RELIGIOSITY AS A COPING RESOURCE FOR DEPRESSION AND DISEASE MANAGEMENT AMONG OLDER DIABETIC PATIENTS

Vanessa G. Dzivakwe

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APPROVED:

Charles A. Guarnaccia, Major Professor
Joshua Hook, Committee Member
Kimberly Kelly, Committee Member
Vicki L. Campbell, Chair of the Department of Psychology
Mark Wardell, Dean of the Toulouse Graduate School
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Compared to the general population, diabetic patients experience a higher prevalence of depression, which can often exacerbate diabetic symptoms and complicate treatment. Studies show that religion is associated with both better physical health and better psychological functioning; however, studies incorporating religion and depression among diabetic individuals are scarce. The present study addressed this gap in the literature by examining archival data from the 2008 and 2010 data waves of the Health and Retirement Study (HRS). Cross-sectional findings confirmed that stronger religiosity was positively correlated with perceived diabetes control and positive diabetes change, and negatively correlated with total number of depressive symptoms and total number of weeks depressed. Longitudinal findings confirmed that stronger religiosity in 2008 was positively correlated with perceived diabetes change in 2010 and negatively correlated with total number of depressive symptoms in 2010. Logistic regression and multiple regression analyses were performed to test four moderation models. Results showed that religiosity significantly moderated the relationship between perceived diabetes control and total number of weeks depressed. More specifically, for diabetics with low levels of religiosity, whether they believed their diabetes was under control or not did not make a significant difference in the total number of weeks depressed. However, high levels of religiosity served as a buffer against the duration of depressive symptoms but only for diabetics who perceived to have their diabetes under control. Understanding how these constructs jointly influence diabetes management and psychological functioning is critical in that medical professionals may utilize such knowledge to enhance treatment outcomes.
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CHAPTER I

INTRODUCTION

According to the latest available report, diabetes mellitus affects 25.8 million people in
the United States (Centers for Disease Control and Prevention, 2011) and 346 million people
worldwide (World Health Organization, 2011). The national estimate represents 8.3% of the U.S.
population and includes diagnosed and undiagnosed cases of both adults and children. Diabetes
mellitus is a chronic illness characterized by a dysregulation of glucose metabolism, which
results from the body’s decreased efficiency in either producing or utilizing insulin (Centers for
Disease Control and Prevention, 2011). Two major types of diabetes have been recognized: Type
1 and Type 2. Type 1 diabetes, which usually develops during childhood and adolescence, results
from the body’s sudden inability to produce insulin. In Type 2 diabetes, the body is able to
produce insulin but may not produce enough or may fail to use it properly. This type of diabetes
often develops in adulthood, although earlier onset has become more common in recent decades.
In adults, Type 2 diabetes accounts for the majority of diagnosed cases (estimated between 90 to
95% of cases), whereas Type 1 diabetes accounts for only 5 to 10% of cases overall (Centers for
Disease Control and Prevention, 2011). Besides Type 1 and Type 2 diabetes, other forms of
diabetes include gestational diabetes, and those that develop from surgery, medications,
infections, pancreatic disease, and other illnesses. Such other forms, however, only account for
1-5% of all diagnosed diabetes cases.

As a chronic and progressive disease, diabetes can lead to serious medical complications
(e.g., blindness, kidney damage, lower limb amputations) and premature death (Centers for
Disease Control and Prevention, 2011). In 2011, diabetes became the seventh leading cause of
death in the United States. Fortunately, most people can minimize or delay these negative health
outcomes by managing their blood glucose, blood pressure, and cholesterol. According to the American Diabetes Association (2011), good glycemic control requires adherence to lifestyle adjustments (e.g., daily glucose monitoring, a healthy diet, regular exercise, foot care) and/or pharmacological therapy (e.g., injected insulin, oral medications). Unfortunately, because the day-to-day demands of diabetes care can be burdensome, disease management represents a major challenge for many diabetic patients and often results in difficulties with treatment adherence (Toljamo & Hentinen, 2001). Poor compliance to medical treatments is common among patients with chronic illnesses (Vermeire, Hearnshaw, Van Royen, & Denekens, 2001). In fact, regardless of disease, prognosis or setting, 30-50% of all medical patients exhibit problems with disease management. Treatment compliance is crucial for diabetic patients because diabetes affects vital physiological functions and, if poorly controlled, can lead to life-threatening biochemical imbalances (Centers for Disease Control and Prevention, 2011).

Psychological Aspects of Diabetes

Given the unique stressors diabetic patients face as a result of their disease, along with the high behavioral self-management aspect of it, researchers have extensively studied the psychological burden of living with diabetes. Evidence suggests that it is not uncommon for individuals with chronic illnesses to experience psychological distress and develop psychological disorders (Carney, 1998; Katon, 2003). Compared to the general population, diabetic patients experience a higher prevalence of psychological disorders (Rubin & Peyrot, 2001), particularly depression (Anderson, Freedland, Clouse, & Lustman, 2001; Carney, 1998; Centers for Disease Control and Prevention, 2011). Several factors contribute to emotional distress and a higher risk for psychological disorders in diabetic patients (Rubin & Peyrot, 2001). First, the daily demands involved in diabetes management can increase patients’ perceived stress and worry about having
acute exacerbations. Despite their active efforts to manage glycemic changes, diabetic patients may still experience frequent and sudden fluctuations in their blood glucose levels, which may trigger frustration and lower their confidence in managing their condition. It has been shown that symptom distress strongly predicts depression among patients with diabetes (Hu, Amoako, Gruber, & Rossen, 2007). In addition, patients who struggle with disease management may fear long-term complications, particularly if they exhibit factors that put them at risk (e.g., obesity, high blood pressure). Diabetic patients may become distressed not only in response to developing medical complications, but also to the disability associated with these complications. Roy and Roy (2001) studied a sample of African-American patients with Type 1 diabetes and found that 31.5% of those who were depressed (i.e., BDI score > 14) attributed their disability to diabetes and its complications.

The presence of psychological distress in diabetic patients further complicates diabetes management and health in general. In fact, depression in diabetic individuals has been associated with poor treatment compliance (Ciechanowski, Katon, & Russo, 2000; Daly, Trivedi, Raskin, & Grannemann, 2007; Sacco et al., 2005), poor glycemic control (Williams, Clouse, Rubin, & Lustman, 2004), and increased diabetic complications (Daly et al., 2007; De Groot, Anderson, Freedland, Clouse, & Lustman, 2001; Simon et al., 2005). Depression may complicate treatment adherence through diminished motivation and less active participation in self-care activities (Rubin & Peyrot, 2001). Alternatively, depression has been linked to a dysregulation of neuroendocrine systems that are closely related to glucose control, resulting in the development or worsening of diabetes (Talbot & Nouwen, 2000). This may possibly explain findings suggesting that depression is associated with a 60% increased risk of developing Type 2 diabetes (Centers for Disease Control & Prevention, 2011). Depression in patients with diabetes has also
been linked to poor physical health (Sacco & Yanover, 2006), comorbid medical disorders (Simon et al., 2005), and increased mortality rates (Egede, Nietert, & Zheng, 2005). Additionally, it has been shown that depressed individuals report significantly more physical symptoms and complain of more impairment from their symptoms (Katon & Ciechanowski, 2002). One possible explanation may be that depression affects people’s cognitions and the way they interpret physical signs, thus increasing symptom reporting.

Depression is formally diagnosed using standard criteria established by the American Psychiatric Association in the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)* (American Psychiatric Association, 2000). In order to be diagnosed with a major depressive episode, at least five of the following symptoms must be present nearly everyday during the same two-week period: depressed mood, diminished interest or pleasure in activities, significant changes in appetite or weight, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, difficulty concentrating or making decisions, feelings of guilt or worthlessness, and/or suicidal ideation. According to the *DSM-IV-TR*, at least one of these symptoms must be depressed mood or loss of interest/pleasure, and all symptoms must cause significant impairment in important areas of the individual’s functioning. The number of symptoms in excess of those meeting diagnostic criteria, as well as the level of impairment, determines the severity of a depressive episode.

The latest national survey on the prevalence of depression estimated that 9% of adults in the United States met criteria for a depressive disorder, including 3.4% who met criteria for major depression (Centers for Disease Control and Prevention, 2010). While some individuals meet diagnostic criteria for a depressive disorder, others may only experience some symptoms. This has been shown to be the case for patients diagnosed with diabetes. For example, Daly and
her colleagues (2007) demonstrated that 37% of diabetic participants in their sample met diagnostic criteria for a major depressive disorder and an additional 27% reported sub-threshold symptoms (i.e., symptoms were present but not sufficient to meet diagnostic criteria). Investigators have found that even sub-threshold symptoms may reduce the quality of emotional and physical functioning in patients with diabetes (Rubin & Peyrot, 2001; Williams et al., 2004).

Older individuals are particularly prone to developing problems related to their emotional functioning. According to the American Association of Geriatric Psychiatry, in 2008, approximately 20% of people aged 55 year and older exhibited some type of psychological problem, with depression being the most prevalent in this age group. Furthermore, depression has been shown to have a high prevalence rate among older adults with diabetes, and it is not uncommon for them to experience multiple depressive episodes throughout their lifetime (Williams et al., 2004). Often, however, older adults with diabetes exhibit sub-threshold symptoms of depression, which nevertheless impact their mental health, self-care, and perceived quality of life (Hu et al., 2007). It is important to note that although older adults with diabetes have, on average, at least one other chronic medical condition, research shows that functional status and comorbidity are not significant determinants of depression in this population.

**Coping Mechanisms**

Researchers have examined the coping mechanisms individuals adopt to cope with stressful events, including having a chronic medical condition. Folkman, Lazarus, Gruen, and DeLongis (1986) defined coping as cognitive and/or behavioral attempts to manage and tolerate situations that are perceived to be stressful or exceeding coping resources. They distinguished two primary modes of coping: emotion-focused and problem-focused. Emotion-focused coping includes seeking emotional support, positive reappraisal, religion, and self-control, whereas
problem-focused coping includes seeking instrumental support, problem solving, and planning (Duangdao & Roesch, 2008).

People usually rely on a combination of emotion-focused and problem-focused coping strategies when faced with stressful situations (Folkman et al., 1986). The joint use of these coping styles has been shown to be generally associated with better outcomes among individuals with chronic illnesses (Duangdao & Roesch, 2008). Similarly, in diabetic patients, both emotion-focused coping and problem-focused coping have been associated with less depression and better adjustment to the disease (Duangdao & Roesch, 2008). These researchers explained that emotion-focused coping (e.g., seeking support and understanding from others) is effective in this population because it helps patients gain emotional strength and a sense of control over their medical condition, which, in turn, facilitates problem-focused coping behaviors (e.g., adherence to treatment regimens). Unfortunately, it appears that older diabetic patients employ fewer active coping strategies (i.e., problem-focused coping) than younger patients do, regardless of the type of diabetes (Karlsen & Bru, 2002).

Religion as a Means of Coping

Religion is one of a number of coping resources that patients utilize to cope with life stressors. Religion is an important construct to examine because research shows that the majority of Americans (92%) believe in God (Newport, 2011). In 2002, a national survey revealed that 67% of the population considered their religious beliefs to be important in their lives, 42% attended religious services, 47% associated frequent religious involvement with greater happiness, and 82% expressed the need for greater spiritual growth (Thoresen & Harris, 2002).

Given the prominence of religion in our society, it is no surprise that religion has been studied extensively. Some investigators use the terms religion and spirituality interchangeably;
however, the two constructs have unique qualities that set them apart. Religion has been defined as “a societal phenomenon involving social institutions composed of members who abide by various beliefs and adhere to certain rules, rituals, etc.” (Thoresen & Harris, 2002). On the other hand, spirituality has been described as involving the pursuit of meaning, purpose in life, and experiences that provide a greater sense of inner peace and being connected to something greater than just oneself (Thoresen & Harris, 2002). Religion is distinct from spirituality in that the latter does not require membership or participation in an organized group. It is important to note that whereas religious individuals are typically spiritual, spiritual people are not necessarily religious. Although spirituality is a potentially important construct, it is not discussed further in this literature review because the datasets used in the present study did not measure spirituality.

To elucidate the multi-dimensional nature of religion, researchers have taken into account the different ways in which people conceptualize religion and thus have defined distinct terms depicting religiosity, including religious affiliation, religious coping, and religious practices (George, Ellison, & Larson, 2002). Religious affiliation indicates a sense of belonging to an organized religious group, and religious coping refers to the extent to which individuals turn to religion to cope with their life troubles. Pargament (1997) described two types of religious coping that exists in the literature: Positive religious coping (e.g., faith in God or a higher power, a sense that God loves, protects and strengthens people), and negative religious coping (e.g., feeling angry at God, feeling punished or abandoned by God). As a means of coping, religious individuals may engage in either public religious practices (e.g., attendance at religious services or study groups) or private religious practices (e.g., prayer, mediation, reading religious materials). The next section focuses on the literature review involving health outcomes and these various forms of religiosity.
Religion and Mental Health

Religion has been studied extensively in the context of mental health. Koenig (2000) reviewed several scientific studies and 67% to 75% reported that religious people function better psychologically and adapt better to stressful situations. In particular, participation in public religious practices (e.g., church attendance) has been positively associated with improved psychological functioning (Ellison & Levin, 1998; Fitchett, Rybarczyk, DeMarco, & Nicholas, 1999; Strawbridge, Shema, Cohen, & Kaplan, 2001), life satisfaction (Fitchett et al., 1999), fewer depressive symptoms (Sternthal, Williams, Musick & Buck, 2010; Strawbridge et al., 2001), less somatization and obsessive-compulsiveness (Lesniak, Rudman, Rector, & David, 2006), and fewer anxiety symptoms (Sternthal et al., 2010). Regular religious attendance has been shown to be related not only to improved mental health but also to the maintenance of such gains (Strawbridge et al., 2001).

In older adults, similar findings regarding religious involvement have been noted. Older adults who attend religious services weekly, monthly, or occasionally exhibit improved psychological functioning and fewer mental health conditions (e.g., major depression, suicidal ideation, and anxiety) than those who participate in religious services less often (Chen, Cheal, McDonel Herr, Zubritsky, & Levkoff, 2007). Private religiosity (i.e., prayer) has also been associated with milder levels of depression in this population (Koenig, 2007). It is important to note that older individuals may rely on their religious beliefs not only to cope with depressive symptoms but also to alleviate death-related anxiety and fears, which become more salient as people reach middle to late adulthood (Musick, House, & Williams, 2004).

In terms of coping, negative religious coping (e.g., being angry at God, feeling abandoned by God) has been shown to predict poorer overall quality of life (Tarakeshwar et al.,...
2006), worse psychological functioning (Hebert, Zdaniuk, Schulz, & Scheier, 2009; Pargament, 1997; Sternthal et al., 2010), more depressive symptoms and less life satisfaction (Hebert et al., 2009). On the other hand, positive religious coping (e.g., looking to God for strength and support) has been positively associated with better overall quality of life (Tarakeshwar et al., 2006) and life satisfaction (Fitchett et al., 1999; Waldron-Perrine et al., 2011). Likewise, intrinsic religiosity (i.e., religious beliefs and experiences) has been associated with less distress and depression (Lesniak et al., 2006). Tarakeshwar and colleagues (2006) suggested that individuals who engage in effective religious coping in their everyday life might resort to similar religious resources to cope with medical illnesses and other stressors.

Religion and Physical Health

Research shows that people tend to explore their faith when faced with life threatening or debilitating medical conditions (Campbell, Yoon, & Johnstone, 2008; Ironson, Stuetzle, & Fletcher, 2006; Tarakeshwar et al., 2006); as a result, religion has been extensively studied within a medical context. Findings show that religious individuals, particularly those who regularly participate in religious services, are not only physically and psychologically healthier (Fitchett et al., 1999; George et al., 2002; Koenig, 2000), but they also live longer (George et al., 2002; Musick et al., 2004; Strawbridge et al., 2001). For instance, in a national sample followed over a 7.5-year period, individuals who participated in religious services at least once per month exhibited a 30-35% reduced risk of death (Musick et al., 2004). Findings indicate that religious individuals also utilize fewer healthcare services (Koenig, 2000). These findings support a protective model of religion, suggesting that it can help prevent and adjust to disease.

Although much of the research on religion and health focuses on general health and mortality, other studies have examined the impact of religion on specific chronic medical
conditions, such as cancer, cardiovascular disease, and pain (Ellison & Levin, 1998; Kliewer, 2004). In a cross-sectional study, Campbell and his colleagues (2008) found that, among patients with cancer, traumatic brain injury, spinal cord injury, and stroke, beliefs in a loving God and positive views of the world were associated with better physical functioning. In a longitudinal study, Ironson and her associates (2006) found that religious HIV patients exhibited better maintenance of CD4 cells, whereas patients who showed a decrease in their religious/spiritual beliefs lost CD4 cells 4.5 times faster than the former group. In contrast, a longitudinal study showed that positive religious coping (e.g., looking to God for strength and guidance) had no significant association with the wellbeing of breast cancer patients (Hebert et al., 2009).

Similarly, in a longitudinal study of rehabilitation outcomes, religion did not significantly contribute to recovery in patients who were recovering from joint replacement, amputation, or stroke (Fitchett et al., 1999).

Religion and Diabetes

Because religious groups often provide specific prescriptions for health-related behavior (e.g., the value of a healthy body), it has been suggested that religious involvement can encourage adherence to medical treatment regimens. However, despite the vast number of studies examining religion and health outcomes, religion has not been widely examined in diabetic patients. The available studies up to date are described here. Newlin, Melkus, Tapper, Chyun and Koenig (2008) studied African American women with Type 2 diabetes and found that religion/spirituality was positively associated with better glycemic control, even after controlling for socioeconomic factors, body mass index, and diabetes medications.

Only one found study to date has investigated the impact of religion on depression in diabetic patients. Kilbourne, Cummings, and Levine (2009) used a cross-sectional study design
to examine this otherwise unexplored area of research. It is important to note that approximately two thirds of their sample \((n = 222)\) reported four medically related impairments on average, and more than half attributed their impairments to diabetes. The more impairments the participants endorsed, the greater their psychological distress. The researchers concluded that various forms of religious involvement helped protect diabetic patients against the negative psychological sequelae of living with diabetes. More specifically, it was suggested that religious beliefs, private religious practices (e.g., prayer, religious reading), and public religiosity (e.g., church attendance) served as protective factors against depression. The authors proposed that the aforementioned religious resources might increase psychological resilience among diabetic patients.

Theoretical Underpinnings for the Positive Outcomes of Religion

Researchers often attribute the protective outcomes of religion to the mediating effect of social support and health practices (George et al., 2002; Musick et al., 2004; Strawbridge et al., 2001). For instance, most faiths often prescribe good health habits, such as promoting physical activity and limiting or prohibiting smoking and alcohol consumption. Similarly, participation in religious services allows members to be part of a close-knit community that interacts on a regular basis and shares common beliefs and values (Ellison & George, 1994; Musick et al., 2004). Such groups become a reliable source of support for members. In fact, frequent churchgoers often report feeling cared for and valued, as well as having both emotional (e.g., understanding) and instrumental (e.g., goods, services, money) support available through their religious communities. Frequent churchgoers also endorse having stable marriages and improved social relationships (Strawbridge et al., 2001), which provide additional sources of support.
In addition to health practices and social support, other mediators have been suggested to explain the relationship between religion and health. Campbell and his associates (2008) believed that the health benefits associated with religion were mediated by physiological mechanisms. He argued that positive thoughts, such as those involved in positive religious coping, can decrease the physiological response to stress, which in turn increases people’s ability to fight disease, thus improving their health. Alternatively, Sternthal and her colleagues (2010) proposed that certain aspects of religious services (e.g., accepting communion, singing hymns, or speaking in tongues) provide emotional catharsis, while other aspects (e.g., silent prayer) may enforce mental rest and reflection. These behaviors may result in relaxation and stress relief, which have known benefits on physical health.

Yet other studies have examined the role of self-control and self-regulation in explaining the positive health outcomes associated with religion. More specifically, it has been proposed that religion promotes self-control. According to McCullough and Willoughby (2009), self-control is a mechanism by which people inhibit personally desirable behaviors in order to pursue goals carrying greater long-term value. For instance, an individual with diabetes may want to eat a piece of cake but does not because she recognizes that eating it would be inconsistent with her goals of achieving a healthy weight and maintaining adequate glucose levels.

McCullough and Willoughby (2009) reviewed 12 studies that examined the relationship between measures of religiousness and self-control and found that 11 of those studies showed positive associations between religiousness and self-control. They also argued that different aspects of religion might lead to different behavioral outcomes, suggesting the need to identify which aspects of religion might foster self-control and which might hinder it. Watterson and Giesler (2012) also found that religious individuals are better at self-regulation than their non-
religious counterparts, particularly in situations with a high demand for self-regulatory resources. McCullough and Willoughby (2009) suggested that religion influences self-regulation by promoting self-monitoring. They believed that the perception of being watched might increase self-awareness, and thus lead to adjustments in behavior. People tend to monitor their behavior in light of their own standards but also in response to the ideals prescribed by their religion and religious communities. For example, public involvement in religious practices may influence self-regulation through frequent contact with an evaluative audience.

Summary of Literature Review

As the studies reviewed show, diabetes and depression often co-occur, particularly among older adults, and the presence of depression often exacerbates diabetic symptoms and complicates treatment, resulting in less than ideal health outcomes. Diabetic patients seek out various resources, including religion, to cope not only the medical aspects of their condition, but also the psychological consequences of living with diabetes. Much of the research available on religion and health suggest that religion is associated with better physical and psychological functioning, as well as reduced utilization of health care resources. Although various factors have been identified as potential mediators to explain the link between religion and health outcomes, studies have not fully clarified whether a true relationship exists between religion and the management of chronic medical conditions; findings are mixed at best. In regards to diabetes research, studies involving religion are scarce; only two studies to date have examined religion in the context of diabetes. In one of these studies, it was concluded that religion/spirituality was associated with better glycemic control among African Americans. The second study investigated the relationship between religion and depression in diabetic patients. This study is
promising in that both religious beliefs and religious practices were found to increase patients’ ability to counteract the psychological distress associated with diabetes.

In spite of the positive appeal of these findings, it is important to exercise caution in interpreting them, as many of the studies cited in this literature review relied on cross-sectional data. Although the authors of these studies sometimes suggest causative relationships, causal influences cannot be determined from such data. It is also prudent to question the validity of these findings, as researchers (Ellison & Levin, 1998; Sloan & Bagiella, 2002) have discovered that some studies have methodological deficiencies that may limit their accuracy. Some of these deficiencies include measuring spirituality and religion as the same construct, focusing on only some aspects of religion, examining only denominational differences, lacking appropriate control of extraneous factors, using only cross-sectional models, and having small and unrepresentative samples.

The Present Study

The emotional and physical toll associated with diabetes warrants the need to identify protective factors against it. The present study, using archival data from the 2008 and 2010 waves of the Health and Retirement Study (HRS; described in the Method section) aimed to expand the narrow body of literature available on the study of religion and psychological functioning among diabetic patients, in addition to clarifying the mechanisms underlying their connection with each other. The purpose of the study was to determine whether, in a sample of older Americans with diabetes, religiosity might serve as a coping resource for depression and disease management. The study addressed some of the methodological limitations observed in previous studies by using a combined longitudinal and cross-sectional design. Following cross-
sectional analyses, longitudinal analyses were conducted to predict 2010 outcome variables from 2008 predictor variables.

Hypotheses

Presented below are three sets of hypotheses. The first two hypotheses, one cross-sectional and one longitudinal, are outlined in detail to show the relationships predicted between religiosity and specific outcome measures of diabetes management and psychological functioning (described in detail in the Method section). In the third hypothesis, four models of moderation are proposed for religiosity.

Cross-Sectional Hypotheses

Based on the review of the literature, and using data from the HRS 2010 wave, it was proposed that,

1) Diabetic individuals with stronger religiosity would be more likely to report:
   a) Their diabetes to be under control,
   b) Their diabetes to have improved or stayed the same compared to the previous wave,
   c) Fewer number of depressive symptoms\(^1\), and
   d) Fewer number of weeks feeling depressed\(^1\).

Longitudinal Hypotheses

Based on the review of the literature, it was proposed that,

2) Diabetic individuals with stronger religiosity in the 2008 wave would be more likely to report:
   a) Their diabetes to be under control in the 2010 wave,

---

\(^1\) These hypotheses are specific to participants who met criteria for the Depression Screener (See flowchart in the Appendix).
b) Their diabetes to have improved or stayed the same in the 2010 wave compared to the 2008 wave,

c) Fewer number of depressive symptoms in the 2010 wave¹, and
d) Fewer number of weeks feeling depressed in the 2010 wave¹.

Moderation Models

First, religiosity was tested as a moderator between measures of depression (i.e., total number of depressive symptoms, total number of weeks depressed) and diabetes management (i.e., perceived diabetes control, perceived diabetes change). Next, religiosity was tested as a moderator between measures of diabetes management (i.e., perceived diabetes control, perceived diabetes change) and depression (i.e., total number of depressive symptoms, total number of weeks depressed). Outlined below are the four proposed models of moderation predicting four different outcomes, respectively.

3) Religiosity was predicted to moderate the relationship between:

   a) Measures of depression and perceived diabetes control¹,
   b) Measures of depression and perceived diabetes change¹,
   c) Measures of diabetes management and total number of depressive symptoms¹, and
   d) Measures of diabetes management and total number of weeks depressed¹.
CHAPTER II

METHOD

Participants and Procedures

The archival data used for the present study originated from the Health and Retirement Study (HRS), a biennial longitudinal project that surveys more than 22,000 Americans over the age of 50 (HRS, August 2011). The HRS is sponsored by the National Institute on Aging (Grant Number NIH U01 AG09740) and conducted by the Institute for Social Research (ISR) Survey Research Center (SRC) at the University of Michigan.

The data for the present study were downloaded directly from the HRS official website. As determined by the U.S Department of Health and Human Services’ Code of Federal Regulations, the content of existing datasets is not considered human subjects data as long as it is de-identified or publicly available (U.S Department of Health and Human Services, 2009), as it is the case for the HRS datasets, which, in addition, had been blinded. The data that were downloaded for the present study corresponded to the 2008 and 2010 waves. Initially, it was also intended to use data from the 2006 wave; however, after careful review of the data, it was discovered that in 2006, a protocol was used whereby only respondents who were new to the HRS were asked questions about depression. The protocol was later changed for the 2008 and 2010 waves, allowing the assessment of depression of all respondents. Data collection for each wave began in February of the corresponding year and ended in February of the following year (HRS, August 2011).

The HRS utilizes probability sampling to select individuals from the 48 contiguous states (excluding Alaska and Hawaii) and includes community dwelling, non-institutionalized individuals over the age of 50 (HRS, August 2011). For the purposes of the present study,
participants were selected for inclusion only if they endorsed a diagnosis of diabetes on both the 2008 and 2010 waves of the HRS. The final sample included 2,539 participants who met this initial selection criteria but this sample size was reduced for some data analyses as a result of the use of the Depression Screener as described below (See sample sizes for each analyses in their respective tables). Sample characteristics are described in detail in the Results section.

Measures

The survey questions for the HRS were drawn from validated instruments from the Michigan Diabetes Research and Training Center (HRS, August 2011). Respondents were interviewed, either in person or over the telephone, using a standard script.

Demographics

Demographic information, such as age, gender, race/ethnicity, marital status, and level of education, were drawn from the HRS Cross-Wave Tracker File.

Diabetes

Diabetes diagnosis. On the core interview, respondents were asked to indicate whether a doctor had ever told them that they had diabetes or high blood sugar (See Appendix). Respondents answered either “Yes” or “No.” The type of diabetes, Type 1 vs. Type 2, was not reported; however, given the age of the sample, the majority (90-95%) likely had Type 2 diabetes.

Perceived diabetes control. On the core interview, respondents were asked “Is your diabetes generally under control?” (See Appendix). Respondents answered either “Yes” or “No.” This item was coded as an ordinal variable, using 1 for “Yes” and 0 for “No.”

Perceived diabetes change. On the core interview, respondents were asked, “Compared to when we interviewed you last, has your diabetes gotten better, worse, or stayed about the
same?” (See Appendix). This item was coded as a continuous variable, using 1 for “worse,” 2 for “stayed the same,” and 3 for “better.”

**Depression**

*Depression screener.* The depression screener was designed based on the Criterion A of the *DSM-IV-TR* (American Psychiatric Association, 2000). On the core interview, respondents were asked the following preliminary questions to determine the presence of depressed mood (See Appendix): “During the last 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?” Positive responses were followed by the question, “During that time, did the feelings of being sad, blue, or depressed usually last all day long, most of the day, about half the day, or less than half the day?” “All day long” and “Most of the day” responses were followed by the question, “During those two weeks, did you feel this way every day, almost every day, or less often than that?” “Every day” and “Almost every day” responses reflected a positive depression screener and were followed by questions that assessed specific depressive symptomatology (described below). “Less often than that” responses were not followed up and were coded as negative on the depression screener.

*Total number of depressive symptoms.* On the core interview, respondents who met criteria for the depression screener were asked eight more questions assessing the presence of specific depressive symptoms, including loss of interest, fatigue, appetite increase, appetite decrease, sleep disturbances, concentration problems, feelings of worthlessness, and thoughts about death (See Appendix). The total number of depressive symptoms was calculated. Higher scores indicated a greater number of depressive symptoms. An inter-item correlation was conducted on these eight items to assess their internal consistency. The Cronbach’s alpha reliability coefficient (based on standardized items) was .52 for 2008 and .51 for 2010.
Total number of weeks depressed. On the core interview, respondents who met criteria for the depression screener were asked how many weeks altogether, out of 52, they experienced these depressive symptoms in the last 12 months (See Appendix). A greater number of weeks indicated longer duration of depressive symptoms.

Religiosity

An exploratory factor analysis using data from the HRS 2010 wave was conducted to determine whether six different items that examined aspects of religion could be combined into fewer factors. The factor analysis was done using Principal Component Analysis as the extraction method and Oblimin with Kaiser Normalization as the rotation method, forcing items into two factors. An examination of factor loadings and item content substantiated the item groupings. The items were “I believe in a God who watches over me,” “I find strength and comfort in my religion,” “I try hard to carry my religious beliefs over into all my other dealings in life,” “How important would you say religion is in your life?,” “About how often have you attended religious services during the past year?,” and “How often do you pray privately in places other than a church or synagogue?” The two factors were initially defined as religious beliefs (the former three items listed above) and religious salience (the latter three items listed above). This exploratory factor analysis was repeated with data from the HRS 2008 wave and resulted in essentially the same factor structure.

Unfortunately, after a careful review of the data, it was discovered that the majority of these religiosity items were part of a supplemental survey only administered one time to a random sub-sample of the HRS. This created a significant reduction in sample size for relevant data analyses, such as cross-wave correlations and longitudinal models. As a result, these items were removed from data analyses, and only the two religiosity items from the core interview
were utilized (i.e., importance of religion and frequency of attendance to religious services). These two items corresponded to the same factor in the factor analysis described above, and they were significantly correlated with each other in the 2008 wave \( (r = .50, p < .001) \) and in the 2010 wave \( (r = .46, p < .001) \). Below is a description of a new religiosity composite created from these two items.

*Religiosity composite.* On the core interview, respondents were asked how important religion was in their life, using a 3-anchor-point Likert-type scale (1 = *very important*, 3 = *somewhat important*, and 5 = *not too important*) (See Appendix). Prior to data analysis, this item was reversed so that higher scores reflected greater importance of religion. On the core interview, respondents were also asked to indicate how often they attended religious services during the past year, using a 5-anchor-point Likert-type scale (1 = *more than once a week* to 5 = *not at all*) (See Appendix). Prior to data analysis, this item was also reversed so that higher scores reflected more frequent attendance to religious services. A composite score was computed by averaging the means for the two items (i.e., importance of religion, frequency of attendance to religious services), with higher scores indicating greater religiosity.
CHAPTER III

RESULTS

Sample Characteristics

As noted above, 2,539 individuals met the initial selection criteria for participating in the present study. The mean age, as reported at the 2010 interview, was 71.62 (SD = 9.11), with a range between 41 and 97. The sample was comprised of 43.5% male and 56.5% female participants. The majority of participants were Non-Hispanic, White/Caucasian (63.7%), with a minority of Non-Hispanic, Black/African Americans (20.2%) and those self-identified as Other (2.2%). There were 13.9% of participants who identified themselves as Hispanic. Marital status was distributed as follows: 56.7% were married, 13.6% separated or divorced, 27% widowed, and 2.7% never married. Education was distributed as follows: no degree (28.9%), GED (5.6%), high school diploma (46.2%), two-year college degree (4.2%), four-year college degree (8.8%), master’s degree (5.0%), and professional degree (Ph.D., M.D., J.D.) (1.3%).

Descriptive Statistics for Diabetes Variables

As indicated above, only individuals who reported a diagnosis of diabetes were included in the final sample of 2,539. Of this sample, 90.5% of participants perceived to have their diabetes under control in 2008 and so did 91% of participants in 2010. When asked whether they believed their disease had gotten better (3), stayed the same (2), or gotten worse (1), over the previous 24 months, participants indicated that their disease had, on average, stayed the same. This was the case in both 2008 ($M = 2.10, SD = .57$) and 2010 ($M = 2.12, SD = .56$).

Descriptive Statistics for Depression Variables

Of the selected diabetic sample, only 7.5% ($n = 190$) of participants in 2008 and 7.3% ($n = 185$) of participants in 2010 met criteria for the depression screener. Only 2.8% ($n = 72$) met
criteria for the depression screener at both times. In comparison to the selected diabetic sample, (7.5% in 2008 and 7.3% in 2010), in the entire HRS sample, 2.7% (n = 1019) of participants in 2008 and 4.4% (n = 1666) of participants in 2010 met criteria for the depression screener. To meet criteria for the depression screener, participants had to have reported that, in the previous 12 months, they felt depressed every day or almost every day for a period of two weeks or more in a row, and that those feelings lasted all day or most of the day. Participants who met criteria for the screener reported experiencing, on average, 5.41 ($SD = 1.55$) depressive symptoms in 2008 and 5.40 ($SD = 1.54$) depressive symptoms in 2010. Additionally, in 2008, participants reported experiencing depressive symptoms for a mean of 15.15 ($SD = 15.94$) weeks, out of 52, whereas, in 2010, participants reported experiencing depressive symptoms for a mean of 17.70 ($SD = 17.90$) weeks, out of 52.

Descriptive Statistics for Religiosity Variables

Table 1 shows descriptive statistics for the religiosity composites and their respective individual variables for 2008 and 2010.

Table 1

*Descriptive Statistics for Religiosity*

<table>
<thead>
<tr>
<th></th>
<th>2008 Mean (SD)</th>
<th>2010 Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religiosity Composite</td>
<td>3.54 (1.20)</td>
<td>3.50 (1.19)</td>
</tr>
<tr>
<td>Importance of religion</td>
<td>4.20 (1.32)</td>
<td>4.19 (1.34)</td>
</tr>
<tr>
<td>How often attend services</td>
<td>2.88 (1.46)</td>
<td>2.81 (1.46)</td>
</tr>
</tbody>
</table>

Note. N’s varied from 2,525 to 2,534, depending upon missing data.

Cross-Sectional Analyses

Given that the depression questions were only administered to a minority of respondents (i.e., those who endorsed that they had felt depressed in the past year), the model was extended
to include all respondents from the diabetic sample. More specifically, for participants who did not meet criteria for the depression screener, the values for the total number of depressive symptoms and the total number of weeks depressed were set to zero, as these participants were not asked these questions and an assumption was made that their scores would be at, or near, zero given they did not meet criteria.

Table 2 shows zero-order Pearson bivariate correlations for the diabetes, depression, and religiosity variables. An examination of Table 2 reveals that correlations were generally small and basically similar across waves (from 2008 to 2010). With a few exceptions noted below, significant correlations generally held up from 2008 to 2010, providing evidence of temporal stability. As it was expected for variables within the same constructs to be significant, these correlations are shown on Table 2 but not discussed further in this section. It is important to highlight, however, that the stability of the religiosity measure over time was much greater ($r = .81, p < .001$) than for any of the other variables examined, suggesting that participants who reported being religious in 2008 were highly likely to report being religious in 2010 as well. With this level of temporal stability, as shown in Table 2, religiosity is unlikely to vary much over multiple years.

2008 Cross-Sectional Data

As shown in Table 2, in 2008, perceived diabetes control had small but significant negative correlations with the depression screener, total number of depressive symptoms, and total number of weeks depressed. On the other hand, perceived diabetes change was not significantly correlated with any of the depression variables. Additionally, although they were small, higher religiosity had significant positive correlations with perceived diabetes control and perceived diabetes change, and significant negative correlations with the depression screener and
<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 2008 diabetes control</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. 2008 diabetes change</td>
<td>.30***</td>
<td>–</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 2008 depression screener</td>
<td>-.12***</td>
<td>-.01</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 2008 total depressive symptoms</td>
<td>-.13***</td>
<td>-.01</td>
<td>.96***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. 2008 total weeks depressed</td>
<td>-.10***</td>
<td>-.02</td>
<td>.60***</td>
<td>.62***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6. 2008 religiosity composite</td>
<td>.06**</td>
<td>.06**</td>
<td>-.06**</td>
<td>-.06**</td>
<td>-.04</td>
<td>–</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. 2010 diabetes control</td>
<td>.32***</td>
<td>.14***</td>
<td>-.11***</td>
<td>-.13***</td>
<td>-.14***</td>
<td>.02</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. 2010 diabetes change</td>
<td>.10***</td>
<td>.23***</td>
<td>-.04</td>
<td>-.05*</td>
<td>-.05**</td>
<td>.04*</td>
<td>.30***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9. 2010 depression screener</td>
<td>-.10***</td>
<td>-.04</td>
<td>.34***</td>
<td>.34***</td>
<td>.27***</td>
<td>-.04*</td>
<td>-.08***</td>
<td>-.05*</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. 2010 total depressive symptoms</td>
<td>-.10***</td>
<td>-.03</td>
<td>.34***</td>
<td>.36***</td>
<td>.27***</td>
<td>-.04*</td>
<td>-.08***</td>
<td>-.05**</td>
<td>.96***</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. 2010 total weeks depressed</td>
<td>-.05*</td>
<td>-.03</td>
<td>.29***</td>
<td>.29***</td>
<td>.13***</td>
<td>-.01</td>
<td>-.05**</td>
<td>-.06**</td>
<td>.57***</td>
<td>.54***</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>12. 2010 religiosity composite</td>
<td>.06**</td>
<td>.07***</td>
<td>-.05*</td>
<td>-.04*</td>
<td>-.02</td>
<td>.81***</td>
<td>.04*</td>
<td>.07***</td>
<td>-.05*</td>
<td>-.05*</td>
<td>-.05*</td>
<td>–</td>
</tr>
</tbody>
</table>

Note. Depending upon missing data, N’s varied from 2,504 to 2,539. *p < .05. **p < .01. ***p < .001.
the total number of depressive symptoms. Religiosity was not significantly correlated with the total number of weeks depressed.

2010 Cross-Sectional Data

As shown in Table 2, in 2010, perceived diabetes control and perceived diabetes change had small but significant negative correlations with the depression screener, total number of depressive symptoms, and total number of weeks depressed. Similarly, higher religiosity had small but significant positive correlations with perceived diabetes control and perceived diabetes change, and significant negative correlations with the depression screener, total number of depressive symptoms and total number of weeks depressed.

Longitudinal Analyses

Table 2 shows bivariate correlations across waves, between 2008 and 2010. As it is the case with cross-sectional relationships, several correlations here were significant but most were small and likely not clinically meaningful.

Regression Analyses

A total of four regression analyses were performed, with each reflecting a relevant outcome. A binary logistic regression analysis was used to evaluate how well religiosity and depression in 2008 predicted perceived diabetes control in 2010. Next, a multiple regression analysis was conducted to evaluate how well religiosity and depression in 2008 predicted perceived diabetes change in 2010. Lastly, two more multiple regression analyses were conducted to evaluate how well religiosity and diabetes in 2008 predicted the total number of depressive symptoms and the total number of weeks depressed in 2010. In addition to main effects, interaction effects were also examined to test the proposed models of moderation (third
hypothesis). Prior to these data analyses, all the predictor variables were centered by subtracting the mean.

Because of the way the depression data was collected, with the screener questions given first and only followed by symptoms and weeks depressed data collection if the screener criteria were met, tests of moderation were performed in two different ways. First, the four regression analyses described above were conducted for the entire sample of diabetics (See Tables 3, 5, 7, 9), with the depression symptoms and weeks data set to zero for the majority of the sample who did not meet the screener criteria. Then, the same four regression analyses were conducted again only with the much smaller number of diabetic participants who met criteria for the depression screener (See Tables 4, 6, 8, 10). In order to present the results of the regression analyses in a logical manner, the tables are ordered by outcome, although they alternate between analyses for the entire sample and analyses for the much smaller depressed subsample. Additionally, it is important to note that the selection of cases for the depressed subsample was dependent upon the predictor and outcome variables being analyzed. For instance, the regression analyses predicting perceived diabetes control and perceived diabetes change were performed only with participants who met criteria for the depression screener in 2008 (n = 148 or 147), as each of the predictor variables involving depression were from the 2008 wave and neither of the outcome variables involved depression. Likewise, the regression analyses predicting total number of depressive symptoms and total number of weeks depressed were performed only with participants who met criteria for the depression screener in both the 2008 and 2010 waves (n = 71 or 41), as values for the variables being analyzed would not have been available unless they met criteria for the screener at both times.
**Prediction of 2010 Perceived Diabetes Control**

Table 3 shows the binary logistic regression analysis predicting perceived diabetes control in 2010 for the entire diabetic sample. The model included four main effects (2008 perceived diabetes control, 2008 religiosity, 2008 total number of depressive symptoms, and 2008 total number of weeks depressed) and two interaction effects (i.e., the cross-product of religiosity and total number of depressive symptoms, and the cross-product of religiosity and total number of weeks depressed). As Table 3 shows, 2008 perceived diabetes control and 2008 total number of weeks depressed significantly predicted 2010 perceived diabetes control, although the regression coefficient for the latter predictor was small. Table 4 shows binary logistic regression analysis predicting perceived diabetes control in 2010 for the much smaller sample of diabetic participants who met criteria for the depression screener. The results yielded similar results; the 2008 perceived diabetes control, 2008 total number of depressive symptoms, and 2008 total number of weeks depressed significantly predicted 2010 perceived diabetes control. Similar to the results for the larger diabetic sample, the regression coefficient for the total number of weeks depressed for the depressed subsample was significant but small.

**Prediction of 2010 Perceived Diabetes Change**

Table 5 shows multiple regression analyses predicting perceived diabetes change in 2010 for the entire diabetic sample. The predictors were 2008 perceived diabetes change, 2008 religiosity, 2008 total number of depressive symptoms, and 2008 total number of weeks depressed. Model 1 shows that 5% of the total variability in 2010 perceived diabetes change was accounted for by 2008 perceived diabetes change. As expected from their correlations in Table 2, Model 2 shows that 2008 religiosity did not predict significantly above and beyond 2008 perceived diabetes change. Model 3 shows that a significant amount of the variance in 2010
Table 3

**Binary Logistic Regression Analyses Predicting Perceived Diabetes Control in 2010 for the Entire Diabetic Sample (n = 2499)**

<table>
<thead>
<tr>
<th>Predictors</th>
<th>β</th>
<th>p-value</th>
<th>Exp (β)</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Perceived Diabetes Control</td>
<td>-2.17***</td>
<td>.000</td>
<td>.11</td>
<td>.08 - .16</td>
</tr>
<tr>
<td>2008 Religiosity Composite</td>
<td>-.02</td>
<td>.794</td>
<td>.98</td>
<td>.87 - 1.11</td>
</tr>
<tr>
<td>2008 Number of Depressive Symptoms</td>
<td>-.08</td>
<td>.140</td>
<td>.93</td>
<td>.84 - 1.03</td>
</tr>
<tr>
<td>2008 Number of Weeks Depressed</td>
<td>-.03*</td>
<td>.016</td>
<td>.97</td>
<td>.95 - .99</td>
</tr>
<tr>
<td>2008 Religiosity Composite X Number of Depressive Symptoms</td>
<td>-.03</td>
<td>.523</td>
<td>.97</td>
<td>.89 - 1.06</td>
</tr>
<tr>
<td>2008 Religiosity Composite X Number of Weeks Depressed</td>
<td>.01</td>
<td>.407</td>
<td>1.01</td>
<td>.99 - 1.03</td>
</tr>
</tbody>
</table>

*Note. Standardized beta (β) coefficients are reported. Prior to data analyses, all predictor variables were centered by subtracting the mean. DF = 1 for all variables.

*p < .05  **p < .01  ***p < .001.*
Table 4

**Binary Logistic Regression Analyses Predicting Perceived Diabetes Control in 2010 for the Diabetic Sample who was Depressed in 2008 (n = 148)**

<table>
<thead>
<tr>
<th>Predictors</th>
<th>β</th>
<th>p-value</th>
<th>Exp(β)</th>
<th>95% Confidence Interval Lower</th>
<th>95% Confidence Interval Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Perceived Diabetes Control</td>
<td>-1.55***</td>
<td>.001</td>
<td>.21</td>
<td>.08</td>
<td>.55</td>
</tr>
<tr>
<td>2008 Religiosity Composite</td>
<td>-.45</td>
<td>.107</td>
<td>.64</td>
<td>.37</td>
<td>1.10</td>
</tr>
<tr>
<td>2008 Number of Depressive Symptoms</td>
<td>-.53*</td>
<td>.040</td>
<td>.59</td>
<td>.35</td>
<td>.98</td>
</tr>
<tr>
<td>2008 Number of Weeks Depressed</td>
<td>-.03**</td>
<td>.014</td>
<td>.97</td>
<td>.94</td>
<td>.99</td>
</tr>
<tr>
<td>2008 Religiosity Composite X Number of Depressive Symptoms</td>
<td>.31</td>
<td>.134</td>
<td>1.36</td>
<td>.91</td>
<td>2.04</td>
</tr>
<tr>
<td>2008 Religiosity Composite X Number of Weeks Depressed</td>
<td>.01</td>
<td>.451</td>
<td>1.01</td>
<td>.99</td>
<td>1.03</td>
</tr>
</tbody>
</table>

*Note. Standardized beta (β) coefficients are reported. Prior to data analyses, all predictor variables were centered by subtracting the mean. DF = 1 for all variables.

*p < .05. **p < .01. ***p < .001.*
Table 5

*Multiple Regression Analyses Predicting Perceived Diabetes Change in 2010 for the Entire Diabetic Sample (n = 2498)*

<table>
<thead>
<tr>
<th>Model</th>
<th>β</th>
<th>R²</th>
<th>Adj R²</th>
<th>ΔR²</th>
<th>F</th>
<th>ΔF</th>
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<tbody>
<tr>
<td>1</td>
<td>.05</td>
<td>.05</td>
<td>.05</td>
<td></td>
<td>134.10***</td>
<td>134.10***</td>
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<td>2008 Perceived Diabetes Change</td>
<td>.23***</td>
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<td>2</td>
<td>.05</td>
<td>.05</td>
<td>.00</td>
<td></td>
<td>67.95***</td>
<td>1.76</td>
</tr>
<tr>
<td>2008 Perceived Diabetes Change</td>
<td>.22***</td>
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</tr>
<tr>
<td>2008 Religiosity Composite</td>
<td>.03</td>
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<tr>
<td>3</td>
<td>.05</td>
<td>.05</td>
<td>.00</td>
<td></td>
<td>35.75***</td>
<td>3.42*</td>
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<td>2008 Perceived Diabetes Change</td>
<td>.22***</td>
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<td>2008 Religiosity Composite</td>
<td>.02</td>
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</tr>
<tr>
<td>2008 Number of Depressive Symptoms</td>
<td>-.02</td>
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<td>2008 Number of Weeks Depressed</td>
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<td>4</td>
<td>.06</td>
<td>.05</td>
<td>.00</td>
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<td>24.29***</td>
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</table>

*Note.* Standardized beta (β) coefficients are reported. Prior to data analyses, all predictor variables were centered by subtracting the mean. *p < .05. **p < .01. ***p < .001.
Table 6

Multiple Regression Analyses Predicting Perceived Diabetes Change in 2010 for the Diabetic Sample who was Depressed in 2008 (n = 147)

<table>
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<tr>
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<th>$\Delta R^2$</th>
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Note. Standardized beta (β) coefficients are reported. Prior to data analyses, all predictor variables were centered by subtracting the mean. *p < .05. **p < .01. ***p < .001.
perceived diabetes change was accounted for by introducing the 2008 total number of depressive symptoms and the 2008 total number of weeks depressed to the regression equation. Although this set of predictors jointly added enough predictive power to improve the overall model over the previous models, it was not sufficient for neither of these individual predictors to be significant. Model 4 shows that no additional variance in 2010 perceived diabetes change was accounted for by adding to the equation cross-products of 2008 religiosity by 2008 total number of depressive symptoms and cross-products of 2008 religiosity by 2008 total number of weeks depressed. Of the individual predictors, only 2008 perceived diabetes change had significant predictive power beyond that contributed by predictors entered in the previous models. When these regression analyses were repeated only including the much smaller sample of diabetic participants who met criteria for the depression screener, the results were similar (See Table 6), except that in the latter analyses, the introduction of depression predictors into Model 3 of the equation did not significantly improve the prediction of 2010 perceived diabetes change above and beyond that contributed by predictors entered in previous models.

**Prediction of 2010 Total Number of Depressive Symptoms**

Table 7 shows multiple regression analyses predicting the total number of depressive symptoms in 2010 for the entire diabetic sample. The predictors were 2008 total number of depressive symptoms, 2008 religiosity, 2008 perceived diabetes control, and 2008 perceived diabetes change. Model 1 shows that 2008 total number of depressive symptoms significantly accounted for 13% of the total variability in 2010 total number of depressive symptoms. As expected from their correlations in Table 2, Model 2 shows that 2008 religiosity did not predict significantly above and beyond 2008 total number of depressive symptoms. Model 3 shows that a significant amount of the variance in 2010 total number of depressive symptoms was added by
Table 7

**Multiple Regression Analyses Predicting Total Number of Depressive Symptoms in 2010 for the Entire Diabetic Sample (n = 2508)**

<table>
<thead>
<tr>
<th>Model</th>
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<th>Adj R²</th>
<th>∆R²</th>
<th>F</th>
<th>∆F</th>
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</tbody>
</table>

*Note. Standardized beta (β) coefficients are reported. Prior to data analyses, all predictor variables were centered by subtracting the mean. *p < .05. **p < .01. ***p < .001.*
Table 8

*Multiple Regression Analyses Predicting Total Number of Depressive Symptoms in 2010 for Diabetic Sample who was Depressed in 2008 and 2010 (n = 71)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>$R^2$</th>
<th>Adj $R^2$</th>
<th>$\Delta R^2$</th>
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<td>.10</td>
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<td>2.92*</td>
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</tbody>
</table>

*Note.* Standardized beta (β) coefficients are reported. Prior to data analyses, all predictor variables were centered by subtracting the mean. *$p < .05$. **$p < .01$. ***$p < .001$.  

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introducing 2008 perceived diabetes control and the 2008 perceived diabetes change to the regression equation. Model 4 shows that no additional variance in 2010 total number of depressive symptoms was accounted for by adding to the equation cross-products of 2008 religiosity by 2008 perceived diabetes control and cross-products of 2008 religiosity by 2008 perceived diabetes change. Of the individual predictors, only 2008 total number of depressive symptoms and 2008 perceived diabetes control had significant predictive power beyond that contributed by predictors entered in the previous models. When these regression analyses were repeated only including the much smaller sample of diabetic participants who met criteria for the depression screener, the results were similar with two exceptions (See Table 8). For the smaller depressed sample, the introduction of diabetes predictors into Model 3 of the equation did not significantly improve the prediction of 2010 total number of depressive symptoms above and beyond that contributed by predictors entered in previous models. In terms of individual predictors, only the 2008 total number of depressive symptoms had significant predictive power beyond that contributed by predictors previously entered.

Prediction of 2010 Total Number of Weeks Depressed

Table 9 shows multiple regression analyses predicting the total number of weeks depressed in 2010 for the entire diabetic sample. The predictors were 2008 total number of weeks depressed, 2008 religiosity, 2008 perceived diabetes control, and 2008 perceived diabetes change. Model 1 shows that 2% of the total variability in 2010 total number of weeks depressed was accounted for by 2008 total number of weeks depressed. As expected from their correlations in Table 2, Model 2 shows that 2008 religiosity did not significantly improve the prediction of 2010 total number of weeks depressed above and beyond 2008 total number of weeks depressed.
Table 9

Multiple Regression Analyses Predicting Total Number of Weeks Depressed in 2010 for the Entire Diabetic Sample (n = 2508)

<table>
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<tr>
<th>Model 1</th>
<th>β</th>
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<th>Adj $R^2$</th>
<th>Δ$R^2$</th>
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<td>.02</td>
<td>.02</td>
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</tbody>
</table>

Note. Standardized beta (β) coefficients are reported. Prior to data analyses, all predictor variables were centered by subtracting the mean. *$p < .05$. **$p < .01$. ***$p < .001$. 

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In Model 3, the introduction of 2008 perceived diabetes control and the 2008 perceived diabetes change did not significantly improve the prediction of 2010 total number of weeks depressed. Model 4 shows that no additional variance in 2010 total number of weeks depressed was accounted for by adding to the equation cross-products of 2008 religiosity by 2008 perceived diabetes control and cross-products of 2008 religiosity by 2008 perceived diabetes change. Although this set of cross-product predictors did not jointly improve the overall model, the individual cross-product of 2008 religiosity by 2008 perceived diabetes control predicted 2010 total number of weeks depressed to a significant degree. Figure 1 shows a graph plot of this finding, confirming an interaction effect. When these regression analyses were repeated only including the much smaller sample of diabetic participants who met criteria for the depression screener, the results were similar (See Table 10), except that in the latter analyses, none of the models or individual predictors significantly contributed to the variability in 2010 total number of weeks depressed.

![Graph](image)

**Figure 1.** Religiosity as a moderator of perceived diabetes control predicting total number of weeks depressed.
Table 10

Multiple Regression Analyses Predicting Total Number of Weeks Depressed in 2010 for Diabetic Sample who was Depressed in 2008 and 2010 (n = 41)

<table>
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<th>β</th>
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<th>Adj $R^2$</th>
<th>$\Delta R^2$</th>
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<tr>
<td>2008 Number of Weeks Depressed</td>
<td>.04</td>
<td>.14</td>
<td>-.02</td>
<td>.11</td>
<td>.90</td>
<td>2.22</td>
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<td>2008 Religiosity Composite</td>
<td>.01</td>
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<td>2008 Perceived Diabetes Control</td>
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<td>2008 Perceived Diabetes Change</td>
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<td>.34</td>
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Note. Standardized beta (β) coefficients are reported. Prior to data analyses, all predictor variables were centered by subtracting the mean. *$p < .05$. **$p < .01$. ***$p < .001$. 

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It is important to note some consistencies observed across regression analyses. Overall, the best predictor of most outcome variables was the same variable measured two years earlier, which demonstrates the temporal stability of individual constructs. As a main effect, religiosity was not a significant predictor of any of the outcome variables. On almost all regression analyses, there was little to no change in the amount of variability from model to model, and the standardized regression coefficients for the individual predictors were usually small.
CHAPTER IV
DISCUSSION

Cross-Sectional Findings

2008 Cross-Sectional Data

Results showed that participants who met criteria for the depression screener and reported a greater number of depressive symptoms and a greater number of weeks depressed tended to be more likely to report poor diabetes control. This is consistent with the scientific literature, which provides evidence for an association between depression in diabetic individuals and poor treatment compliance (Ciechanowski et al., 2000; Daly et al., 2007; Sacco et al., 2005), and between depression and poorer glycemic control (Williams et al., 2004). On the other hand, no significant associations were found between perceived diabetes change and measures of depression. It is important to emphasize that diabetes is a chronic and progressive disease, so whereas some respondents may perceive to have their diabetes under control, the disease is unlikely to improve. This may explain the scarcity of higher scores in perceived diabetes change, which would reflect diabetes improvement, and thus the lack of significant associations with depression. Another important observation is that diabetes change may be more difficult to estimate than perceived diabetes control because the former requires an estimate of diabetes change over time and the latter is simply based on their perceived diabetes control at the time of the current interview.

Results also showed that the more religious participants were the more likely they were to report favorable diabetes outcomes and the less likely they were to report depression, as measured by the screener and the number of depressive symptoms. These findings are consistent with research that shows that higher religiosity is positively associated with better glycemic
control among diabetics (Newlin et al., 2008) and better psychological functioning (Koenig, 2000). Nonetheless, religiosity was not associated with the total number of weeks depressed. A possible interpretation may be that being religious might potentially impact the extent of a depressive episode but not its duration.

2010 Cross-Sectional Data

Results showed that participants who believed their diabetes had worsened or was not under control were more likely to be depressed, as measured by the depression screener and the number of symptoms and weeks depressed. Not only does the literature show that diabetic individuals are more prone to experience depression compared to the general population (Anderson et al., 2001; Carney, 1998; Centers for Disease Control and Prevention, 2011), which was also found here when comparing the diabetic subsample in this study with the entire 2008 and 2010 HRS samples, but it has also been shown that the complexity of diabetes management plays a major role. As an alternative explanation, depressed individuals tend to interpret situations more negatively, and it is possible that depression impacts people’s appraisal of their disease status. In addition, as suggested by other researchers, depression may affect treatment adherence, and thus health outcomes, through diminished motivation and less active participation in self-care (Rubin & Peyrot, 2001).

Similar to the 2008 cross-sectional findings, the results from the 2010 cross-sectional analyses also showed that the more religious participants were, the more likely they were to report favorable diabetes outcomes and less likely they were to be depressed. Although this could be interpreted as religiosity having a protective role against the occurrence of depression, it is also possible that those who are depressed tend to seek God or religiosity to help them cope with their symptoms. For instance, attending religious services may facilitate social support
and/or a spiritual connection to a higher power, which may both help improve depressive symptoms or shorten the weeks feeling depressed. In fact, research shows that participation in public religious practices (e.g., church attendance) has been positively associated with improved psychological functioning (Ellison & Levin, 1998; Fitchett et al., 1999; Strawbridge et al., 2001).

**Longitudinal Findings**

Results showed that participants who reported their diabetes was not under control in 2008 were more likely to report depression in 2010, as measured by the depression screener and number of symptoms and weeks depressed. Similarly, participants who endorsed being depressed in 2008 were less likely to report their diabetes to be under control in 2010. This provides evidence that these constructs are closely linked and can impact each other in significant ways. Not only can the challenges of diabetes management potentially affect people psychologically years later (there are an average of two years between interviews), but so can depression potentially affect diabetic control, possibly through diminished motivation, reduced self-efficacy, or in the way that people interpret their health status and prognosis.

Similarly, participants who reported a greater number of depressive symptoms and a greater number of weeks depressed in 2008 were less likely to report diabetes improvement in 2010. To the contrary, perceived diabetes change in 2008 was not significantly associated with any of the depression measures in 2010. Given that these non-significant results were also found for the 2008 cross-sectional data, it is possible that estimating changes in diabetes may prove more difficult than simply stating whether the condition is currently under control, particularly because this estimate compares the current status of their disease to that of two years earlier, which is when they were last interviewed. Although it is not possible to determine the causal direction of the diabetes control/change and depression constructs, or the existence of an
unmeasured third variable, even with longitudinal data, the relationship of these constructs suggests their co-importance in diabetic management.

In terms of religiosity, longitudinal data showed that individuals who reported being religious in 2008 were highly likely to report being religious in 2010. This finding strongly supports that religiosity is a stable construct, unlikely to vary much over time. Findings also showed that the more religious respondents were in 2008, the more likely they were to report an improvement in their diabetes in 2010. Similarly, the more religious participants were in 2008, the less likely they were to meet criteria for the depression screener and the fewer depressive symptoms they were likely to report in 2010. These results are consistent with literature that suggests that higher religiosity is positively associated with better glycemic control among diabetics (Newlin et al., 2008) and with better psychological functioning (Koenig, 2000). Although causal inferences cannot be made, these longitudinal findings support the notion that these constructs are related from a temporal standpoint.

Prediction of Outcome Variables

With the exception of the prediction of number of weeks depressed for the depressed diabetic subsample (as shown in Table 10), an overall finding from the regression analyses was that the best predictor of each outcome in 2010 was the same construct measured in 2008. This demonstrates the stability of individual constructs over multiple-year time periods. Additionally, all regression analyses revealed that, as a main effect, religiosity from 2008 did not significantly improve the prediction of 2010 outcome variables in any of the regression models. Although religiosity had small but significant associations with various measures of diabetes and depression, religiosity did not have sufficient predictive power to predict any long-term outcomes. These findings are not consistent with the only other study available in the literature
examining religiosity and depression among diabetic individuals (Kilbourne et al., 2009).

Kilbourne and his colleagues examined the role of religious beliefs, religious reading, prayer, and religious attendance on depressive symptoms, as measured with the CES-D. Hierarchical regression analyses revealed that each of these predictors significantly contributed in explaining the variance in depressive symptoms. An important distinction, however, is that in the former study, participants were primarily female, African-American diabetic patients recruited at primary care clinics, compared to the participants in the present study who were mostly White/Caucasian, community dwellers who happened to be diabetics when they were recruited.

Perceived Diabetes Control

Results for the entire diabetic sample suggested that those who are depressed for a greater number of weeks are more likely to report poor diabetes control two years later. Results for the smaller sample of depressed diabetics were similar in that depressed individuals exhibiting a greater number of depressive symptoms and weeks depressed are also more likely report poor diabetes control two years later. Although the findings pertaining to the total number of weeks may not be clinically meaningful given their small effect size, it is important to consider potential clinical implications. Diabetic patients who are depressed may benefit from psychological interventions not only to alleviate their depression but also to prevent a worsening of their diabetes control as a result of being depressed. Based on non-significant cross-product interactions, the proposition that religiosity would serve as a moderator between depression and perceived diabetes control was not supported. Although interactions are difficult to find even when they may be present (Aiken & West, 1991), given the large sample size and thus increased power, it is likely that a moderation relationship did not exist.
**Perceived Diabetes Change**

Results suggested that adding the 2008 total number of depressive symptoms and the 2008 total number of weeks depressed to the model as a set added sufficient predictive power to significantly improve the regression model, although the F-change value was small; however, it was not enough for either depression construct to be individually significant. This finding is a noticeable contrast to the prediction of 2010 perceived diabetes control. As mentioned previously, diabetes control may be easier to more accurately report upon than diabetes change. To report diabetes control, the older adults in the present study did not need to look back in time to first recall previous diabetes control and then current diabetes control, as it was the case for estimating change in their diabetes from the last time they were interviewed (i.e., two years earlier). Consistent with correlational data, perceived diabetes control may be a more sensitive, and thus important, measure than perceived diabetes change. In addition to main effects, cross-product interactions were examined, and it was concluded religiosity did not have a moderating effect between depression and perceived diabetes change.

**Total Number of Depressive Symptoms**

Results suggested that perceived diabetes control in 2008 contributed to the prediction of total number of depressive symptoms in 2010. These results only applied to the entire diabetic sample and suggest that those who report poor diabetes control are more likely to report a greater number of depressive symptoms two years later. This is not surprising given that diabetes management has been shown to be complex and diabetic patients are likely to become depressed (Anderson et al., 2001; Carney, 1998; Centers for Disease Control and Prevention, 2011). Although the effect sizes were small, these findings may potentially have clinical implications as clinical health psychologists may target patients who exhibit poor diabetic control for early
psychological interventions with a focus on both disease and mood management. Medical providers may also become aware of the mental health consequences of poor diabetic control, as this may complicate treatment outcomes.

Total Number of Weeks Depressed

Results did not show a significant contribution of the 2008 diabetes constructs to the prediction of the total number of weeks depressed in 2010. However, results suggested that the 2008 cross-product of religiosity and perceived diabetes control predicted the total number of weeks depressed in 2010 to a significant degree. This finding only applied to the entire diabetic sample. More specifically, as shown in Figure 1, diabetics with low levels of religiosity, whether they believed their diabetes was under control or not did not make a significant difference in the total number of weeks they experienced depressive symptoms. However, among diabetic individuals with stronger levels of religiosity, those with poor diabetes control were depressed for a greater number of weeks while those who perceived their diabetes to be under control experienced their symptoms for fewer weeks. These findings have clinical implications, as being religious does not seem to benefit individuals with poor diabetes control in terms of the duration of their depressive symptoms. However, high levels of religiosity may serve as a buffer against the duration of depressive symptoms for diabetic individuals who perceive to have their diabetes under control.

Strengths and Limitations of the Study

The present study expanded the narrow body of literature that exists on the study of depression and diabetes management among older diabetic individuals. In addition, some of the methodological limitations observed in previous studies were addressed by using a combined longitudinal and cross-sectional design. The present study was based on a large nationally
representative sample of 2,539 diabetic participants, and the majority of participants were older in age, which accurately represents the diabetic population since the prevalence of diabetes is generally higher among older adults. It is also important to note that the diabetic participants in the present study met criteria for the depression screener at almost twice the rate as the entire HRS sample of over 35,000 individuals. This suggests that the diabetic sample in the present study was more depressed than the larger HRS sample, which is also representative of the diabetic population at large.

The study also has limitations that need to be addressed. The study was quasi-experimental so, as with all observational studies, the data limited the ability to make inferences about causation. In addition, it is possible that some individuals in the larger study may have chosen not to participate due to being stressed or overwhelmed at the time of the survey as a result of depression or diabetes treatment regimens. This may have excluded from the study diabetic individuals with certain characteristics.

In terms of study measures, participants were not asked to specify the type of diabetes they had. This is problematic because the nature of the disease for each of the diabetes subtypes varies, and thus individuals tend to adjust to them differently, which may impact the outcomes measured in the study. Another limitation is that perceived diabetes control was measured with a single self-report question, which may be an inaccurate and unreliable measure of diabetes control, limiting the interpretability of the results. Furthermore, perceptions of diabetes control/change among depressed participants may have possibly been influenced by depressed mood and negative thinking at the time of the interview, which may bias the results regarding diabetes management. In addition, for participants who did not meet criteria for the depression screener and thus were not asked questions about symptoms and weeks depressed, an assumption
was made to set their scores to zero. This assumption is limiting, as those values may not truly be zero for some individuals, such as those presenting with sub-threshold depressive symptoms. In addition, participants who endorsed depressive symptoms may not necessarily have been depressed as a result of having diabetes but rather other comorbid medical conditions or personal issues. Another limitation is that the religiosity composite was modified to include only two items (i.e., importance of religion and religious attendance) as opposed to six, and thus the measure may not fully capture the essence of being religious.

Future Directions

Any future research should attempt to utilize strong research designs, such as combining cross-sectional and longitudinal data, as they may yield results that are more conclusive than cross-sectional data alone. Given the complexity of the different subtypes of diabetes, future studies should examine individuals with each type of diabetes separately, or at least control for diabetes type in statistical analyses. It is also advisable, whenever possible, to resort to objective measures of glycemic control, such as HbA1C, as subjective measures may be sensitive to transient mood changes and perceptions. Lastly, when studying religiosity, it is strongly recommended that religiosity composites include multiple items.

Understanding how depression and diabetes interact with each other and jointly influence diabetes management and psychological functioning is critical in that medical professionals may utilize such knowledge to enhance treatment outcomes.
APPENDIX

RELEVANT QUESTIONS FROM HRS CORE INTERVIEW
**DIABETES QUESTIONS**

**DIABETES DIAGNOSIS**
Has a doctor ever told you that you have diabetes or high blood sugar?
   0. NO
   1. YES

**DIABETES UNDER CONTROL**
Is your diabetes generally under control?
   0. NO
   1. YES

**DIABETES BETTER/WORSE/SAME**
Compared to when we interviewed you last [in (PREV WAVE INTERVIEW DATE)], has your diabetes gotten better, worse, or stayed about the same?
   1. WORSE
   2. ABOUT THE SAME
   3. BETTER
DEPRESSION QUESTIONS

FELT DEPRESSED IN PAST YR
During the last 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?

0. NO
1. YES

If “YES,” then ask:

DEPRESSED WHAT PORTION OF DAY
Please think of the two-week period during the last 12 months when these feelings were worst. During that time did the feelings of being sad, blue, or depressed usually last all day long, most of the day, about half the day, or less than half the day?

1. LESS THAN HALF THE DAY
2. ABOUT HALF THE DAY
3. MOST OF THE DAY
4. ALL DAY LONG

If “ALL DAY LONG” or “MOST OF THE DAY,” then ask:

DEPRESSED EVERY DAY
During those two weeks, did you feel this way every day, almost every day, or less often than that?

1. LESS OFTEN
2. ALMOST EVERY DAY
3. EVERY DAY

If “EVERY DAY” or “ALMOST EVERY DAY,” then ask about specific symptoms (continued on page 54).
During the last 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?

Yes

Please think of the two-week period during the last 12 months when these feelings were worst. During that time did the feelings of being sad, blue, or depressed usually last A) all day long, B) most of the day, C) about half the day, or D) less than half the day?

A, B

During those two weeks, did you feel this way A) every day, B) almost every day, or C) less often than that?

A, B

C

No

Negative (discontinue depression questions)

C, D

Negative (discontinue depression questions)

Positive (ask questions about specific depressive symptoms)
LOSS OF INTEREST
During those two weeks, did you lose interest in most things?
0. NO
1. YES

FEELING TIRED
Thinking about those same two weeks, did you ever feel more tired out or low in energy than is usual for you?
0. NO
1. YES

LOSE APPETITE
During those same two weeks, did you lose your appetite?
0. NO
1. YES

APPETITE INCREASE
Did your appetite increase during those same two weeks?
0. NO
1. YES

TROUBLE FALL ASLEEP
Did you have more trouble falling asleep than you usually do during those two weeks?
0. NO
1. YES

TROUBLE CONCENTRATING
During that same two-week period, did you have a lot more trouble concentrating than usual?
0. NO
1. YES
FEELING DOWN ON YOURSELF
People sometimes feel down on themselves, and no good or worthless. During that two-week period, did you feel this way?
   0. NO
   1. YES

THOUGHTS ABOUT DEATH
Did you think a lot about death -- either your own, someone else's, or death in general -- during those two weeks?
   0. NO
   1. YES

TOTAL WEEKS DEPRESSED
About how many weeks altogether -- out of 52 -- did you feel this way during the last 12 months?
RELIGIOSITY QUESTIONS

IMPORTANCE OF RELIGION
How important would you say religion is in your life; is it very important, somewhat important, or not too important?

1. NOT TOO IMPORTANT
3. SOMewhat IMPORTANT
5. VERY IMPORTANT

HOW OFTEN ATTEND RELIGIOUS SERV
About how often have you attended religious services during the past year?

1. NOT AT ALL
2. ONE OR MORE TIMES A YEAR
3. TWO OR THREE TIMES A MONTH
4. ONCE A WEEK
5. MORE THAN ONCE A WEEK
Religiosity Questions Previously Considered But Not Used in Final Statistical Analyses

BELIEVE IN GOD
I believe in a God who watches over me.
1. STRONGLY DISAGREE
2. SOMEWHAT DISAGREE
3. SLIGHTLY DISAGREE
4. SLIGHTLY AGREE
5. SOMEWHAT AGREE
6. STRONGLY AGREE

TRY HARD TO CARRY OUT BELIEFS
I try hard to carry my religious beliefs over into all my other dealings in life.
1. STRONGLY DISAGREE
2. SOMEWHAT DISAGREE
3. SLIGHTLY DISAGREE
4. SLIGHTLY AGREE
5. SOMEWHAT AGREE
6. STRONGLY AGREE

FIND STRENGTH IN RELIGION
I find strength and comfort in my religion.
1. STRONGLY DISAGREE
2. SOMEWHAT DISAGREE
3. SLIGHTLY DISAGREE
4. SLIGHTLY AGREE
5. SOMEWHAT AGREE
6. STRONGLY AGREE
OFTEN PRAY PRIVATELY

2008 wave: How often do you pray privately in places other than a church or synagogue?

1. NOT IN THE LAST MONTH
2. AT LEAST ONCE A MONTH
3. SEVERAL TIMES A MONTH
4. ONCE A WEEK
5. SEVERAL TIMES A WEEK
6. DAILY

2010 wave: How often do you pray privately in places other than a church or synagogue?

1. NEVER/NOT RELEVANT
2. NOT IN THE LAST MONTH
3. AT LEAST ONCE A MONTH
4. SEVERAL TIMES A MONTH
5. ONCE A WEEK
6. SEVERAL TIMES A WEEK
7. DAILY
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