators. These beliefs and expectations are represented as being influenced by the value orientations and influencing attributions, emotions, and adherence. The latent variable representing emotion has anxiety, fear, and worry as indicators. Attribution processes is a manifest variable representing perceptions of

personal control regarding contraction and the progression of diabetes. Adherence behavior is a manifest variable represented here by a measure of glucose level. Since psychological processes are more proximal determinants of behavior than cultural elements and disease related beliefs, they are represented in the model as the closest determinant of glucose level, the outcome. Thus, these results suggest attributions of personal controllability and emotions as partially mediating the effects of culture.



+ p < .10, * p < .05, ** p < .01; dashed line indicates path removed in final analysis.

Figure 1. Model of Cultural and Psychological Influences on Diabetic Adherence: Attributions of Personal Controllability.

The general hypothesis proposing that relationships among cultural value orientations, health beliefs, attribution processes and emotions as determinants of variance in adherence was confirmed: A test of the model described (see Figure 1) resulted in a good fit of the data. Despite the small sample size and the number of parameters (23), the data fit well with a CFI = .92, χ^2 (56) = 43.79, p = .06. Thus, confirming that variance in adherence was in part a function of the relationships among culture (fatalism mastery cultural value orientations and health beliefs), attribution processes, and emotions. The power of these relationships was limited due to the sample size; however, the relevance of the proposed relationships within the model is evident. The nature of the relationships predicting adherence, as discussed with regard to the specific hypotheses of this research, should be considered within the scope of the entire model.

Specific Hypotheses

As proposed in the first specific hypothesis, attributions of controllability were influenced by cultural value orientations, but suggesting some degree of complexity. Specifically, both the direct and indirect influence of value orientations (fatalism and mastery) on attributions of personal controllability were confirmed in that the data fit the tested model (CFI= .92). As depicted in Figure 1, the path leading directly from fatalism (F) to personal control (P) demonstrate the influence of fatalism value orientation on attributions of controllability. Higher degrees of fatalism decreased perceptions of personal controllability. The path from mastery (M) to personal control (P) shows that mastery values influence attributions of controllability as well: Higher degrees of mastery values increased perceptions of personal controllability.

As depicted in Figure 1, value orientations in part directly influence health beliefs concerning diabetes: The path from fatalism (F) to beliefs (B) confirmed higher fatalism values increased the strength of health beliefs concerning one's susceptibility to diabetes complications, severity of the disease, barriers to treatment, and fatalistic health beliefs. In this population of diabetics, only the fatalism value orientation effected health beliefs since the path from mastery (M) to beliefs (B) was nearly irrelevant (standardized coefficient = -.02).

The direct path from health beliefs (B) to attributions of personal controllability (P) indicated beliefs, albeit minimally, influenced perceptions of personal controllability. Higher scores on health beliefs (concerning one's susceptibility to diabetes complications, severity of the disease, barriers to treatment, and fatalistic health beliefs) increased perceptions of personal controllability. Since, fatalism directly influenced health beliefs, the path from beliefs (B) to personal control (P) also shows the indirect effect of fatalism on personal controllability. Directly, higher fatalism decreased perceptions of personal controllability; whereas, when mediated by health beliefs, high fatalism increased perceptions of personal controllability.

The second hypothesis proposing cultural value orientations and beliefs directly influence adherence as well as indirectly through mediating attributions of controllability and related emotions was confirmed. The direct effects of value orientations and health beliefs on adherence were confirmed by the paths leading from fatalism (F), mastery (M), and health beliefs (B) to glucose (G). Higher scores in values significantly predicted higher glucose levels thus indicating worst adherence. Higher levels of fatalism and health beliefs suggested the same, but did not reach significance.

As depicted in Figure 1, value orientations, particularly fatalism, influenced emotions as seen by the paths from fatalism (F) and mastery (M) to emotions (E). Higher levels of value orientations indicated more anxiety, fear, and worry. The path from personal controllability (P) to emotions (E) indicated that higher levels of personal controllability result in lower anxiety, fear, and worry. The effects of attributions (P) and emotions (E) on adherence (G) were generally confirmed: Higher perceptions of personal control and related anxiety, fear, and worry indicated better adherence behaviors as seen by lower glucose levels. These same paths (P and E to G) also suggest personal controllability and emotions mediate the direct influence of value orientations and health beliefs on glucose, thereby confirming the second hypothesis.

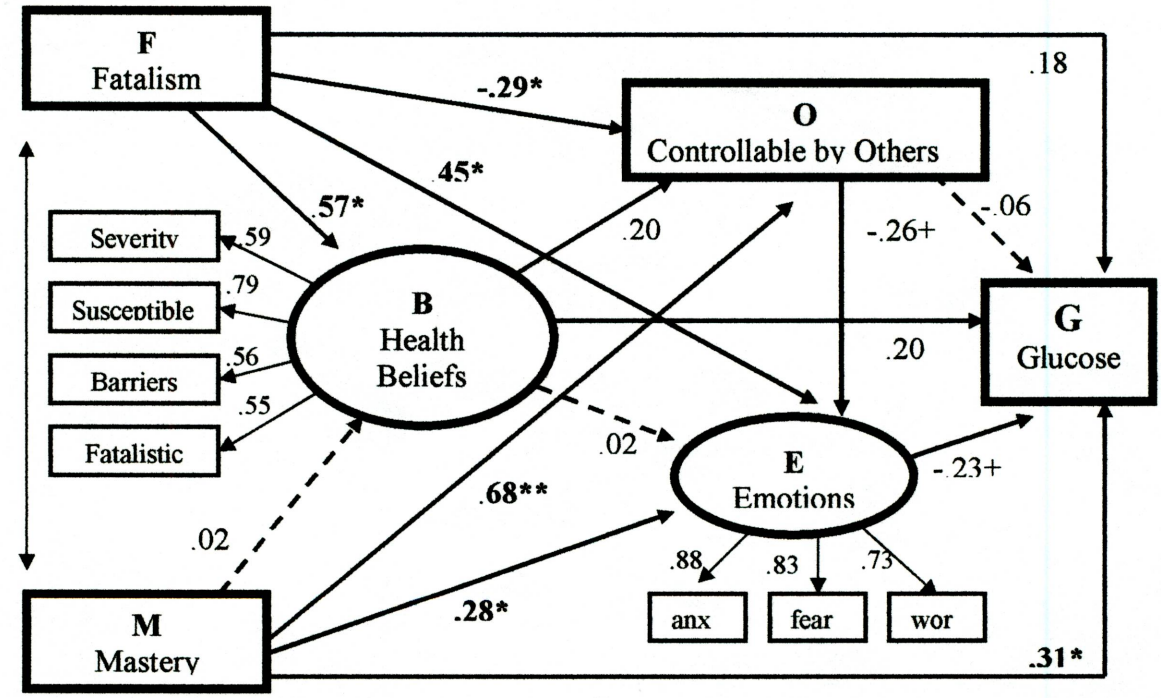
Additional Analysis

Additional analyses were conducted to examine a more parsimonious revision of the first model, based on conceptually compatible observations from the Walden and Lagrange multiplier tests. Then another aspect of perceived of attributions of controllability, controllable by others, was considered.

First, the non-significant paths corresponding to the effect of mastery orientation (M) on health beliefs (B) and health beliefs (B) on emotions (E) were removed (Indicated by dashed lines in Figure 1). This did not represent a significant change in the variance accounted for, as seen by no difference in χ^2 (χ=0.84, for 2 degree of freedom). Therefore even thought in other cases these paths may be retained due to theoretical relevance, in this exploratory study, there is no statistical or conceptual reason to do so. Thus, the revised model was retained

To better understand how more proximal determinants of behavior (e.g., attribution and emotion) mediate the influence of culture and beliefs, a second model using a different domain of attribution processes was also tested. This third model (see Figure 2) analyzed attributions regarding perceived controllability by others, in place of personal controllability, to determine how this different domain of attributional thinking may be influenced by cultural value orientations and effect adherence behaviors. With exception of that single variable, all other latent and manifest variables for the third model were identical to those depicted in Figure 1. Again, the general hypothesis was supported and the data fit this second model well; CFI = .92, χ^2 (55) = 46.14, p = .04. Generally, little difference existed between the personal controllability model (Figure 1) and the controllability by others model depicted in Figure 2: Except, for the way the attributional variables related to some of the variables in the model. Specifically controllability by others was not influenced by fatalism as was control by the person. Also, control by others influenced emotions and glucose level more than personally controllable.

Based on EQS suggestions, modifications to decrease the restrictions on this second model by removing non-significant parameter estimates were considered. The parameters to be removed corresponded to the effect of mastery value orientations (M) on health beliefs (B), health beliefs (B) on emotions (E), and fatalism values on perceptions of controllability of others (O). Modifications to the model did improve the fit of the data; CFI = .93, χ^2 (56) = 46.49, p = .07. Yet, as with the first model, these changes did not represent a significant improvement, (difference ratio chi-square of 0.35 on 3 degrees of freedom)



+ p < .10, * p < .05, ** p < .01; dashed line indicates path removed in final analysis.

Figure 2. Model of Cultural and Psychological Influences on Diabetic Adherence: Attributions of Controllability by Others.

Conclusion

This study examined cultural and psychological factors thought to influence disparities in diabetic adherence behaviors. The ways in which such factors relate to one another as determinants of treatment outcomes were considered. Overall, the results provide support for the propositions and overall approach to studying how culture may influence health behaviors. While only fatalism and mastery cultural value orientations were presently considered, the aim of this research was not only to study these specific value orientations but to determine whether such variables influenced diabetic adherence as an example of the possible relationship between culture and health behavior. The general hypothesis was supported in that the proposed set of relationships provided a good fit to the data.

Between group analyses revealed that in this sample of diabetics, ethnic groups did not significantly differ on cultural or other variables of interest. Comparisons regarding potentially interesting group differences are tentatively based on supplementary analysis illustrated in graphs 1-6. Within the entire sample however, the results confirmed the influence of cultural variables overall accounting for the intragroup and individual variations in adherence. Thus reveal interesting aspects of how the investigated variables relate to one another while influencing adherence. The power of these relationships is limited due to the sample size yet these results remain both theoretically and practically significant. More importantly, the usefulness of the proposed approach to studying culture (see Betancourt & Lopez, 1993) as it relates to health was supported. Thus, comparisons between ethnic groups are secondary to the

analysis of within group variations in cultural variables as these variations relate, to any degree, to psychological processes and health behaviors or disease outcome.

It is encouraging that the data fit the hypothesized models, despite a small sample and thus limited power. Yet, there are some limitations to the generalizability of these findings: Sample size, low response rate, and general methodology using English only mailed surveys. The limited sample size and low response rate may be indicative of a selection bias common when attempting to study attitudes and beliefs about adherence behavior. It could mean that those who are not adhering did not choose to participate, and those who did are the ones who tend to be more compliant. Indeed it seems that the topic of adherence may elicit pride and willingness to participate for some and avoidance in others. Additionally, the sample size and response rate may have been impacted by period effects occurring during the time survey packets where mailed to prospective participants: Threats of bio-terrorism possibly deterred individuals from opening packets. Although ethnic groups were relatively equal in number, the sample of Latinos may have also been restricted by not using a survey instrument in Spanish. Thus, the sample only includes Latinos who read English well enough to respond and who may not be representative of all Latino American diabetics.

Because of the ramifications for any or all of these limitations, it is difficult to extrapolate results from this study to the general diabetic or chronic disease population. However, in no way was this study intended to draw conclusions from this sample and generalize to any population. Rather, the purpose is to shed light on relationships among specific cultural and psychological factors serving as antecedents to adherence behavior. The possibility that variables, such as the fatalism and mastery value orientations, may

account for disparities in treatment adherence is particularly relevant to this purpose and approach to understanding how culture may influence health. Consequently, conclusions regarding the representation of Latinos or even comparison between ethnic groups remains secondary to understanding the within group variations associated with specific aspects of culture.

Overall, the present study identified the influence of both cultural variables and mediating psychological factors on treatment adherence. The theoretical importance of this begins with the confirmation of the general approach to studying culture as it relates to health outcomes. The results are consistent with previous cross cultural work by Betancourt and collaborators in other behavioral domains (e.g. Triandis, et al. 1993; Betancourt, Hardin, & Manzi, 1992; Betancourt & Lopez, 1993; Betancourt & Fuentes, 2001; Zaw & Betancourt, 2002). For example, in a recent study, Zaw and Betancourt (2002) found attribution processes and emotions mediated the effects of other cultural value orientations (e.g., collectivism and individualism) on styles of conflict resolution. The present results lend support to this theoretical framework while highlighting the complexity and scope of how cultural factors may influence behavior and, in this study, health outcomes.

A particularly important aspect of these results is that the two value orientations, in the past seen as two extremes of one dimension, relate to adherence and mediating psychological factors in distinctly different ways. Although with some limitations, both value orientations are positively correlated with glucose levels and thus appear to be detrimental to diabetic outcomes; particularly for mastery orientations. Fatalism and mastery orientations relate differently to the other variables examined (health beliefs,

attributions of controllability and emotions) that are thought to temper the harmful influence value orientations may have on adherence thus, diabetic outcomes. This unfavorable consequence may reflect one of the possible mechanisms underlying ethnic disparities in diabetic outcomes. Consequently, the results highlight the overarching need for the medical system to consider and address the influence that cultural elements have on health behaviors (Lau, Hartman, & Ware, 1986; Lipton, Losey, Giachello, Mendez, & Girotti, 1998; Oomen, Owen, & Suggs, 1999; Ruiz, 1985; Williams, & Collins, 1995).

The results also illustrate that more proximal components to behavior, such as cognitive processes and emotions, may mediate the negative influence of value orientations on adherence. Interestingly, these elements operated differently with each value orientations. Fatalism strongly related to the kinds of health beliefs included in the study, while mastery did not. These health beliefs influenced attributions of controllability. Attributions of controllability inversely related to both negative emotions and glucose. Hence, for more fatalistic diabetics, health beliefs appear to mediate the detrimental effect fatalism alone can have on adherence. In the case of fatalistic individuals, health beliefs also offer a significant target for intervention.

The practical implication of these result are particularly appealing for treatment and education efforts. The results suggest that for fatalistic diabetics, education and treatment programs targeting culturally based cognitive elements (e.g., beliefs relevant to diabetes) may be more successful at improving adherence. Conversely, the same programs may be less effective for patients high in mastery since, as seen in Figure 1, the relationship between health beliefs and mastery values was nonexistent. Such programs, targeting disease related health beliefs, would not be able to mediate the detrimental

influence that mastery orientations have on diabetic adherence. The effectiveness of targeting health beliefs, as is done in many education programs, may be more dependent on preceding value orientations than more proximal predictors of behavior (Christiansen, Moran, & Wiebe, 1999; Friend, Hatchett, Schneider, & Wadhwa, 1997; Hegel, Ayllon, Theil, & Oulton, 1992; Kirscht, 1983; Rubin, Peyrot, & Saudek, 1991).

Another interesting result was that the two kinds of attribution of controllability, personal control and control by others, supported the general premise of the study yet operated somewhat differently in the proposed model. Each attributional dimension is known to relate to distinct psychological effects (Weiner, 1986; 1995). For instance, perception of personal control, or the belief that an individual can overcome barriers effectively and act upon his or her environment, is extremely important in deterring undesirable psychological states and therefore behavioral consequences. In this population of diabetics, the results indicate that perceptions of personal controllability may mediate the potentially harmful influence that fatalism, mastery, and diabetic health beliefs have on glucose levels.

The different domains of cultural values, operated differently on attributions of controllability. In the case of personal controllability, as expected based in conceptual aspects, mastery was positively correlated while fatalism maintained an inverse relationship. For controllability by others, mastery maintained a strong relationship while fatalisms effect was minimal. The later is consistent with the construct represented by the fatalism scale (Betancourt, Hardin, & Manzi, 1992; Hofstede, 2000; Kluckholm & Strodbeck, 1961; Powe, 1989). Specifically, fatalism reflected one's view of oneself in relation to fate and ability to control the relevant aspects of life, not necessarily whether

others are in control. Theoretically, this also offers insight into the cultural value domain under investigation. Practically, this result further illustrates the importance of targeting perceptions of control and related emotions in education, treatment, and intervention efforts as a means of mediating the influence, in this case detrimental, that value orientations have on diabetic and health outcomes.

In this study, mastery orientation positively correlated with negative emotions and both attribution of controllability domains but particularly controllability by others. It follows that an individual maintaining a greater sense of control over their life yet facing a chronic and at times uncontrollable illness like diabetes, may need to shift their cognitive reference point to defer the blame and responsibility of the progression of the disease. Consequently, the progression of the disease would be attributed to outside that individual and heightened levels of anxiety, fear, and worry make sense. Fortunately, greater attributions of controllability and negative emotions maintained an inverse relationship with glucose levels therefore, could mediate mastery orientations detrimental influence on adherence.

The differences observed between gender and ethnicity groups, while not all significant in this particular sample of diabetics, provide some interesting interaction trends (see Graphs 1-6). These are issues important to have in mind for future research and may shed light on how variations in the predictor variables manifest differently in groups such as gender or educational levels. For instance, the mediating impact emotions may have on women's health outcomes. Recall that preliminary results revealed women reported greater degrees of anxiety and fear. Previous research suggests this could be detrimental to health outcomes (Friend, Hatchett, Schneider, & Wadhwa, 1997; Lipton,

Losey, Giachello, Mendez, & Girotti, 1998; Taylor, Helgeson, Reed, & Skokan, 1991). This is particularly relevant when ethnicity is considered.

Research demonstrates particular cultural environments, such as Latino, apply pressure on women to maintain their familial role and so may hamper their efforts to adhere to diabetic regimens (Chavez, Hubbell, Mishra, & Valdez, 1997; Laws, & Meyo, 1998; Zaldivar, & Smolowitz, 1994). In this population of diabetics, emotions which are inversely related to glucose levels, may mediate the detrimental influence that cultural values appear to have on diabetic adherence. Although an individual might maintain high levels of cultural value orientations, perceptions of fear, anxiety, and worry, may motivate them to adhere closer to their diabetic treatment. Consequently, these emotions buffer the negative impact that cultural value orientations may have on diabetic outcomes. Hence, in the case of Latino women, heightened emotions may serve diabetic women well.

The main effects that education had on value orientations, health beliefs, and glucose pose another issue to consider when interpreting these results. The fact that there are differences in education and some interaction trends with gender is not surprising nor is it appropriate to interpret that these issues account for the variance observed within the variables of interest. In comparing variance between groups, one always runs the risk of attributing what are cultural factors, such as values, beliefs, norms, expectations, etc., to ethnicity or race, when in fact it may have to do more with education, social economic level, or other grouping factors that contribute to these differences (Betancourt, & Lopez, 1993; Reid, 1994). In the future it is important to try to not only control but also systematically examine these factors, education and gender, in relation to culture.

It is apparent from this investigation and process, that in order to fully comprehend what drives cultural disparities in health outcomes; one must first identify, measure, and understand the specific cultural constructs (e.g., fatalism and mastery) in relation to the specific health behaviors (Betancourt, & Fuentes, 2001; Betancourt, & Lopez, 1993). Given the limitations of current research examining the relationships of culture to diabetes, investigators must respond to this challenge with an approach that is both culturally sensitive and methodologically appropriate.

A model of health behavior, based on the scientific understanding of the relationships between culture, psychological processes, and health behavior and outcome, may link theoretically grounded empirical understanding of culture and health with effective interventions for a diverse population (Hayes-Bautista, 1992; Williams, & Collins, 1995). Hence, it is important for practitioners to pay attention to specific elements of culture that may contribute to differences within groups instead of focusing on behavioral discrepancies between ethnic or racial groups. Identification and measurement of how culture influences health behavior and outcome is important, but also what psychological factors are likely to mediate these effects and what role these have in influencing health outcomes. This knowledge will better serve the medical communities efforts at diabetic treatment, intervention, and policy efforts.

Despite of the limitations of the present study, the resulting model was confirmed and able to highlight relationships between culture and behaviors related to diabetic treatment adherence. Research based on this or similar models may provide a better understanding of the cultural components that underlie health disparities and guide future research and intervention efforts with these and other cultural groups dealing with

chronic illnesses or health promotion and disease prevention efforts. Such research may further benefit intervention strategies at the individual (e.g. treatment and professional patient interactions), as well as the social (e.g. public health policy and intervention) levels. Such culturally based interventions may, in turn, contribute to the elimination of disparities between ethnic and social groups in health care utilization, prevention, intervention, and outcome.

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Appendix B: Value Orientation Scale

Please circle one number to best indicates what you think and how strongly you agree with the following statements. Remember, there is no right or wrong answer.
5 point Likert Scale: 1= Strongly Disagree to 5=Strongly Agree

Subjugated to Nature Subscale:

1. Generally, if something is going to happen it usually does, no matter what I do to avoid it
2. When life start to go exactly as I want, something usually happens to change things
3. Life doesn't give you any breaks, that's why I take it one day at a time
4. I find it difficult to plan for my future because so many things that can happen
5. Life can go up or down, so I can never tell how things will turn out
6. My fate seems completely predetermined
7. For me, the future seems totally unpredictable
8. I carry my burdens because I must; that's what I am supposed to do
9. World affairs are too complex for an ordinary person like me to make a difference.
10. In relationships, those that fall apart or end in divorce do so because one can't really change someone or the things that happen
11. Most relationships are destined to be what they are
12. Even if I do everything in my power to take care of my pets, there's no telling if they'll stick around
13. Raising children is difficult, even if you are the best parent, there's no way to know how your kids will turn out
14. Fate determines if one is meant to be in good health or get sick, either way, not a lot can be done about one's health
15. Despite what doctors and scientist say, advances in technology will not influence whether I live longer or healthier
16. Every person has a set time to live and when that time is over, it's just over
17. At work, my success has to do with Destiny and being in the right place at the right time
18. When it comes to work, I just go along with whatever comes my way
19. When it comes to life, it is best to pay attention to what is happening now because the past has gone and the future is too uncertain to count on
20. A lot of things change in life. Sometimes for better, sometimes for the worse, but in the long run it works out to be about the same
21. When I enjoy something a lot, I'd rather indulge in it immediately than save it for later

Control Over Nature Subscale:

22. No matter what is going to happen, I can always do something about it
23. There is always a way to influence what happens to you, that's why I work really hard to make my future better
24. When it comes to life, I play a very active role in what happens to me
25. When it comes to my future, I know it is up to me to take care of anything that comes my way

26. There are many troubling conditions in the world but it is still possible to make a difference by taking charge of one's own life and making the most of it
27. One can make any relationship work if they spend enough time and work hard at it
28. If I planted a garden and worked really hard at tending the plants I could guarantee everything would grow
29. I expect my children will have more than I ever will as long as they work hard and plan right.
30. It's possible to avoid getting sick and prevent most illnesses by taking care of yourself today
31. When it comes to farming, I think farmers who take advantage of the latest scientific information will grow better crops than farmers who leave it all to Nature
32. People who work hard and plan ahead will achieve greater success than those who don't
33. Saving money is important in order to guarantee a better future
34. It is best to look ahead, work hard, and be willing to give up things now so the future will be better
35. A lot of things change in life. Sometimes for better, sometimes worse but in the long run it's better than it use to be
36. If I really want something a lot, I'm willing to wait as long as it takes to get that specific thing
37. If one eats well and takes good care of their body, one will be in better health
38. Paying attention to scientific knowledge and technology, and following doctors' recommendations is important for living longer and healthier

Appendix C: Diabetes Health Belief Scale (DHBS; Harris & Linn, 1985)

We are interested in your responses to the following health-related questions. **Circle one of the numbers on the right-hand side of the page to indicate best how you feel.** 1= Not at all 2= Slightly 3= Somewhat 4=Fairly 5=Extremely

1[1]	How much does getting checked for an illness make you scared you may really have that disease?	5 4 3 2 1
2[1]	How much do you believe that if someone is meant to get sick, they will get sick no matter what they do?	5 4 3 2 1
3	How much do you believe that if someone is diagnosed with an illness, it's already too late to do anything for the person?	5 4 3 2 1
4	How much do you believe that if you have an illness, it doesn't matter what doctors and nurses tell you to do, you'll get sick anyway?	5 4 3 2 1
5	How important do you think it is to get a medical checkup even when you feel ok?	5 4 3 2 1
6	How much would you say your diet interferes with your lifestyle?	5 4 3 2 1
7	How much do you think your doctor can help you achieve a longer life span with your diabetes?	5 4 3 2 1
8	How easily would you say you get sick?	5 4 3 2 1
9[2]	How much do your family and friends help you stay on your diet?	5 4 3 2 1
10[2]	How helpful would you say an educational program is for diabetic patients?	5 4 3 2 1
11[3]	How much do you worry about what you eat?	5 4 3 2 1
12	How much would/does kidney disease interfere with your normal everyday activities?	5 4 3 2 1
13	How much of a problem would you have if you did not take your medications?	5 4 3 2 1
14	Do you think that it is likely that diabetes will cause you to have a shortened life expectancy?	5 4 3 2 1
15	How helpful to you is coming to the clinic for regular appointments?	5 4 3 2 1
16	How much does taking your medication interfere with everyday activities of living?	5 4 3 2 1
17	How likely are you to either develop poor circulation, or have the condition worsen?	5 4 3 2 1
18	Do you hesitate to tell newly made friends that you have diabetes?	5 4 3 2 1
19	How likely do you think it is that you will get eye disease related to your diabetes, or have conditions worsen?	5 4 3 2 1
20	Some people are quite concerned about the chance of getting sick while others are not. How concerned are you about getting sick?	5 4 3 2 1
21	How much would/does eye disease interfere with your everyday activities?	5 4 3 2 1
22	How much do you think your doctor can help you if you develop/have tingling and numbness in your arms and legs?	5 4 3 2 1

Note: [1] Item removed from fatalistic belief subscale; [2] item removed from benefits subscale; [3] item removed from severity subscale. Thus, items 3, 4 (Fatalistic health beliefs); 5, 8, 10, 15, 22 (Benefits); 6, 17, 18, 21 (Barriers); 7, 16, 19, 20 (Susceptibility to Dz); and 12, 13, 14 (Severity of Dz) were used in analysis.

Appendix D: Causal Dimension Scale- Revised (CDSII)

After feeling sick for a long time, Angela went to the doctor. The doctor said she had diabetes. The doctor told Angela that this was a serious condition that she could die from unless she changed her habits. To try and control her diabetes, the doctor put Angela on several medications, a strict diet and exercise routine, along with daily shots of insulin. Six months later, Angela's symptoms were worst and she went back to the doctor. When the doctor asked if she had been following her treatment plan Angela said, "no".
Why didn't Angela follow the doctor's advice to control her diabetes?_____

Think about the reason or reasons you have written above. The items below concern your opinions about the cause or causes of Angela's behavior. Circle one number for each of the following questions.
The reason Angela didn't follow the doctor's advice is caused by something:

1[3]	That reflects an aspect of herself 1…2…3…4…5 Reflects an aspect of the situation
2	Manageable by Angela 1……2……3……4……5 Not manageable by Angela
3[1]	Permanent 1……2……3……4……5 Temporary
4	Angela can regulate 1……2……3……4……5 Angela cannot regulate
5	Over which others have control 1…2….3…4…5 Over which others have no control
6	Inside of Angela 1……..2……..3…….4……..5 Outside of Angela
7[1]	Stable over time 1…….2……3……4……..5 Variable over time
8	Under the power of other people 1...2…3..4…5 Not under the power of other people
9	Something about Angela 1……..2……..3……4…….5 Something about others
10	Over which Angela has power 1….2….3...4…5 Over which Angela has no power
11[1]	Unchangeable 1……..2……..3……..4……..5 Changeable
12[3]	Other people can regulate 1……..2……3……4……5 Other people cannot regulate

Note: [1] Item removed from stability subscale. [2] Item removed from locus of causality subscale. [3] Item removed from control by others subscale. Thus, items 2, 4, 10 (Personal control), 5, 8 (Control by others), and 6, 9 (Locus of cause) were used in analysis.

Now please think about the scenario you read and try to recall, while having read the case, how did you feel? Circle one number to indicate how you felt:

Calm	1	2	3	4	5	6	7	Anxious
Indifferent	1	2	3	4	5	6	7	Worried
Fearless	1	2	3	4	5	6	7	Afraid
Hopeless	1	2	3	4	5	6	7	Hopeful
Doubtful	1	2	3	4	5	6	7	Certain
Happy	1	2	3	4	5	6	7	Depressed
Ashamed	1	2	3	4	5	6	7	Proud

Appendix E: Cover Letter

October 1, 2001

Dear (name of diabetic patient),

As you may know, the Loma Linda University's Diabetes Treatment Center and Faculty Medical Offices are clinics where individuals can receive education and management of their diabetes. Though an affiliation with Loma Linda University, both of these offices are teaching and research facilities. The purpose of this letter is to inform you that you have been selected to participate in a research study designed to gain additional knowledge about how people deal with their diabetes. From time to time data from your medical record(s) may be used in this specific research project. This will only be done when the data can be extracted anonymously. The data will then be placed into a database that provides absolute anonymity (your name will not be used in the research database and there will be no way to identify you further). Your information will be strictly CONFIDENTIAL and will only be used as part of a group of respondents.

Participation in this study is expected to take approximately 20 minutes and only requires you to complete the enclosed questionnaire and return it using the enclosed self – addressed stamped envelope. By participating in this study, you will be exposed to no particular risk other than what you are exposed to in daily life. Your participation is completely voluntary and you may refuse to take part in the study without penalty by simply checking the decline box on the survey and promptly returning it. During the study, you also have the freedom to withdraw without any consequence to your present or future medical care.

If after you participate in this study you have any questions, comments, or concerns about the study or the informed consent process, you may contact the research investigators or a third party at the address and phone numbers provided we will provide to you below.

Scott Lee, MD., Diabetes Treatment Center, Research Director;Director of Diabetes Care
Hector Betancourt, Ph.D., Senior Research Director, Loma Linda Graduate School
Keikilani McMillin, Research Assistant
Loma Linda University
Loma Linda, Ca. 92354
Phone (909) 558-8577

If you wish to contact an impartial third party not associated with this study regarding any complaint you may have about the study, you may contact the following for information and assistance:

Office of Patient Relations
Loma Linda University Medical Center
Loma Linda, Ca. 92354
Phone (909) 558-4647

Appendix F: Follow up Letter

October 1, 2001

Dear diabetic patient,

Two weeks ago you were sent a survey entitled **Caring for Diabetes** and asked to participate in a research project. This study was designed to learn more about how patients here at Loma Linda deal with their diabetes so that we may better serve them. The purpose of this letter is to encourage you to complete the survey if you have not already done so. Please remember that the information you provide is completely confidential and will only be used as part of a larger group. Should you choose not to participate, please check the decline box on the survey and return it using the self-addressed envelope. If you have already returned your survey, then we would like to thank you for your time and if you are interested in the results please contact the research investigators at (909) 558-8579. When contacting the investigators for a copy of the final results, please leave your name and mailing address.

Again, thank you for your support,

Scott Lee, MD.,
Research Director, DTC; Director of Diabetes Care, LLUMC

If you have any questions, comments, or concerns you may contact the research investigators at (909) 558-8579. Or if you wish to contact someone not involved in the research regarding any complaint you may have about the study, you may contact the Office of Patient Relations.

Research investigators:
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