THE IMPACT OF TRUST IN HEALTH CARE PROVIDERS ON SUCCESSFUL DIABETES

SELF-MANAGEMENT

by

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THESIS ABSTRACT

THE IMPACT OF TRUST IN HEALTH CARE PROVIDERS ON SUCCESSFUL DIABETES
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Type 2 diabetes is a chronic disease that requires individuals to assume the primary responsibility of self-managing their health behaviors. Many professionals may be involved in promoting positive health behaviors among patients with diabetes, but how patients' relationships with their healthcare providers impact their self-management behaviors has not yet fully been explored. Are efforts by healthcare providers to impart good self-management behaviors effective for patients with type 2 diabetes? The current study aimed to contribute to this area of the literature by exploring which providers have the strongest associations with patients' self-management behaviors, and whether trust influences this association. Using self-report questionnaires and an in-person interview, 59 middle-aged and older adults with type 2 diabetes answered questions regarding provider use, trust in these providers, and health behaviors and clinical health outcomes. The results from linear regression analyses revealed that patients' trust in their providers was a key factor in moderating the association between seeing a primary care provider (e.g. family practitioners), seeing an endocrinologist, or primary health insurer type and lower average fasting blood sugar and Hemoglobin A1c levels . The results of this study suggest that important diabetes health outcomes (i.e. blood glucose values) are related to the patient-provider relationship; health behaviors (e.g., exercise or diet), however, are not influenced by this relationship. The results from this study may provide some insight into how providers influence different self-management behaviors and health outcomes in patients with type 2 diabetes and how trust is a key aspect of the patient-provider relationship.

Healthcare is changing. There is an increased focus on health promotion, which strives to increase positive health behaviors, improve individual outcomes, and improve overall population health at both the individual and broader social levels (Bandura, 2004; World Health Organization, 2012). Many individuals are receiving their medical care from multiple healthcare providers, especially individuals with complex and chronic diseases that involve adherence to a demanding medical regimen (Bodenheimer, Chen, & Bennett, 2009). Insurance companies and employers are offering members wellness programs and providing incentives for good health behaviors, such as exercising and quitting smoking, to help promote wellness (Partnership for Prevention, 2001). Despite these and other efforts aimed at improving individual health and preventing disease, more than 133 million Americans continue to suffer from a chronic disease (National Health Council, 2012). Chronic diseases are a significant cost burden on the American healthcare system, yet are often manageable or preventable (Bodenheimer et al., 2009).   One chronic disease that remains at the forefront of healthcare improvement initiatives in the United States is diabetes (United States Department of Health and Human Services [HHS], Healthy People 2020, 2010).

Given the personal and societal costs associated with the complications of diabetes, the prevalence rates are cause for concern. Diabetes affects approximately 25.8 million people in the United States, with approximately 10.9 million individuals aged 65 or older diagnosed with diabetes. In 2010 alone, approximately 1.9 million new adult cases of diabetes were diagnosed. This equates to a total of over 8% of the population in the United States (Centers for Disease Control and Prevention [CDC], 2011). Of those cases, between 90-95% have type 2 diabetes (National Diabetes Information Clearinghouse [NDIC], 2011). The rise in prevalence rates of diabetes is not limited to the United States, but is also a global epidemic. In 2010 alone, it was estimated that 285 million adults worldwide had diabetes, and this number was projected to increase to 439 million adults by the year 2030 (Shaw, Sicree, & Zimmet, 2010). Moreover,

diabetes was listed as the seventh leading cause of death in 2007 and a contributing cause for many more deaths (CDC, 2011).

Management of Type 2 Diabetes

Type 2 diabetes involves the body's inability to respond appropriately to insulin, a hormone that regulates the amount of glucose in the blood (DeFronzo, Bonadonna, & Ferrannini, 1992). In healthy individuals, the body is able to compensate to keep the blood glucose level stable. In individuals with diabetes, glucose levels may be too low, normal, or too high, depending on how well diabetes is managed. Left untreated, glucose levels in individuals with type 2 diabetes remain consistently high. High blood glucose wreaks havoc on the blood vessels and can damage most major organ systems (CDC, 2011).

Glycemic control is one way to assess how well glucose levels – and an individual's diabetes – are being managed over time (Clark, Sterrett, & Carson, 2000). This is measured through Hemoglobin A1c [HbA1c] in the blood, an assessment of the average level of blood glucose over the previous three months (Khaw, Wareham, Bingham, Luben, Welch, & Day, 2004). Though guidelines vary, the clinical ideal for a healthy HbA1C level is less than 7% (Clark et al., 2000). Additional guidelines for healthcare professionals who treat diabetes exist, but vary between the publishing organizations, and are lengthy and complex. An overview of the guidelines for three major organizations [American Diabetes Association; Veterans Health Association; and, American Association of Clinical Endocrinologists] reveal some differences between recommendations, but overall these guidelines encourage providers to closely monitor for the following: metabolic glucose control; patient self-checked blood glucose; high blood pressure; neuropathy; foot examinations to check for evidence of impaired healing; need for referrals for eye exams; high cholesterol; and kidney function (Clark et al., 2000).

Patients are expected to take on the bulk of the responsibility of managing their diabetes at home (Clark et al., 2000). Included in these self-management activities are taking medications, either oral or insulin injections up to several times per day; adhering to a diet low in

carbohydrates, high in fiber, and low in fat; taking blood samples, usually several times per day, to monitor daily blood glucose levels; exercising on a regular basis; and monitoring for changes in skin integrity to prevent infection. Moreover, individuals need to ensure they are regularly visiting their provider to maintain proper diabetes control and prevent complications (Toobert, Hampson, & Glasgow, 2000; Clark et al., 2000). The most dangerous complication of severely high blood glucose is a hyperglycemic hyperosmolar state, which leads to severe dehydration, coma, and even death, if left untreated (Chaisson et al., 2003; Campbell & Martin, 2009). More commonly, poorly regulated blood glucose can lead to nerve damage, necrosis and amputation (particularly of the lower extremities), heart disease, high blood pressure, stroke, blindness and kidney failure (Campbell & Martin, 2009).

Due to the severity of the disease progression and the large number of individuals diagnosed in the United States (CDC, 2011) and around the world (Shaw et al., 2010), diabetes remains important to study. Though self-care interventions have been demonstrated to be effective at successfully managing the disease (Clark et al., 2000), patients with diabetes continue to struggle with performing these management behaviors and poor adherence to treatment recommendations is common (McNabb, 1997). Additionally, the aging population and rising obesity rates illustrate that these concerns are not fleeting (Shaw et al., 2010). Thus, it is important to understand what factors are related to successful diabetes management, including how health care providers influence important health behaviors and health outcomes.

Healthcare Providers Roles in Diabetes Management

Due to the complex treatment of diabetes, many healthcare providers may be involved in assisting individuals with self-management. Often, individuals will seek care from multiple sources, including primary care physicians, endocrinologists, dieticians, pharmacists, and registered nurse educators (National Diabetes Education Program [NDEP], 2011). Health insurance providers also are involved, and many offer management programs for consumers with chronic diseases (Villagra & Ahmed, 2004). Specialized diabetes care is becoming more

available, with more insurance companies offering case management services to clients with

diabetes (Norris et al., 2002). Despite the potential for involvement of a multidisciplinary team of

healthcare professionals to assist in the care of diabetes, many individuals still suffer from

diabetic complications as a result of poor self-management of the disease (CDC, 2011).

Though patients have less frequent contact with their providers than other members of

their social network (e.g. family, friends), they can have a substantial impact on how patients

manage their self-care activities outside of the healthcare context. For instance, healthcare

providers offer guidance as to how to manage the disease at home (NDEP, 2011). It is

recommended that individuals with diabetes seek care from both a generalist (typically, primary

care physicians) and specialists (Funnell et al., 2009). The diabetes healthcare team generally

should consist of physicians, nurses, dieticians, and pharmacists (American Diabetes Association

[ADA], 2003). Despite the recommendations to utilize a team approach, it is unknown if

individuals are utilizing these services and what effect these healthcare providers actually have on

self-management behaviors.

There are many factors involved in the successful treatment of diabetes. With multiple

providers involved in different aspects of care, it is important to determine how interactions and

relationships with different types of providers impact self-management behaviors and clinical

health outcomes. How effective is involvement by healthcare providers to encourage proper self

management of diabetes? Is this involvement related to engagement in some types of health

behaviors and clinical health outcomes over others? Do individuals' perceptions of the

professional influence how healthcare professionals' involvement is associated with their health

behaviors and clinical health outcomes?

The Role of the Individual and Patient-Provider Relationship in Diabetes Management

Psychological research has the potential to provide insight into how average people

diagnosed with diabetes cope with the demands of the illness (Gonder-Frederick, Cox, &

Ritterband 2002). Thorough treatment of any disease must take into account the complexities of

human behavior, including relationships. Without determining what aspects of care patients find most beneficial and exploring patients' perceptions of their relationships with their providers, it would be difficult to know which interventions are most effective and how to holistically care for individuals with diabetes. The patient-physician relationship has been examined as one contributor to improving physician effectiveness at promoting positive health behaviors and ultimately, patient adherence. Aspects of the patient-physician relationships that have been examined to date include physician communication (Stewart, 1995; Roter, 2000) and interaction styles (Flocke, Miller, & Crabtree, 2002)). These studies show that the patient-provider relationship hinges on good communication at the patients' level of understanding (Schillinger, Bindman, Wang, Stewart, & Piette, 2004).

The effect that the patient-physician relationship has on improving self-management in diabetes, in particular, has been examined in the literature (Ciechanowski, Katon, Russo, & Walker, 2001; Heisler, Bouknight, Hayward, Smith, & Kerr, 2002; Piette, Schillinger, Potter, & Heisler, 2003; Schillinger et al.,2004). These studies suggest that some aspects of the patient-provider relationship (e.g. physician communication style) can be important for patients' engagement in diabetes self-management behaviors (Heisler et al., 2002; Piette et al., 2004). Additional lines of research suggest that the more satisfied patients are with their providers, the more adherent they are to their prescribed treatment regimen (Ciechanowski et al., 2001). It is still unclear how patient-provider relationships can optimally promote adherence to such regimens. One factor that may be important to consider in examinations of how the patient-provider relationship is related to engagement in health behaviors is patients' level of trust in their providers.

Trust and the Patient-Provider Relationship

As in most interpersonal relationships, trust is a vital element in the patient-provider relationship (Pearson & Raeke, 2000). Trust does not have a single definition and is comprised of several facets. For trust to exist, individuals must accept the vulnerable situation (e.g., being

diagnosed with diabetes) and believe that the other person is acting in their best interests in a caring manner (Hall, Dugan, Zheng, & Mishra, 2001). In the patient-provider relationship, trust is comprised of patients' perceptions of practitioners' "competence, compassion, privacy and confidentiality, reliability..., and communication" (Pearson & Raeke, pp. 509-510, 2000). As trust is partly comprised of communication, previous results on the importance of patient-physician communication may in fact be related to a more general measure of trust.

Patients' level of trust in their provider may partially account for how patients' relationships with their providers influence their health behaviors. Studies involving trust in healthcare professionals traditionally have focused on the relationship between patients and their physicians (Hall et al., 2001; Anderson & Dedrick, 1990; Thom, 2001; Pearson & Raeke, 2000). These studies found that patients who report high trust in their physicians have better adherence to treatment and have better self-reported health (Hall et al., 2001; Thom, Ribisl, Stewart, & Luke, 1999), which further suggests that trust is an important element of the patient-provider relationship. Moreover, levels of trust may be impacted by patients' race. One study, surveying 1,681 Black and Non-Hispanic White older adults, found that patients' trust in their physicians impacted use of routine preventative care, such that those with higher levels of trust used more services, but that Black older adults had significantly lower levels of trust in their physicians than Non-Hispanic White older adults (Musa, Schulz, Harris, Silverman, & Thomas, 2009).

Although there may be many types of providers (e.g. nurse case managers, diabetes educators, pharmacists, and dieticians; NDEP, 2011) involved in diabetes care, few studies have examined patients' trust in non-physician healthcare providers and fewer have examined how this may relate to actual diabetes self-management. There does not appear to be any studies focused on examining patients' trust in nurse case managers or diabetes educators. There have been some studies that have examined trust in pharmacists, but these studies mostly have focused on patients' trust of pharmacists related to medication facts and medication dispensing (Donohue, Huskamp, Wilson, & Weissman, 2009; Law, Okamoto, & Kelly, 2008), not adherence to

medication. Research on dieticians has focused more on improving patient adherence to dietary guidelines (Williamson, Hunt, Pope, & Tolman, 2000) than on patient perceptions of trust in their dieticians. Moreover, studies of trust in the healthcare context are more generally focused, in that they rarely examine specific populations, such as individuals with chronic diseases (Hall et al., 2001; Anderson & Dedrick, 1990; Zheng, Hall, Dugan, Kidd, & Levine, 2002; Balkrishnan, Dugan, Camacho, & Hall, 2003; Balkrishnan, Hall, Blackwelder, & Bradley, 2004; Goold, Fessler, & Moyer, 2006).

Though not typically considered a provider, insurance companies may play a crucial role in the delivery of healthcare, particularly in patients with chronic conditions (Villagra & Ahmed, 2004). Trust in health insurers is an emerging topic of study, and new measures and studies have begun to evaluate this relationship (Zheng et al., 2002; Balkrishna et al., 2003; Balkrishnan et al., 2004; Goold, et al., 2006). In a sample of 439 participants, Balkrishnan and colleagues (2003) measured and compared trust in insurers with trust in physicians and trust in the medical profession in general. Using the Trust in Insurers scale (Zheng et al., 2001), participants rated their level of trust in their insurance company. The results from this study showed that lower levels of trust were associated with negative experiences, such as disputes with the insurer, and higher levels of trust were associated with more positive experiences, such as participant choice in insurance provider (Balkrishnan et al., 2003). Additional studies show similar results in that trust was higher for patients who experienced fewer disputes between the patient and insurance provider (Hall et al., 2001), and had the ability to pick their own primary care providers (Balkrishnan et al., 2004). Higher levels of trust also were related to patients choosing to remain with that insurance company (Zheng et al., 2002). It is unknown, however, whether patient trust affects the willingness of patients to engage in insurance sponsored programs, such as diabetes care management services, and whether this translates into better adherence to prescribed medical regimens.

Despite the healthcare system's movement toward a health promotion model, there is limited research available on the effectiveness of encouraging self-management in individuals who utilize the healthcare system most, such as individuals with diabetes (Bodenheimer et al., 2009). With the continued increase in diabetes prevalence (Campbell & Martin, 2009; CDC, 2011), it would be beneficial to examine whether patients' interactions with their providers are deemed effective at all. Moreover, as middle aged and older adults are particularly susceptible to diabetes (CDC, 2011), it is important to examine these factors as it relates to the people most afflicted by this condition.

Examinations of trust in health care providers allow for a more thorough understanding of the patient-provider relationship and how it may impact actual self-care. For patients with type 2 diabetes, they must accept that they need a medical intervention to manage their diabetes, and that their healthcare provider has their best interest in mind when prescribing a treatment regimen. Furthermore, it is important to examine if and how trust in a healthcare provider influences the acceptance of recommendations through adherence to health behaviors required for successful self-management of diabetes. Yet, how patients' perceptions of trust in *different* healthcare providers relate to their self management behaviors has not yet been explored.

The Current Study

Using a racially-diverse sample of middle-aged and older adults with type 2 diabetes, this study examined the relationship between use of healthcare providers and insurers and engagement in diabetes self-management behaviors and outcomes (namely, average fasting glucose, HbA1c, and adherence to diet, exercise, medication regimen, and glucose monitoring) and clinical health outcomes (namely, average fasting blood glucose and HbA1c levels). This study further examined how participants' trust in their healthcare providers and insurers influenced the above relationship. Specifically, this study sought to answer the following questions:

1. What is the relative impact of various healthcare providers on health behaviors and outcomes important for successful diabetes self-management?

2. Does the impact of a healthcare provider on health behaviors and outcomes depend on the patient's level of trust in that healthcare provider?

3. What combination of healthcare providers in multidisciplinary teams has the largest impact on these health behaviors and outcomes?

    Hypotheses. I hypothesized the following relationships:

1. Medical doctors (primary care physicians and endocrinologists) would have the most impact on self-management behaviors and outcomes, due to higher frequency of visits to a physician than other types of providers.

2. I expected that trust would moderate this relationship, where higher levels of trust in the provider would be associated with patient engagement in better health behaviors and better clinical health outcomes.

3. Furthermore, I anticipated a comprehensive team (physicians, dieticians, nurse case managers or diabetes educators, and pharmacists) to be the most effective at promoting positive health behaviors and outcomes indicative of good glycemic control.

Method

Participants

The data for the current study are from a larger study on psychosocial factors related to diabetes management ("The Diabetes Experiences Study"). The study received IRB approval in March 2013 and renewed approval in January 2014. The participants for this study included 59 middle-aged and older adults with type 2 diabetes currently residing in the greater Philadelphia area. Eligibility criteria consisted of participants who were between the ages of 45-85 years old; diagnosed with type 2 diabetes; seeing a healthcare provider to manage their diabetes at least one per year; fluent in the English language; and free of significant cognitive impairment. Participants were mostly non-Hispanic white (62.3%), but other ethnic groups were also represented (24.5% African-American/Black; 3.8% Hispanic; 3.8% Asian/Pacific Islander; 1.9% Mixed Racial Background; and, 3.8% other). The sample was evenly split between men (50.8%)

and women (49.2%). On average, participants were 59.69 years old (SD = 8.97, range = 45-82 years old), and most of the sample (93.2%) had at least a high school level education. Recruitment fliers (see Appendix Z) were posted in local places of businesses that allowed for advertisements (e.g. grocery stores, pharmacies) and healthcare provider offices (e.g. primary care physicians, diabetes educators). Advertisements for interested participants also were placed in local periodicals and websites (e.g. Craigslist). Additionally, research assistants attended various local community events (e.g. Collingswood Market, Step Out for Diabetes event) to spread the word about the study and distribute fliers.

Procedure

All interested potential participants were screened for eligibility. Eligible participants who agreed to participate were given consent forms and information about how to complete the study. Before the interview, participants were asked to complete a self-administered questionnaire either over the phone, through email, or via mail. If participants were unable or unwilling to complete the form prior to the interview, this portion was completed at the scheduled appointment time. The pre-interview questionnaire assessed: participants' length of time since diagnosis; frequency of blood glucose testing; results of fasting blood glucose for three consecutive days; date and result of most recent Hemoglobin A1c test; type of practitioner caring for the participants' diabetes; race of main diabetes care provider; whether other providers were involved in diabetes care and how often they were seen within one year; current prescribed diabetes medications; and information regarding insurance coverage and providers. Participants were given the option to email, mail, or bring the pre-interview questionnaire with them to their scheduled appointment. Participants typically completed the questionnaires through an in-person interview, either at the Relationships, Health and Aging lab Rutgers Camden campus or at another convenient location (e.g. a participant's home, local library).

The procedure and consent forms were briefly reviewed again at the beginning of the interview, and participants were asked if they had any questions before proceeding. Participants

then began the structured interview, which lasted approximately 90 minutes (but ranged between one hour to two hours across participants), of which approximately 15 minutes were devoted to the questions specific to this study. Trained interviewers read each question aloud. To aid in comprehension, cards with each response option were provided for all multi-item response scales, so participants had a visual reference for their answers. Questions included in the interview asked about participants' health status, health behaviors, and their relationships with friends, family, and their healthcare providers. Participants were offered breaks between each interview section and were offered another opportunity to ask questions at the end of the interview. After the interview, participants completed a post-interview self-administered questionnaire, which focuses on questions for the broader study. A brief exit survey also asked participants about any questions or concerns they had related to their participation. All participants were compensated $20 in cash for their time, and received a reusable grocery bag with the study logo. Participants also were entered into a raffle for a chance to win an additional $100. Finally, participants traveling to the Rutgers-Camden campus were compensated for parking and bridge toll costs.

For participants who were interested in the study, but could not commit to an in-person interview, a mail-out version of the interview materials were made available, which included return postage. Of the participants who participated, 17.8% (10 participants) opted for the mail version. Participants who chose to complete the mail-out version of the questionnaire were given contact information for the lab if they had any questions regarding the materials and were allotted at least 2 weeks to complete the materials (of which, participants typically spent between 60-90 minutes completing the questionnaires). Participants who opted for the mail-out version were compensated $20 for their time, which was sent via money order after the completed questionnaire was returned to the lab. A variable for interview vs. mail version was developed to examine any significant differences in key variables by mode of survey administration.

Measures

Independent variables. The independent variables for the proposed study were healthcare providers typically involved in the care of patients with diabetes: primary care providers (including physicians, nurse practitioners, physician assistants, endocrinologists); nurse case managers or diabetes educators; pharmacists; and insurers.

Primary diabetes care provider. To determine the participants' primary provider of their diabetes care, a question "Who is the main person you see for your diabetes?" was included in the pre-interview questionnaire. Response options included: family doctor (M.D. or D.O.); nurse practitioner or physician's assistant; endocrinologist or diabetes specialist; or, "other," where participants were able to specify which type of provider (see Appendix A).

Other diabetes-related healthcare providers. A one-item question "Who has been involved in the care of your diabetes?" was included in the pre-interview questionnaire to determine which providers (such as, family doctor, endocrinologist, nurse case manager, diabetes educator, and dietician) the participants see for treatment of their diabetes.   Participants selected all providers that applied and added additional providers not listed. Responses were coded into a yes (1) or no (0) format. For each provider that received a "yes" response, participants also were asked to specify how many times in the past year they saw that provider (see Appendix B).   Any questions that involved providers that participants did not respond affirmatively to seeing were omitted from the interview.

Pharmacists. Pharmacist usage was determined indirectly using a two-item medication usage question ("Please fill out the chart to list your current diabetes medications" and "Please list additional current medications…you take on a daily basis") (See Appendix C)**.** Responses were coded as a yes/no format such that participants who fill out the chart with at least one prescription medication were coded as a "yes" for pharmacist use. Participants who did not fill out the chart and reported no medication use were coded into "no" for pharmacist use.

Insurers. A short set of questions assessed recent and current insurance usage in the pre-interview questionnaire (see Appendix D). Participants were asked items such as "Are you

currently insured?"and "Were you insured at any point in the last 6 months?". Participants who answered "yes" to either having current insurance or being insured in the last six months were coded as a "yes" for insurance use. Participants who did not have current or recent insurance within the last six months were coded as "no" for insurance use (see Appendix D).

Combinations of providers. To examine whether different combinations of providers, pharmacists and insurers (multidisciplinary teams) are most effective in promoting adherence, I calculated variables that included every combination of provider and insurer that were endorsed affirmatively by participants (e.g. primary care physician only; primary care physician and dietician; primary care physician, pharmacist, and case manager). There were 24 possible combinations between five variables (family provider, endocrinologist, nurse case manager/diabetes educator, dieticians, and pharmacists). Provider groups were created in SPSS with the requirement that each participant must have at least a family provider or an endocrinologist.

Moderator. Trust in the participants' providers was measured using several adapted trust scales (see Appendices E-J). The original scales were all shown to have good reliability (Cronbach's α ranged from .89-.93).

Trust in primary care providers. Trust in primary care providers was measured using a modified version of the Interpersonal Trust in a Physician scale (Hall et al., 2002a) (see Appendix E). The original scale has high reliability ($\alpha = .93$) and good construct validity, measured by calculating a bivariate correlation with other previously established measures of physician trust. It is scored on a 5-point Likert-type scale, ranging from 1 [Strongly Disagree] to 5 [Strongly Agree] (Hall et al., 2002a). The modified version consists of 10-questions that ask participants questions related to trust in the primary professional who manages their diabetes, specified to the target population from the original scale (e.g. "[Your doctor] will do whatever it takes to get you all the care you need") (see Appendix E). The modified scaled also had high reliability in this sample ($\alpha = .93$).

Trust in nurse case managers and educators. No scales previously existed to measure trust specifically in nurse case managers or diabetes educators. To measure these constructs the Interpersonal Trust in a Physician scale (Hall et al., 2002a) was modified slightly to be applicable to these providers. In the modified versions, questions are worded to reflect participants' nurse case manager or diabetes educator (see Appendix F). A sample question includes "Your [nurse case manager or educator] will do whatever it takes to get you the care you need" and are rated from 1 [Strongly Disagree] to 5 [Strongly Agree] on a Likert-type scale (see Appendix F). Using modified versions of the Trust in Physician scale allowed for more direct comparisons between the impact of primary care providers versus other providers on adherence-related health behaviors and outcomes. The modified scale had high reliability in this sample ($\alpha = .95$).

Trust in dieticians. No scales previously existed to measure trust specifically in dieticians. To measure this construct, a modified version of the Interpersonal Trust in a Physician scale (Hall et al., 2002a) was utilized. In the modified version, questions were worded to reflect the participants' dietician, and were rated on a 5-point (1 [Strongly Disagree] to 5 [Strongly Agree]) Likert-type scale. A sample question includes, "[Your dietician] only thinks about what is best for you" (see Appendix G). The reliability of the modified version of this scale in this sample was good ($\alpha = .98$). Utilizing modified versions of the Trust in Physicians scale in this way will allow for more direct comparisons between the impact of primary care providers versus other providers on adherence-related health behaviors.

Trust in pharmacists. Trust in pharmacists was measured using a modified version of the Trust in Pharmacists Scale (Ngorsuraches et al., 2008). The original 30-item questionnaire has been shown to have good validity and reliability (Ngorsuraches et al., 2008). This measure was shortened and modified for use of a sample in the United States for this study. The modified version was a 15-item questionnaire scored on a 5-point (1 [Strongly Disagree] to 5 [Strongly Agree]) Likert-type scale (see Appendix H). This scale was chosen due to the nature of the questions that measure several areas of trust in pharmacists (benevolence, technical competence,

and communication). In addition, these questions are specific to the unique interactions

participants may have with pharmacists in the United States, such as "Pharmacists care about

your health" and "Pharmacists can help you with your illness" (see Appendix H). The modified

version of this scale had good reliability in this sample (α = .91).

   Trust in insurers. Trust in insurers was measured using the Trust in a Health Insurer

measure (Zheng et al., 2002). This is an 11-item questionnaire in which participants indicate their

trust in health insurance companies scored on a 5-point (1 [Strongly Disagree] to 5 [Strongly

Agree]) on a Likert-type scale (see Appendices I-J). This scale has good psychometric properties,

(Cronbach's α = .92; Zheng et al., 2002). The utilization of this measure will allow for the

inclusion of up to two insurers, to examine feelings toward a primary insurer and, if applicable, a

secondary insurer. This scale had good reliability in this sample for both primary (α = .91) and

secondary (α = .92) insurers.

   Dependent variables. The dependent variables for the proposed study included health

behaviors and clinical health outcomes important for the successful self-management of diabetes

along with general questions of adherence to providers' recommendations.

   Dietary behaviors. Dietary behaviors important for maintaining good glycemic control

were measured using a 7-item modified version of the Fat and Fiber-Related Diet Questionnaire

(Shannon, Kristal, Curry & Beresford, 1997). This measure assessed the types of foods the

participants have eaten in the previous week to further examine how well the participants are

adhering to a diabetic diet. Respondents rated on a 4-point (1 = "Rarely or none of the time" to 4

= "Most or all of the time") Likert-type scale how often they consumed a specific food. An

example item includes "In the past week, how often did you eat foods high in sugar…?" (see

Appendix K). Participants also were asked, on a 5-point (1 = "Never", 5 = "Always", or "Does

not receive this recommendation"), Likert-type scale "How often do you" follow your diet

"<u>exactly </u>as your health care provider prescribes?" (see Appendix K). The reliability for this

measure in this sample was lower than anticipated (α = .55). This is in contrast with other

studies, where reliability was higher for both the full (α = ~.70, Shannon et al., 1997) and

modified versions for use with patients with diabetes (α = .79, August, & Sorkin, 2010).

Medication adherence. Participants were asked, on a 5-point (1 = "Never", 5 =

"Always", or "Does not receive this recommendation") Likert-type scale, "How often do you"

take your medications "<u>exactly </u>as your health care provider prescribes?" (see Appendix L).

Exercise behaviors and adherence. Exercise behaviors were assessed utilizing a two-

item assessment of frequency of cardiovascular and strengthening exercises ("During an average

week, how often do you do any regular activities (like brisk walking, dancing, gardening,

shoveling, lifting) for AT LEAST 20 MINUTES at a level that causes you to sweat HEAVILY

INCREASE your breathing and heart rate?" and "During an average week, how often do you do

any physical activities specifically designed to STRENGTHEN your muscles (such as lifting

weights or doing calisthenics) or STRETCH your muscles (such as yoga, or exercises like

bending side-to-side, toe touches, and leg stretches)?") rated on a 7-point (1 = "I am unable to do

any regular heavy activity" to 7 = "Everyday") Likert-type scale (see Appendix M). Participants

also will be asked, on a 5-point (1 = "Never", 5 = "Always", or "Does not receive this

recommendation") Likert-type scale, ("How often do you" exercise regularly "<u>exactly</u> as your

health care provider prescribes?" (see Appendix M). For analyses, a composite measure was

created for these two variables to take into account both cardiovascular and strengthening

exercises. These variables were significantly correlated (r = .67, p < .001), so given that both

types of activities are important to assess overall exercise adherence, the composite measure was

utilized in analyses (see Appendix M).

Average fasting blood glucose. Participants were asked how often they check their blood

glucose, with options ranging from "In the morning before breakfast" to "Before meals and at

bedtime" to "None of these" with an opportunity to then explain their actual blood glucose

monitoring behaviors Additionally, for those who self-monitored their blood glucose in some

way, participants were asked to report three consecutive days of fasting blood glucose levels (see Appendix N).

   Glucose monitoring adherence. Participants also were asked, on a 5-point (1 = "Never", 5 = "Always", or "Does not receive this recommendation") Likert-type scale, "How often do you" check blood glucose "<u>exactly </u>as your health care provider prescribes?" (see Appendix O).

   HbA1c level. HbA1c level was assessed by asking "Please list the most recent results of your HbA1c test." Participants then could fill-in the response with the date of the level and value of their results (see Appendix P).

   Type of primary insurance. Type of insurance was measured by asking participants "Who is your primary insurance provider?" in a multiple choice format, with a fill-in-the-blank response option for any insurance provider not listed (see Appendix Q). Nearly the entire sample had current or recent insurance coverage (96.6%), so this variable had very little variability. Thus, primary insurance type (coded as either private or government) was examined as the independent variable when examining its relationship to health behaviors and outcomes.

   Potential covariates. Potential covariates were selected based on the inclusion of these variables in previous literature on patient-provider relationships and health behaviors. They also were selected by examining whether they were significantly associated with any of the key study variables at $p < .10$. Potential covariates were assessed through questions either from the pre-interview questionnaire or during the interview. The variables examined as potential covariates were: gender, time since diagnosis, diabetes complications, type of insurance, trust in the general medical community, participant race, provider race, and type of pharmacy used.

   Gender. Gender was measured through a one-item based on interviewer observation "Code sex by observation: Male or Female" (see Appendix R).

   Time since diagnosis. Time since diagnosis was measured by asking participants "When were you diagnosed with diabetes?" using a fill in the blank format ("please list year") in the pre-

interview questionnaire (see Appendix S). Time since diagnosis was then calculated by subtracting the year of diagnosis from the year at the time of data collection (2013).

Diabetes complications. Diabetes complications were measured through a question in the interview ("Have you ever had any of the following problems or complications as a direct result of your diabetes?"), where respondents will be able to answer yes or no to a list of complications (e.g. "loss of eyesight" and "amputation of any extremity"). Participants who answered yes to any complication then were coded as 'yes' to having diabetes complications while those without were coded as 'no' (see Appendix T).

Type of secondary insurance provider. Participants were asked "Who is your secondary insurance provider?" in a multiple choice format with a fill in the blank option for any insurer not listed (see Appendix U).

Trust in the general medical community. Trust in the medical community was measured utilizing a modified version of the Trust in Doctors Generally scale (Hall, Camacho, Dugan & Balkrishnan, 2002b). The original version of this scale has good validity and good internal consistency (Hall et al., 2002b). The modified version applies to healthcare professionals generally by replacing the word *doctors* with *healthcare professionals*. A sample question includes "Healthcare professionals are totally honest in telling their patients about all of the different treatment options available for their conditions." The items are rated on a 5-point Likert-type scale (1 = strongly disagree and 5 = strongly agree) (see Appendix V). The reliability of this modified scale was good (α = .92).

Race of patient. Participants' self-identified race was measured using a one item question ("What is your racial background?") with multiple choice response options, including other with an opportunity to specify (see Appendix W).

Race of provider. Race of the primary diabetes care provider was measured by a one item question ("What race/ethnicity is your primary care provider?") with multiple choice response options (see Appendix X).

Type of pharmacy used. Type of pharmacy used was measured by a one item question ("What type of pharmacy do you use to obtain your medications?") with multiple choice response options (see Appendix Y).

Analyses

All analyses were conducted using SPSS version 22 software.

Scales, reliabilities and constructing. I examined the internal consistency for all multi-item (≥3) scales using Cronbach's alpha, and for all 2-items scales using Pearson's r. I then computed scales by summing each item and calculating the mean to form composite measures. In order for the scale to be computed, at least two-thirds of the questionnaire items had to be non-missing.

Descriptive statistics. I examined frequencies for all study variables as well as means and standard deviations for continuous variables. Finally, bivariate correlations among continuous key study variables were examined using Pearson's *r*.

Hypotheses tests.

Main and interactive effects. Linear multivariable regression analyses were performed to determine the significance and strength of the association between the independent and dependent variables, and whether the potential moderators influence the nature or direction of these associations (hypothesis #1 and #2). Interaction terms were computed by first centering variables to reduce the chance of multicollinearity. Then product terms were created for each combination of independent variables and moderators (e.g. primary care physician x trust in physician). Variables then were entered into the regression model in the following sequence: covariates (step 1), independent variables and moderators (step 2), and interaction terms of independent variables X moderators. Separate regressions were run for each outcome.

To determine the nature of any significant interactions, separate regression equations were calculated by following the procedures and recommendations by Aiken and West (1991). Results were plotted to determine the nature of any significant interaction effects. Simple slopes

also were calculated, defined as the regression of the outcome of the dependent variable on the independent variable at the specific value of the moderator (mean +/- 1 SD) (Aiken & West, 1991) to determine whether the regression lines are significantly different from zero. The calculations were computed using a online calculator developed by Preacher, Curran, & Bauer, (2003).

Finally, to determine which multidisciplinary teams of providers have the largest association with engagement in health behaviors and outcomes (hypothesis #3), provider groups were calculated using all possible combinations (24) of individual providers. One-way ANOVAs were then run between provider groups and each dependent variable.

Results

Descriptive Statistics

The average time since diabetes diagnosis among participants was 5.96 years ($SD =$ 23.53, range = 0-35). The average fasting blood glucose was above the clinically desired range of 70-130 for individuals with diabetes, with large variability among participants ($M = 130.38$, $SD =$ 37.21, range = 87-240) and the average HbA1c was slightly above the recommendation ($M =$ 7.16, $SD = 1.53$, range = 5.2-11.5). Less than half of the sample (45.8%) had experienced complications from their diabetes.

The types of providers currently utilized by participants varied. Most participants (78.0%) saw a family physician as their main diabetes care provider. The most commonly utilized provider group was family care providers and pharmacists (for a breakdown on provider groups, see Table 1). The majority of the sample (96.6%) currently had primary health insurance and, of those, 61.4% had insurance through a private company. Furthermore, 98.2% of the sample had a pharmacist. Most individuals only utilized a primary care physician and pharmacist as their diabetes management team (45.8%) and few participants currently saw dieticians, nurse case managers, or diabetes educators as part of their regular care routine. Additionally,

descriptive statistics were run on all scales used (see Table 2) along with intercorrelations for key variables (see Table 3).

Though all covariates were initially entered into the model, only five covariates contributed to the model based on the standards for inclusion ($p < .10$) to the model. The covariates that remained in the final regression models included: participant race, participant age, participant history of complications, time since diagnosis, and provider race. The other potential covariates were not significant.

Provider Impact on Health Behaviors and Outcomes

Primary care providers. Trust in the main provider for diabetes treatment was significantly related to average fasting blood glucose ($\beta = 3.32, p < .01$), but using a primary care provider was not significantly related to average fasting blood glucose ($\beta = .37, p = .07$) (see Table 4). There was no significant relationship between using a primary care provider or trust in the health behaviors of HbA1c , exercise, medication adherence, glucose monitoring adherence, exercise adherence, dietary adherence, or dietary behaviors.

Endocrinologists. Using an endocrinologist as the main provider for diabetes care was only marginally related to lower average fasting blood glucose ($\beta = -.50, p = .056$) and was not significantly linked to HbA1c ($\beta = .29, p = .17$) (see Table 5). Additionally, using an endocrinologist as the primary provider for diabetes care was not significantly related to exercise, medication adherence, glucose monitoring adherence, exercise adherence, dietary adherence, or dietary behaviors.

Main provider type. The type of main provider (i.e.MD/DO, NP/PA, or endocrinologist) used for diabetes care also was examined in relation to self-management behaviors and clinical health outcomes. Dummy variables were created for each of the provider types, with using a medical doctor/doctor of osteopathic medicine as the reference group. Using a nurse practitioner/physician's assistant did not differ significantly from using a primary care physician in either fasting blood glucose ($\beta = .113, p = .42$) or HbA1c ($\beta = .160, p = .135$).

Using an endocrinologist exhibited a marginal relationship with average fasting blood glucose (β = -.51, p = .052), but no relationship with HbA1c (β = -.289, p = .157) (see Table 6). The type of main provider used for diabetes care was not significantly related to exercise, medication adherence, glucose monitoring adherence, exercise adherence, dietary adherence, or dietary behaviors.

Insurance type. Trust in primary insurer was significantly related to average fasting blood glucose (β = -1.62, p < .01), such that individuals with low trust in their insurers had higher average blood glucose values. Trust in primary insurer also was significantly negatively related to HbA1c (β = -.97, p < .05) (see Table 7). There was no significant relationship between insurance type or trust and exercise, medication adherence, glucose monitoring adherence, exercise adherence, dietary adherence, or dietary behaviors.

Other Providers, Frequency of Visits and Provider Groups

Regression models for other providers (e.g. dieticians, pharmacists) were not significantly related to any health behaviors or outcomes. Frequency of provider visits was not correlated with health behaviors or outcomes. Moreover, ANOVAs that examined the relationship between different provider groups and health behaviors and outcomes also were non-significant.

Interactive Effects of Provider Usage and Trust in a Provider on Health Behaviors and Outcomes

Trust in a provider significantly moderated several associations between health care provider use and health behaviors and outcomes. First, there was a significant interaction between primary care provider usage and trust in the main diabetes care provider on average fasting blood glucose (β = -3.23, p < .01). Simple slopes analyses revealed that individuals with low trust in their main provider and who were less likely to use a primary care provider had higher average levels of fasting blood glucose (simple slope = 199.60 (73.28), t = 2.72, p < .05).

Those with high levels of trust, regardless of use, in contrast, had a lower average fasting blood glucose level (simple slope = -79.33 (33.81), t= 2.35, $p < .05$) (see Figure 1).

Second, there were significant interactions between using an endocrinologist as a main diabetes care provider, and trust in the main diabetes care provider both individually ($\beta = .78$, $p < .01$) and when compared to using a family physician ($\beta = .81$, $p < .01$) on average fasting blood glucose. Simple slopes were examined and this relationship was significant at only low levels of trust for both using an endocrinologist as the main diabetes provider (simple slope = -87.85(37.61), $t = 2.34$, $p < .05$) (see Figure 2) and when compared to using a primary care physician (simple slope = -90.57(38.00), t=-2.38, p < 0.05) such that average blood glucose was higher in individuals with low levels of trust in their endocrinologist (see Figure 2 and 3).

Lastly, there was a significant interaction between primary insurance type (private or government) and trust in insurer on average fasting blood glucose ($\beta = 1.64$, $p < .01$). Simple slopes were again examined, and the relationship was only significant at low levels of trust (simple slope = -40.72 (16.20), $t = -2.51$, $p < .05$), such that lower trust in the primary insurer was related to higher   average fasting blood glucose levels (see Figure 4).

There was not a significant interaction between seeing a family care provider and trust in the primary care provider in predicting HbA1c ($\beta = -1.41$, $p = .06$), but it was trending towards significance. The interaction between using an endocrinologist as the main provider and HbA1c was not significant ($\beta = -1.41$, $p = .09$). Similarly, there was no significant interaction between using an endocrinologist (when compared to using a primary care physician) and trust for HbA1c ($\beta = .40$, $p = .07$). No significant interaction was found between primary insurance type and HbA1c ($\beta = .67$, $p = .11$).

Discussion

Consistent with my first hypothesis, most individuals received the most frequent care from a primary care physician and/or an endocrinologist (see Table 1), but only average fasting blood glucose was significantly impacted by this relationship. Not surprisingly, due to the long-

standing goal of primary diabetes care providers to promote good glycemic control, simply seeing a family care provider decreased average level of fasting blood glucose. When compared to primary care physicians, patients who saw an endocrinologist as their main provider had marginally lower blood glucose levels. This relationship held when endocrinologists were examined further as the sole primary diabetes care provider. Moreover, trust modified the relationship between both family provider usage and type (but only for endocrinologists) and average fasting blood glucose. Interestingly, trust in insurer by type of primary insurer (private versus government) also significantly impacted average blood glucose and, additionally, HbA1c. Trust in insurer moderated the relationship between insurer type and average fasting blood glucose. Provider groups and frequency of provider visits, however, did not significantly impact self-management behaviors in this sample.

The results suggest that health care providers may be most influential on clinical outcomes rather than actual health behaviors, but that these clinical outcomes may be more representative of short-term diabetes control versus successful long-term management. The relationship between trust in primary care insurers and *both* short- (average fasting blood glucose over three days) and long-term (HbA1c) indicators of diabetes control suggests that the larger healthcare system may have as great (or greater) of an impact on diabetes self-management as the providers patients see more frequently. Moreover, the lack of findings for provider groups' impact on health behaviors and outcomes may be due to an insufficient number of people routinely using multiple-provider care teams to help manage their diabetes. Without individuals actually utilizing the services of these providers routinely, it is difficult to determine what impact (if any) they have on patients' health behaviors and outcomes.

Though some health outcomes were significantly related to seeing a particular provider, and some of these associations were further moderated by trust (e.g. seeing a family care provider and average fasting blood glucose), the health outcomes most strongly linked to provider use were the more objective, clinical health outcomes (that is, blood glucose and HbA1c.) This

suggests that there may be other factors involved in other health behaviors, like exercise and diet, such as the influence of family and friends.

In fact, the literature on the importance of social relationships in health, particularly in diabetes, is robust (August & Rook, 2012). Family members and friends may influence health behaviors by providing support for those behaviors (health related social support), which has been shown to have a positive influence on treatment adherence in people with chronic illnesses (Beverly, Miller, & Wray, 2008), and in diabetes (Glasgow, & Toobert, 1988; Connell, Fisher, & Houston, 1992; Gallant, 2003; Beverly, Miller, & Wray, 2008). Health-related social support may have a larger impact on diet (e.g. (Beverly et al., 2008) and exercise (e.g. Tang, Brown, Funnell, & Anderson, 2008) than the formal social network (i.e. healthcare providers), given that these behaviors occur on a daily basis in the context of patients' everyday lives.

In addition to social support, family and friends also may attempt to regulate patients' health behaviors through health-related social control. Health-related social control often has dual-effects on the recipients (such that, health behaviors may improve, but at the expense of the recipients' well-being) (Lewis, & Rook, 1999; August, & Sorkin, 2010). As such, this involvement may have either a positive or negative impact on diabetes self management. In fact, research suggests that the use of certain types of negative health-related social control tactics, for example, pressure, can lead to worse health behaviors, such as poorer quality dietary intake (Stephens, Franks, Rook, Iida, Hemphill, & Salem, 2013).

There are some limitations to the current study that are important to note when interpreting the results. The overall number of participants was modest. The sample size limited the power available to detect significant findings and fewer opportunities to examine potentially meaningful differences within subgroups. Additionally, there was little variability in some of the measures (e.g. nearly the entire sample had pharmacists). Although it may be the case that few individuals are actually utilizing a multi-provider care team to help manage their diabetes, it is also impossible to conclude from this sample what impact those providers would have on diabetes

self-management. The reliability of the dietary measure for our sample was low, which may have precluded finding significant results for this variable. However, since no significant results were found for dietary adherence as well, it is also possible that there is actually no significant influence for diet. Lastly, since this was a cross-sectional study design, it not possible to determine the direction of the effects. It could be the case, for example, that individuals who have higher trust in their providers are also more likely to see their providers, thus creating a feedback loop between trust and glycemic control.

Despite these limitations, the results of this study are encouraging and provide some insight as to how certain providers can impact self-management behaviors and outcomes and how trust in the patient-provider relationship can influence clinical health outcomes. Considering the significant relationship impact of trust on modifying the relationship between providers and health outcomes, it is important to discover ways to engender patients' trust in their providers, including their insurers. Continued efforts should be made to improve patient-physician communication and provide a patient-centered approach when providing care to individuals with diabetes to help promote good clinical outcomes.

Though few individuals had existing relationships with all types of providers, it remains essential to study the different providers involved in diabetes care in order to fully understand the effectiveness of providers on imparting self-management behaviors to their patients. In our sample, many participants had private insurance that would cover the cost of using multiple providers, but few had specialist providers as part of their regular healthcare team. This may help to explain why good diabetes self-management continues to be elusive. The results of this study could provide further insight into what behaviors and outcomes are most influenced by efforts of health promotion.

A better understanding of these influences could lead to more effective relationships with providers, significant improvement on the quality of life for individuals with diabetes, and demonstrate the relative effectiveness of the recent shift in healthcare's focus towards health

promotion. If health promotion is indeed the new gold standard of the evolving United States healthcare system, evaluating the relative effectiveness of different providers would provide insight as to what helps (and what hinders) patients effectively manage their diabetes, which could promote better adherence. Many of the providers examined in this study that were not frequently used (e.g. diabetes educators) are specifically trained in a holistic model that is consistent with the goals of health promotion. Yet, if we do not understand the effectiveness of these providers, the actual rates of use (and continued use after initial diagnosis), and the relationships patients have with these providers, it is not an efficient use of the limited resources in healthcare.

Tables

Table 1

Health Care Provider Group Combinations

	Percent	Number of participants
FP + Pharm	45.8%	27
FP, Endo, + Pharm	15.3%	9
FP, DE/NCM, + Pharm	11.9%	7
FP, DE/NCM, Diet, + Pharm	5.1%	3
Other	15.3%	9

Note. FP = family provider. Endo = endocrinologist. DE/NCM = diabetes educator or nurse case manager. Diet = dietician. Pharm = pharmacist. All other combinations were created when a particular group had less than 3 participants belonging to it.

Table 2

Descriptive statistics for main variables scales.

Variable	*n*	*M*	*SD*
Dependent Variables			
Exercise Regularly	53	3.79	1.54
Diet	59	1.79	.50
Medication Adherence	57	4.79	.56
BGM Adherence	58	-.49	1.15
Exercise Adherence	58	3.12	1.30
Diet Adherence	58	3.50	1.047
Moderating Variables			
Trust PCP	59	4.34	.68
Trust DE/NCM	14	4.01	.95
Trust Dietician	5	3.58	1.04
Trust Pharmacist	58	3.88	.59
Trust Primary Insurance	57	3.42	.80

Table 3

Intercorrelations of Key Variables

	PCP	Fam	Endo	DE/NCM	Diet	INS	Avg BG	HbA1c	FatFib	Exer	Med Ad	BGM Ad	Ex Ad	Diet Ad
PCP	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Fam	-.52***	---	---	---	---	---	---	---	---	---	---	---	---	---
Endo	.66***	-.36**	---	---	---	---	---	---	---	---	---	---	---	---
DE/NCM	.02	-.04	-.04	---	---	---	---	---	---	---	---	---	---	---
Diet	.02	.11	.10	.35**	---	---	---	---	---	---	---	---	---	---
INS	-.22	.03	-.06	-.12	-.16	---	---	---	---	---	---	---	---	---
Avg BG	.30	-.31*	.24	.15	-.05	-.06	---	---	---	---	---	---	---	---
HbA1c	.13	-.19	.11	.02	-.20	-.03	.52**	---	---	---	---	---	---	---
FatFib	.14	.04	.11	.08	-.04	.08	.04	.09	---	---	---	---	---	---
Exer	-.06	-.03	.01	-.16	-.09	.11	.35*	.21	.21	---	---	---	---	---
Med Ad	-.23	-.09	-.23	.14	-.21	.11	-.06	-.20	-.13	.07	---	---	---	---
BGM Ad	-.13	-.07	-.02	.23	-.16	.26	-.14	-.01	-.16	-.18	.33*	---	---	---
Ex Ad	-.28*	.09	-.27*	.07	.06	.17	-.37*	-.30	-.44**	-.49**	.18	.47**	---	---
Diet Ad	-.16	.05	-.12	.12	.06	.13	-.11	-.16	-.52**	-.20	.18	.42**	.52**	---

Notes. PCP = Primary Care Provider. Fam = Sees Family Provider. Endo = Sees Endocrinologist. DE/NCM = Sees diabetes educator or nurse case manager. Diet = Sees dietician. INS = Insurance Type. Avg BG = Average Fasting Blood Glucose. FatFib = Fat and Fiber Intake. Exer = Exercises. Med Ad = Medication Adherence. BGM Ad = Blood Glucose Monitoring Adherence. Ex Ad = Exercise Adherence. Diet Ad = Dietary Adherence.
* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4

Linear regression coefficients for using primary care provider and diabetes health outcomes.

Variable	Avg. FBG		HbA1c	
	β	t	β	t
Primary Care Provider $n = 54$				
Main effects				
Uses primary care provider	.37	1.90	.28	1.44
Trust MDCP	3.32	3.01**	1.36	1.82
Patient race	-.08	-51	-.25	-2.23*
Time since diagnosis	.58	3.73**	.83	6.71***
Complications	.08	.57	.07	.64
Race of MDCP	-.30	2.13*	.27	2.54*
Interactions				
Primary care provider x Trust	-3.23	-2.95**	-1.41	-1.95
	Adjusted $R^2 = .50$		Adjusted $R^2 = .68$	

Notes. MDCP = Main diabetes care provider. Avg FBG = Average fasting blood glucose. PCP = primary care provider. HbA1c = Hemoglobin A1c.
*$p < .05; **p < .01; *** p < .001$

Table 5

Linear regression coefficients for using endocrinologist and diabetes health outcomes.

Variable	Avg. FBG		HbA1c	
	B	t	β	t
Endocrinologist (PCP) $n = 9$				
Main effects				
Endocrinologist	-.50	-2.00[1]	-.29	-1.40
Trust MDCP	.02	.13	-.10	-.97
Patient race	.21	-1.36	-.30	-2.60*
Patient age	-.09	-.49	-.26	-2.08*
Time since diagnosis	.56	3.60**	.80	6.71***
Complications	.01	3.65**	.04	.32
Race of MDCP	-..22	-1.45	.29	2.59*
Interactions				
Endocrinologist x Trust	.78	2.78**	-1.41	-1.95
	Adjusted R^2 = .48		Adjusted R^2 = .67	

Notes. MDCP = Main diabetes care provider. Avg FBG = Average daily blood glucose. HbA1c = Hemoglobin A1c.
[1]Marginally significant (p = .056).
* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Table 6

Linear regression coefficients for using main diabetes provider by type and diabetes health outcomes.

Variable	Avg. FBG		HbA1c	
	β	t	B	t
MDCP (By Type) $N = 59$				
Main effects				
NP/PA	.11	.82	.16	1.54
Endocrinologist	-.51	-2.04[1]	-.29	-1.46
Trust MDCP	.02	.13	-.11	-1.01
Patient race	-.21	-1.31	-.29	-2.61*
Patient age	-.08	-.43	-.26	-2.11*
Time since diagnosis	.61	3.65**	..86	7.03***
Complications	-.01	-.10	.01	.06
Race of PCP	-.19	-1.27	.32	2.87**
			.	
Interactions				
Endocrinologist x Trust	.81	2.83**	.40	1.91
	Adjusted $R^2 = .48$		Adjusted $R^2 = .69$	

Note. Reference group = primary care physician. MDCP = Main diabetes care provider. Avg FBG = Average daily blood glucose. HbA1c = Hemoglobin A1c. [1]Marginally significance (*p* = .052). [2]Marginally significance (p = .052)
* *p* ≤ .05; ** *p* ≤ .01; *** *p* ≤ .001

Table 7

Linear regression coefficients for type of primary insurer and diabetes health outcomes.

Variable	Avg. FBG		HbA1c	
	β	*t*	β	*t*
Primary insurer type *n* = 57				
Main effects				
Primary insurer type	-.10	-.68	-.04	-.37
Trust primary insurer	-1.62	-2.95**	-.97	-2.37*
Patient race	.04	-.23	-.14	-1.18
Patient age	-.07	-.39	-.31	-2.40*
Time since diagnosis	.43	-2.65*	.66	5.25***
Complications	.04	.23	.03	.21
Interactions				
Insurer Type x Trust	1.635	3.09**	.670	1.66
	Adjusted R^2 = .27		Adjusted R^2 = .55	

Notes. Avg FBG = Average daily blood glucose. HbA1c = Hemoglobin A1c.
*$p < .05$; ** $p < .01$; *** $p < .001$

Figure 1

Figure 1. Trust Interaction on Primary Care Provider and Avg FBG

Figure 2

Trust Interaction on Endocrinologist and Avg FBG

Figure 3

Trust Interaction on PCP Type (Endo) and Avg FBG

Figure 4

Figure 4. Trust Interaction on Primary Ins. Type and Avg. FBG
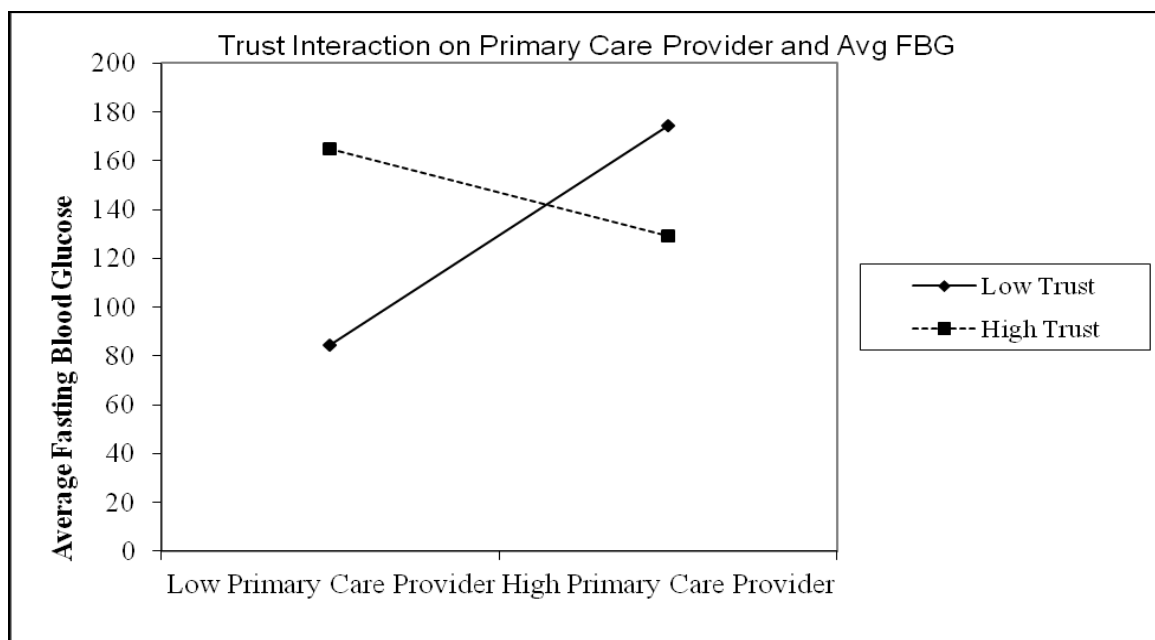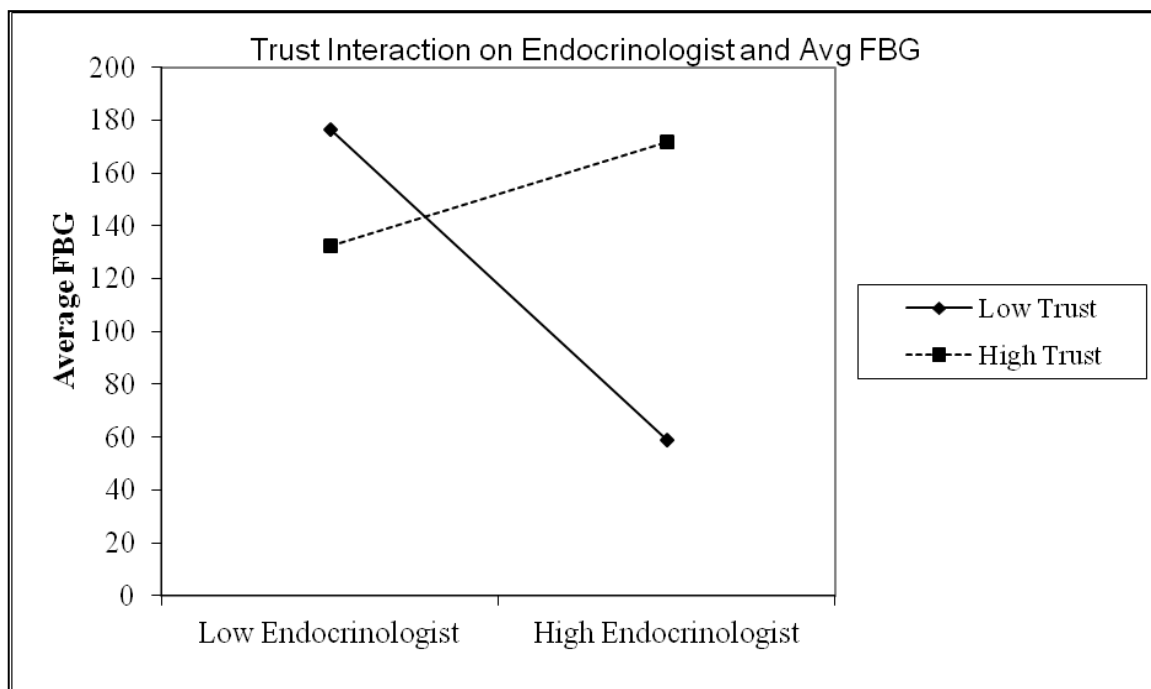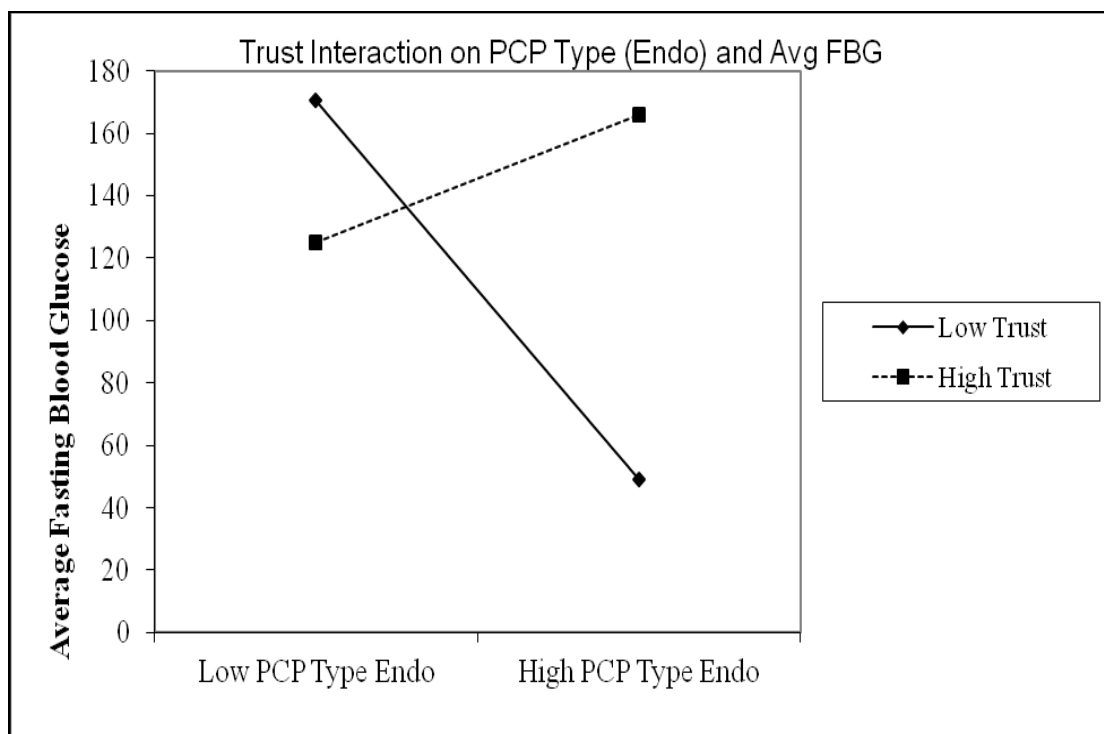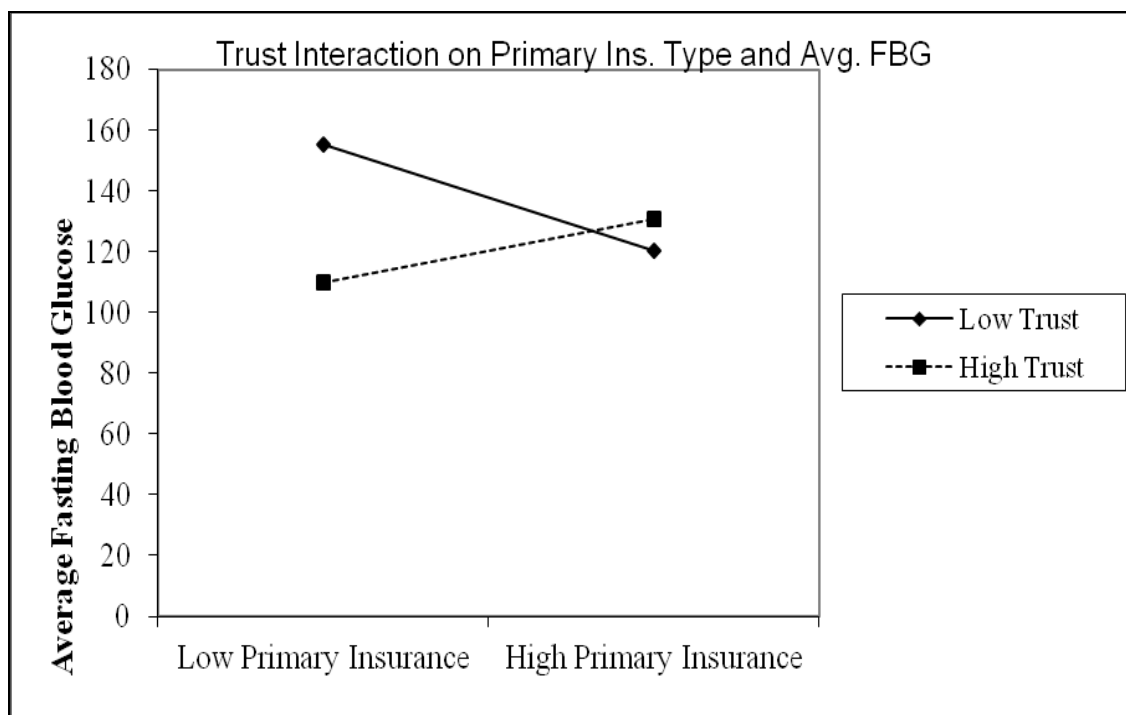
Appendix A

Who is the main person you see for your diabetes? *(circle one)*

      a. My family doctor (MD or DO)

      b. A nurse practitioner of physician's assistant in my doctor's office (NP or PA)

      c. An endocrinologist or diabetes specialist

      d. Other (please list): _____

Appendix B

Many individuals with diabetes have multiple providers who help manage their diabetes. Who has been involved in the care of your diabetes? *(circle as many that apply)* *How many times in the past year?*

    a. Family doctor (internal medicine or family practice)   _____

    b. Endocrinologist (diabetes specialist)   _____

    c. Nurse Case Manager   _____

    d. Diabetes Educator   _____

    e. Dietician   _____

    f. Opthamologist (eye specialist)   _____

    g. Mental health provider (psychologist or psychiatrist)   _____

    h. Other (please list): _____   _____

Appendix C

Please fill out the chart to list your current *diabetes* medication. This information can be found listed on your prescription bottles.

Name of Medication (brand or generic)	Dose of Medication (How much do you take?)	Frequency of Medication (How often do you take it?)	Route of Medication (How do you take it?)
Example: Metformin	*1000mg (2 tablets)*	*Twice a day before meals*	*By mouth*

Please list any additional *current* medications, herbal supplements, vitamins, or over-the-counter drugs you take on a daily basis. This information can be found listed on your prescription bottle or on the recommended dosing of the over the counter bottle. If you take a different amount from the bottle, please list what you actually take.

Name of Medication	Dose of Medication (How much do you take?)	Frequency of Medication (How often do you take it?)	Route of Medication (How do you take it?)
Example: Multivitamin	*1 tablet*	*Once in the morning*	*By mouth*

Appendix D

Are you currently insured?

_____Yes (Please continue to Question 2)

_____No (Please continue to Question 1b)

Were you insured at any point in the last 6 months?

_____ Yes (Please continue to question 2, thinking about your most recent insurer)

_____No   (You are finished with this section)

Appendix E

Please answer the following questions regarding your relationship with the primary doctor who takes care of your diabetes. (This may be your family doctor, an endocrinologist, a nurse practitioner, or physician assistant.)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. [Your doctor] will do whatever it takes to get you all the care you need.	1	2	3	4	5
2. Sometimes [your doctor] cares more about what is convenient for [him/her] than about your medical needs.	1	2	3	4	5
3. [Your doctor] 's medical skills are not as good as they should be.	1	2	3	4	5
4. [Your doctor] is extremely thorough and careful.	1	2	3	4	5
5. You completely trust [your doctor's] decisions about which medical treatments are best for you.	1	2	3	4	5
6. [Your doctor] is totally honest in telling you about all of the different treatment options available for your condition	1	2	3	4	5
7. [Your doctor] only thinks about what is best for you.	1	2	3	4	5
8. Sometimes [your doctor] does not pay full attention to what you are trying to tell [him/her] .	1	2	3	4	5
9. You have no worries about putting your life in [your doctor] 's hands.	1	2	3	4	5
10. All in all, you have complete trust in [your doctor].	1	2	3	4	5

Appendix F

Please answer the following questions regarding your relationship with your *diabetes educator* that helps educate you regarding caring for your diabetes. [Interviewer: Not everyone will have one of these. Please refer to pre-interview questionnaire and check which providers participant uses.]	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Diabetes Educator: _____					
Participant does not have diabetes educator: _____ [Check here and go to next section]					
1. [Your educator] will do whatever it takes to get you all the care you need.	1	2	3	4	5
2. Sometimes [your educator] cares more about what is convenient for [him/her] than about your medical needs.	1	2	3	4	5
3. [Your educator]'s knowledge and skills are not as good as they should be.	1	2	3	4	5
4. [Your educator] is extremely thorough and careful.	1	2	3	4	5
5. You completely trust [your educator]'s recommendations.	1	2	3	4	5
6. [Your educator] is totally honest in telling you about all of the different treatment options available for your condition.	1	2	3	4	5
7. [Your educator] only thinks about what is best for you.	1	2	3	4	5
8. Sometimes [your educator] does not pay full attention to what you are trying to tell [him/her].	1	2	3	4	5
9. You have no worries about putting your life in [your educator]'s hands.	1	2	3	4	5
10. All in all, you have complete trust in [your educator].	1	2	3	4	5

Please answer the following questions regarding your relationship with your *nurse case manager* that helps educate you regarding caring for your diabetes. [Interviewer: Not everyone will have one of these. Please refer to pre-interview questionnaire and check which providers participant uses.]	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Nurse Case Manager: _____					
Participant does not have case manager: _____ [Check here and go to next section]					
1. [Your case manager] will do whatever it takes to get you all the care you need.	1	2	3	4	5
2. Sometimes [your case manager] cares more about what is convenient for [him/her] than about your medical needs.	1	2	3	4	5
3. [Your case manager]'s knowledge and skills are not as good as they should be.	1	2	3	4	5
4. [Your case manager] is extremely thorough and careful.	1	2	3	4	5
5. You completely trust [your case manager]'s recommendations.	1	2	3	4	5
6. [Your case manager] is totally honest in telling you about all of the different treatment options available for your condition.	1	2	3	4	5

7. [Your case manager] only thinks about what is best for you.	1	2	3	4	5
8. Sometimes [your case manager] does not pay full attention to what you are trying to tell [him/her].	1	2	3	4	5
9. You have no worries about putting your life in [your case manager]'s hands.	1	2	3	4	5
10. All in all, you have complete trust in [your case manager].	1	2	3	4	5

Appendix G

Please answer the following questions regarding your relationship with your dietician. (INTERVIEWER: Not everyone will have one of these. Please refer to pre-questionnaire.)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. [Your dietician] will do whatever it takes to get you all the care you need.	1	2	3	4	5
2. Sometimes [your dietician] cares more about what is convenient for [him/her] than about your medical needs.	1	2	3	4	5
3. [Your dietician] 's knowledge and skills are not as good as they should be.	1	2	3	4	5
4. [Your dietician] is extremely thorough and careful.	1	2	3	4	5
5. You completely trust [dietician]'s recommendations.	1	2	3	4	5
6. [Your dietician] is totally honest in telling you about all of the different treatment options available for your condition.	1	2	3	4	5
7. [Your dietician] only thinks about what is best for you.	1	2	3	4	5
8. Sometimes [your dietician] does not pay full attention to what you are trying to tell [him/her].	1	2	3	4	5
9. You have no worries about putting your life in [your dietician]'s hands.	1	2	3	4	5
10. All in all, you have complete trust in [your dietician].	1	2	3	4	5

Appendix H

Please answer the following questions regarding your relationship with your pharmacist and your views on pharmacists generally.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Pharmacists care about your health.	1	2	3	4	5
2. Pharmacists keep your sensitive medical information private.	1	2	3	4	5
3. Pharmacists would admit if a mistake was made when dispensing your medications.	1	2	3	4	5
4. Pharmacists are experts about medications.	1	2	3	4	5
5. Pharmacists can help you with your illness.	1	2	3	4	5
6. Pharmacists can help you solve your medication problems.	1	2	3	4	5
7. Pharmacists carefully dispense your medications.	1	2	3	4	5
8. Pharmacists give clear directions in how to use your medications.	1	2	3	4	5
9. What pharmacists tell you is always right.	1	2	3	4	5
10. Pharmacists give you the opportunity to ask questions.	1	2	3	4	5
11. You are confident in pharmacists' counseling.	1	2	3	4	5
12. Pharmacists are willing to talk or answer your questions.	1	2	3	4	5
13. You always follow pharmacists' advice.	1	2	3	4	5
14. Pharmacists use easy language for counseling.	1	2	3	4	5
15. Pharmacists refer you to other healthcare professionals when needed.	1	2	3	4	5

Appendix I

Please answer the following questions regarding your relationship and feelings towards your (primary) health insurance company.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. You think the people at _____ are completely honest.	1	2	3	4	5
2. _____ cares more about saving money than about getting you the treatment you need.	1	2	3	4	5
3. As far as you know, the people at _____ are very good at what they do.	1	2	3	4	5
4. _____ would pay for you to see any specialist you might need.	1	2	3	4	5
5. If you asked _____ about what treatments your insurance covers, you think _____ would be totally honest with you.	1	2	3	4	5
6. If someone at _____ made a serious mistake, you think they would try to hide it.	1	2	3	4	5
7. You worry there are a lot of loopholes in what _____ covers that you don't know about.	1	2	3	4	5
8. You believe _____ will pay for everything it is supposed to, even really expensive treatments.	1	2	3	4	5
9. If you got really sick, you are afraid _____ might try to stop covering you all together.	1	2	3	4	5
10. If you have a question, you think _____ will give a straight answer.	1	2	3	4	5
11. All in all, you have complete trust in _____.	1	2	3	4	5

Appendix J

Please answer the following questions regarding your relationship and feelings towards your (secondary) health insurance company.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. You think the people at _____ are completely honest.	1	2	3	4	5
2. _____ cares more about saving money than about getting you the treatment you need.	1	2	3	4	5
3. As far as you know, the people at _____ are very good at what they do.	1	2	3	4	5
4. _____ would pay for you to see any specialist you might need.	1	2	3	4	5
5. If you asked _____ about what treatments your insurance covers, you think _____ would be totally honest with you.	1	2	3	4	5
6. If someone at _____ made a serious mistake, you think they would try to hide it.	1	2	3	4	5
7. You worry there are a lot of loopholes in what _____ covers that you don't know about.	1	2	3	4	5
8. You believe _____ will pay for everything it is supposed to, even really expensive treatments.	1	2	3	4	5
9. If you got really sick, you are afraid _____ might try to stop covering you all together.	1	2	3	4	5
10. If you have a question, you think XXX will give a straight answer.	1	2	3	4	5
11. All in all, you have complete trust in _____.	1	2	3	4	5

Appendix K

In the past week, how often did you….

	RARELY OR NONE OF THE TIME (< 1 DAY)	SOME OR A LITTLE OF THE TIME (1- 2 DAYS)	OCCASIONALLY OR A MODERATE AMOUNT OF THE TIME (3- 4 DAYS)	MOST OR ALL OF THE TIME (5 - 7 DAYS)
a. Eat foods high in sugar (such as candy, fruit juice, cookies, tea or coffee flavored with sugar)…………	1	2	3	4
b. Add salt to your food (e.g. soy sauce or fish sauce) or eat foods high in salt (e.g. pickled food)……....	1	2	3	4
c. Use butter, lard, oil, or shortening in the foods you were eating………	1	2	3	4
d. Put sour cream, cheese, butter, or mayonnaise on vegetables, potatoes, corn, or rice?……………..	1	2	3	4
e. Eat a lot of fruits or vegetables as part of your usual diet?…………	1	2	3	4
f. Eat foods that have been deep fried?………………………………….	1	2	3	4
g. Eat snack foods high in fat (i.e. chips, candy bars)…………………..	1	2	3	4

How often do you do the following <u>exactly</u> as your health care provider prescribes?

	Never	Rarely	Sometimes	Usually	Always	DOES NOT RECEIVE RECOMMENDATION
Following my diet…………	1	2	3	4	5	9

Appendix L

How often do you do the following <u>exactly</u> as your health care provider prescribes?

	Never	**Rarely**	**Sometimes**	**Usually**	**Always**	**DOES NOT RECEIVE RECOMMENDATION**
a. Taking medications as prescribed…	1	2	3	4	5	9

Appendix M

During an average week, how often do you do any regular activities (like brisk walking, dancing, gardening, shoveling, lifting) for AT LEAST 20 MINUTES at a level that causes you to sweat HEAVILY INCREASE your breathing and heart rate?

Everyday…………………………………………	1
At least 5-6 times a week………………………….	2
At least 3 to 4 times a week……………………….	3
About 1-2 times a week…………………………….	4
Less than once a week…………………………….	5
Never………………………………………………	6
I am unable to do any regular heavy activity………	o9

During an average week, how often do you do any physical activities specifically designed to STRENGTHEN your muscles (such as lifting weights or doing calisthenics) or STRETCH your muscles (such as yoga, or exercises like bending side-to-side, toe touches, and leg stretches)?

Everyday…………………………………………	1
At least 5-6 times a week………………………….	2
At least 3 to 4 times a week……………………….	3
About 1-2 times a week…………………………….	4
Less than once a week…………………………….	5
Never………………………………………………	6
I am unable to do any regular heavy activity………	o9

Appendix N

How many times per day do you check your blood sugar?

       a. Not at all

       b. Once in the morning

       c. Before meals

       d. Before meals and before bed

       e. Other (Please describe): _____

Many individuals with diabetes test their blood sugar first thing in the morning before they have eaten. This is known as a "fasting blood sugar". If you do this, please record your fasting blood sugar for 3 consecutive days and list the dates/times.

       Date: _____   Time: _____   Blood Sugar:_____

       Date: _____   Time: _____   Blood Sugar: _____

       Date: _____   Time:_____   Blood Sugar:_____

Appendix O

How often do you do the following exactly as your health care provider prescribes?

	Never	Rarely	Sometimes	Usually	Always	DOES NOT RECEIVE RECOMMENDATION
Checking my blood for sugar……	1	2	3	4	5	-9

Appendix P

Many individuals with diabetes have blood work done every few months to check their "Hemoglobin A1c" (HbA1C) levels. This test indicates how well controlled your blood sugar is over the last few months. Please list the most recent results of you HbA1C test (you may need to check with your health care provider). If you have never had this test done, please write "Never done".

Date of HbA1C level: _____   Results: _____%

Appendix Q

Who is your primary insurance provider? (This information can be found on your insurance card.)

      a. Horizon Blue Cross

      b. Aetna

      c. Medicare

      d. Medicaid

      e. Other (please list): _____

Appendix R

(INTERVIEWER: CODE SEX BY OBSERVATION)

a. Male

b. Female

Appendix S

When were you diagnosed with diabetes?

(Please list year) _____

Appendix T

Have you ever had any of the following problems or complications as a direct result of your diabetes?

a. Loss of eyesight (like diabetic retinopathy)

   YES   NO

b. Neuropathy (nerve damage in the feet that lessens the ability to feel in that area)

   YES   NO

c. Frequent yeast infections

   YES   NO

d. Kidney failure

   YES   NO

e. Amputation of any extremity

   YES   NO

   [IF YES] Please list: _____

f. Other

   YES   NO

   [IF OTHER] Please explain: _____

Appendix U

Who is your secondary insurance provider? (If you do not have a secondary insurance provider, please select

"E".)

        a. Horizon Blue Cross

        b. Aetna

        c. Medicare

        d. Medicaid

        e. None (Only a primary insurance provider)

        f. Other (please list): _____

Appendix V

Please answer the following questions regarding your feelings with the *general* medical community and healthcare professionals. (For example, nurses or physicians.)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Healthcare professionals in general care about their patients' health just as much or more as their patients do.	1	2	3	4	5
2. Sometimes healthcare professionals care more about what is convenient for them than about their patients' medical needs.	1	2	3	4	5
3. Healthcare professionals are extremely thorough and careful.	1	2	3	4	5
4. You completely trust health care professionals' decisions about which medical treatments are best.	1	2	3	4	5
5. Healthcare professionals are totally honest in telling their patients about all of the different treatment options available for their conditions.	1	2	3	4	5
6. Healthcare professionals think only about what is best for their patients.	1	2	3	4	5
7. Sometimes healthcare professionals do not pay full attention to what patients are trying to tell them.	1	2	3	4	5
8. Healthcare professionals always use their very best skill and effort on behalf of their patients.	1	2	3	4	5
9. You have no worries about putting your life in the hands of healthcare professionals.	1	2	3	4	5
10. A healthcare professional would never mislead you about anything.	1	2	3	4	5
11. All in all, you trust healthcare professionals completely.	1	2	3	4	5

Appendix W

What is your racial background?

(circle one)

a.   1

……………………………………………..

b. African American or Black……………………….……………   2

c. Hispanic………………………………………………………..   3

d. Asian or Pacific Islander……………………………………….   4

e. Native American or Alaskan Native…………..……………....   5

f. Mixed racial background……………………………………….   6

Specify_____

g. Other race (Specify)_____   7

Appendix X

What race/ethnicity is your primary care provider?

        a. Caucasian/White

        b. African-American/Black

        c. Hispanic/Latino

        d. Asian/Pacific Islander

        e. Other (please list): _____

Appendix Y

What type of pharmacy do you use to obtain your medications?

a. My local pharmacy (family owned, neighborhood pharmacy)

b. A chain pharmacy convenient to my home (e.g. Rite Aid, CVS, Walgreens)

c. A pharmacy located in my shopping market (e.g. Shop Rite, Acme, Walmart)

d. A mail-order pharmacy

e. Other (please describe): _____

Appendix Z

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