Toward a Better Understanding of Trust on Outcomes:

The Case of Patient-Physician Encounters

ABSTRACT

Trust in physicians has been associated with a range of patients’ behaviors. However, previous research has not focused on the mechanisms by which trust affects health status and mostly has made use of self-reported outcomes. Studying a sample of 480 adult patients with type 2 diabetes, we found that patients who trust their physicians were more likely to have stronger self-efficacy expectations and outcome expectations. This, in turn, was associated with better treatment adherence and objective health outcomes. Furthermore, high trusting patients were likely to report better health status through enhanced self-efficacy belief. This study clarifies the effect of trust on different types of health outcomes and provides the empirical evidence that trust in physicians is associated with therapeutic response.

Keywords:
Patients’ trust in physicians; self-efficacy expectations; outcome expectations; adherence to recommendations; self-reported health outcomes; objective health outcomes.
INTRODUCTION

Trust is important in health organizations as shown by the increasing amount of research and theory on the topic (Armstrong et al., 2006; Mohseni & Lindstrom, 2007; Rowe & Calnan, 2006). It appears to be most salient in patient-physician encounters because they have uncertainty and risk regarding health outcomes. The need for trust in physicians relates to the vulnerability associated with being ill as well as the information imbalances in health care. Researchers have suggested that trust is a key part of patient-physician relationships in which excellent health care is delivered (Safran et al., 1998).

Trust in the physician is a patient’s optimistic acceptance of a vulnerable situation, based on the expectation that the physician will act in the patient’s best interest (Hall, 2006). The majority of research on patient’s trust has concentrated on what organizational or physician factors can affect trust (Berrios-Rivera et al., 2006; Kao, Green, Zaslavsky, Koplan, & Cleary, 1998; Shenolikar, Balkrishnan, & Hall, 2004) and how trust relates to similar attitudes (e.g. satisfaction) and behaviors (Safran et al., 1998; Thom, Kravitz, Bell, Krupat, & Azari, 2002; Trachtenberg, Dugan, & Hall, 2005). Little is known about how trust relates, and through what mechanisms, to measurable health outcomes (Hall, 2006; Pearson & Raeke, 2000). The value of trust in health care contexts derives in large part from its potential to improve the efficacy of treating disease. Therefore, research on trust will be incomplete if we fail to tackle questions about relationships between trust and health care outcomes (Calnan, Rowe, & Entwistle, 2006).

The purpose of this study was to examine the effects of trust in one’s physician on one’s health outcomes. The present article seeks to extend existing research on trust in two ways. First, much of the past research has relied mainly on self-report measures of outcomes, such as current general health status (Kao et al., 1998), or reported improvement of symptoms (Thom et al., 2002). Concerned about the limitations of these data, some researchers have urged using
objective, independently observed outcome measures to examine health outcomes (Hall, Dugan, Zheng, & Mishra, 2001; Lee & Lin, 2008). Our study assesses the effect of trust on health outcomes by drawing on laboratory data from patients’ medical records. In addition, we adapted a more sophisticated health survey instead of the single-item measures used in other studies concerning similar topics (Armstrong et al., 2006; Mohseni et al., 2007; Nummela, Sulander, Rahkonen, Karisto, & Uutela, 2008; Thom et al., 2002)

Second, while some studies have researched outcomes of patient’s trust, detailed conceptual analyses and empirical information are scarce as to how trust actually contributes to health outcomes. It has been suggested that trust can improve therapeutic response through better treatment adherence (Thom, Hall, & Pawlson, 2004). The empirical basis to move beyond this speculation is limited. Similarly, past research has not addressed the issue of why patients’ trust would be related to adherence. Based on the self-efficacy theory (Bandura, 1986), we proposed both self-efficacy expectations and outcome expectations as possible mediators that might link trust with patient adherence.

We posed two questions in the present research: Would patients’ trust in physicians lead to better health outcomes? Furthermore, how and why would such effects occur? The current study of the impact of trust on health outcomes addresses the knowledge gap between theoretical and conceptual arguments and empirical support for the role of expectations and patient adherence. The next section provides the theoretical justification for, and an explication of, the trust framework that was tested in this study.

A FRAMEWORK FOR UNDERSTANDING OF TRUST ON OUTCOMES

Trust and Health Outcomes

Capturing the key elements of the concept as highlighted by various disciplinary lenses,
Bhattacharya and Devinney (1998) define trust as “the expectancy of positive outcomes that one can receive with the action of another party in an interaction characterized by uncertainty.” This definition, which proposes that trust is related to good outcomes, is consistent with many findings from early behavioral and sociological research. Likewise, recent public health surveys have found that low trust in the health care system is associated with poor self-rated health (Armstrong et al., 2006; Mohseni et al., 2007).

Medical evidence suggests that a patient's trust in the physician may influence the patient’s health. Past research has reported that trust in one’s physician is positively correlated with self-reported health status (Kao et al., 1998), symptom improvement (Thom et al., 2002), and physical and mental health-related quality of life (Préau et al., 2004). These studies beg further questions about whether patient’s trust is also linked to objective health outcomes.

As trust has long been recognized as an important precursor of cooperation, a patient’s intention to accept vulnerability is based on the level of trust. Without patient’s trust, cooperative behaviors--such as following physician’s recommendations--are hard to achieve (Dibben, Morris, & Lean, 2000). When patients do not trust their physicians, they are less likely to maintain continuity, because they may be concerned about treatment decisions that the physicians might make and not want to put themselves at a risk to the physician. Trust in a specific physician is strongly associated with improved adherence to treatment regimen (Penman et al., 1984; Safran et al., 1998; Trachtenberg et al., 2005). A patient's trust may heighten the quality of the patient-physician interaction (Mechanic, 1998), facilitate disclosure by patients (Hall, 2005), and predict continuity of a provider (Safran, Montgomery, Hong, Murphy, & Rogers, 2001; Thom, Ribi, Stewart, & Luke, 1999). Theoretically, trust should serve to reinforce the functioning of the clinical relationship as a health partnership, thereby increasing the probability of treatment adherence and decreasing the likelihood of leaving the physician’s practice or withdrawing from
a health plan. For example, Mainous et al. (2004) found that trust in one’s primary care physician was related to earlier cancer detection, which is critical to prognosis and survival rate. Consequently, patient’s health outcomes, as a result of effective care and increased compliance, are more likely to be improved.

Kaplan, Greenfield, & Ware (1989) have shown a significant relationship between patient-physician relationships and both functional and mental health outcomes. Since trust is the core component of therapeutic partnerships in health care (Dibben & Lean, 2003), we expected patients with higher levels of trust to have better health outcomes than patients with lower levels of trust. Accordingly, we hypothesized:

**Hypothesis 1a:** Patient’s trust in the physician will be positively associated with self-reported health outcomes.

**Hypothesis 1b:** Patient’s trust in the physician will be positively associated with objective health outcomes.

Although past research provides support for our hypothesis that trust may impact on health outcomes, there is little theory or empirical research that focuses on the processes that might link these constructs. We extend prior research by examining variables--including self-efficacy expectations, outcome expectations, and patient adherence--that may influence the relationships between trust and outcomes. Figure 1 illustrates our proposed relationships and provides an overview of the study.

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Insert Figure 1 about here

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Process Model Linking Trust to Adherence

Although researchers have examined the relationship between trust, self-efficacy, and outcome expectations in non-health care settings (Ergeneli, Ari, & Metin, 2007; Siwatu, 2007), a look at the health care literature reveals a lack of research in this area. By definition, trust reflects patient’s expectations (Hall, 2006). Because published studies find that most placebo effects are linked to expectancies (Kirsch, 2004; Stewart-Williams & Podd, 2004), trust is suggested to affect a patient’s therapeutic response by mechanisms similar to the action of placebos (Basmajian, 1999; Hall et al., 2001). According to Bandura (1997), expectancies are of two types: self-efficacy expectations and outcome expectations. Crow and colleagues (1999) thus applied self-efficacy and outcome expectations to access the process of expectancy in placebo effects. They also proposed the patient-physician relationship as a critical determinant of these two constructs. Following this approach, we developed a process model intended to explain the mechanisms through which trust influences patient adherence.

Trust, self-efficacy expectations, and outcome expectations regarding adherence. The dominant explanation for trust and cooperative behavior in previous research hinges on the positive expectations of behavior of another party and outcomes in interaction (Bhattacharyya et al., 1998; Gambetta, 1988). According to Bhattacharyya, trust links to positive outcome expectations. Trust may shape the outcomes that individuals expect their cooperative efforts to produce. Those of high trust thus expect their efforts to realize favorable outcomes. Because physicians have authority to make treatment decisions that have significant impact on patients’ treatment outcomes, perceptions about the trustworthiness of the physician become important. When patients believe their physicians are trustworthy, they are more likely to expect more results from the physicians’ recommended health behaviors or treatment plans. For trusting
patients, favorable outcomes can be increased through cooperation or adherence. However, an additional cognitive component of motivation, self-efficacy expectations arising from patient-physician encounters, may also predict this relationship.

According to a dominant paradigm in research on motivation and effort are a function of not only the outcomes individuals anticipate will result from their action but also their efficacy expectations (Bandura, 1986). Predictions of cooperative behavior resulting from trust have relied solely on the first aspect of a general motivation model, anticipated outcomes in interaction, and have neglected the second aspect, efficacy. In the health care setting, perceived self-efficacy is a patient’s appraisal of ability to exercise control over one’s health habits and behaviors (Bandura, 2004). Although previous study have proposed that patient-physician relationships are a key determinant of patient’s perceived self-efficacy (Thind & Maly, 2006), research to date does not approach the relationship between patient trust and self-efficacy.

How trust influences a patient’s sense of efficacy regarding adherence may operate through a number of means. Our rationale for expecting this relationship is based on Bandura’s self-efficacy theory, which suggests a number of antecedents of self-efficacy expectations (Bandura, 1986, 1997). First, trust frequently results from one’s positive experience over time. Reliability in previous interactions with the trustor gives rise to positive expectations about the future interactions (Rousseau, Sitkin, Burt, & Camerer, 1998). Patients trust their physicians and engage in health behaviors that will provide them with as much success as achieved in previous treatments. These positive experiences in patient-physician encounters over time should be self-reinforcing and should strengthen expectations about patients’ ability to perform recommended health behaviors. Because mastery of experience is the most influential source of efficacy information (Bandura, 1986), patients’ sense of efficacy is likely to be shaped by previous successes in trusting settings. Second, exhortation and suggestion by credible persons
can influence an individual’s sense of efficacy (Bandura, 1986). For example, self-efficacy for
disease management can be enhanced by health professional support and genuine persuasion in
the context of a trusting relationship (Howells, 2002). Arising through support and realistic
encouragement, a trusted physician’s persuasion can contribute to patients’ health behaviors by
enhancing self-efficacy and motivating patients to overcome the impediments to adherence. Third,
higher levels of anxiety serve as negative feedback that can erode self-confidence and
performance (Bandura, 1997). Patients having a low level of trust are likely to be psychologically
distressed when the physician has power over important treatment decisions. In contrast, patients
are likely to feel safer and less anxious about the physician making these decisions when they
believe the physician is trustworthy (Hall et al., 2001). In this regard, trust may reduce patients’
emotional distress and thus increase cognitive appraisal of self-efficacy.

In sum, by reducing uncertainty and decreasing efforts to copiously account for all potential
contingencies, trust results in greater control over behavior (Zand, 1972). In contrast, perceptions
of untrustworthiness increase an individual’s awareness of existing conflicts of interest and
courage them to view the relationship as less cooperative (Mishra, 1996). Extending the work
of previous research, we expect that trusting patients will have high levels not only of outcome
expectations but also of self-efficacy expectations.

**Self-efficacy and outcome expectations as mediators leading to adherence.** In general,
self-efficacy and outcome expectations, which cognitive control of behavior is based on, are
highly correlated with patient adherence to treatment (Iannotti et al., 2006; Kerr et al., 2005). The
stronger the perceived self-efficacy and outcome expectations, the higher the goals of health
behavior people set for themselves and the firmer their commitment to them (Bandura, 2004). For
example, a study of motivation to exercise in stroke survivors found that self-efficacy and
outcome expectations are key determinants of adherence to both initiating and maintaining exercise programs (Shaughnessy, Resnick, & Macko, 2006). Because individuals’ self-efficacy expectations will guide their choice of activities, preferences for tasks, and persistence in working on a task, such beliefs can influence patient adherence in the face of different obstacles. In addition, a patient may have high self-efficacy for adhering to recommendations to treat disease, but if he does not believe the advised medication and behavior will improve health (i.e., outcome expectations), then adherence is unlikely. Accordingly, both self-efficacy and outcome expectations are influential in the adoption and maintenance of health behaviors recommended by physicians.

Taken together, when individuals believe another party is trustworthy, they will have more positive expectations and be more comfortable engaging in cooperative behaviors that may put them at risk (Lewicki, McAllister, & Bies, 1998; Schoorman et al., 2007). For instance, trust in the physician was found to be one of the strongest predictors of patients’ decisions to enroll in a study of a new treatment of cancer (Penman et al., 1984). Rosenbaum (1990) posited that the patient-physician relationship may influence the process-regulating cognition that underlies adherence to treatment. Therefore, we advanced the following hypotheses to test the effect of trust in the physician, mediated through self-efficacy expectations and outcome expectations, on patient adherence to recommendations.

**Hypothesis 2a:** Self-efficacy expectancy will mediate the positive effects of trust in the physician on patient adherence.

**Hypothesis 2b:** Outcome expectancy will mediate the positive effects of trust in the physician on patient adherence.
Health Outcomes as Consequences of Patient’s Adherence and Self-efficacy

In recent decades, the potential ability of medical professionals to diagnose and treat diseases has been propelled by an exponential increase in biomedical knowledge and new technologies. However, whether medical intervention requires a patient to follow a prescribed medication regimen, involves making a necessary dietary or other lifestyle change, or simply requires an individual to attend a scheduled appointment or follow-up, the patient’s adherence is necessary, in virtually all cases, for safe, effective, and efficient treatment (Christensen & Johnson, 2002).

Medical studies have shown that adherence is a primary determinant of treatment effectiveness and health outcomes (Kuo et al., 2003). In the words of C. Everett Koop, a well-known former U.S. Surgeon General, “Drugs don't work in patients who don't take them." Because improved treatment adherence may close the gap between potential and actual treatment benefits, the full benefit of a medication is achieved only if a patient follows the prescribed regimen reasonably closely. Conversely, poor adherence attenuates the optimum clinical benefit (Dunbar-Jacob & Mortimer-Stephens, 2001). Particularly if chronic illness exists, the extent of patient adherence to medical advice to change their health habits heavily influences effective disease management and patient health (Donovan & Blake, 1992). Thus,

\textit{Hypothesis 3: Patient adherence will be positively associated with patient’s objective health outcomes.}

Evidence from meta-analyses across diverse spheres of functioning consistently shows that efficacy beliefs contribute significantly to performance including health outcomes (Bandura & Locke, 2003). In relation to health, individuals with strong efficacy beliefs have less feelings of helplessness and faster recovery from difficulty (Smarr et al., 1997). Greater self-efficacy is more
likely to increase pain tolerance and to decrease perception of limitations to lifestyle (Lorig, Mazonson, & Holman, 1993; Piira, Taplin, Goodenough, & von Baeyer, 2002). For example, Engel et al. (2004) found that patient’s sense of efficacy has significant impact on reduction in symptoms and on recovery of function after knee surgery. The individual’s psychosocial adaptation to chronic illness also depends on the person’s perception of the illness’s burden and its intrusiveness. Compared to people with a low efficacy belief, patients with a high efficacy belief are less likely to perceive themselves as sick or depressed (Jemal, Ward, Hao, & Thun, 2005). Therefore, chronic illness research has shown that self-efficacy significantly predicts a sense of physical and emotional well-being (Goldstein et al., 2004).

In the preceding section we discussed trust as an antecedent of self-efficacy and self-efficacy as an antecedent of self-reported health outcomes. As stated earlier, trust is also a strong predictor of self-reported health outcomes. We now focus on the theoretical ordering of these constructs. Patient’s trust in physicians reduces uncertainty and accordingly contributes to the sense of control. Patients with a high level of trust are more likely than other patients to believe that they can overcome difficulties and favorably influence outcomes (high self-efficacy expectations). When a patients’ sense of efficacy is strengthened, they are more resilient, adjust better to the sick role, and report better health status. Accordingly, we hypothesized:

**Hypothesis 4:** Patient’s self-efficacy will mediate the positive effects of trust in the physician on patient’s self-reported health outcomes.

**METHODS**

**Research Site and Participants**

To explore our research issues, we examined cross-sectional and follow-up data from a
sample of patients with type 2 diabetes. This study was done in one medical center and one district hospital in Taiwan. Two facilities were chosen to involve a range of patients from different social, economic and ethnic backgrounds, which allowed a relatively realistic picture of patients who are undergoing routine treatment in various outpatient facilities. The study was approved by the Local Institutional Review Board, and written consent was obtained from each patient before enrollment. The sample included 480 patients with type 2 diabetes, with average disease duration of 6.8 years (see Table 1). The mean age of patients was 59.2 years (SD = 13.66), and 177 of the 480 patients (36.9%) were female.

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**Procedure**

Our data came from self-administered questionnaires and medical records. Data collection began in March 2006 and ended in December 2006. Two research assistants recruited patients in a 4-month period during times and days when patients with type 2 diabetes were scheduled for clinic appointments. The assistants screened daily appointment lists and medical charts for patients to determine potential eligibility. We identified consecutive patients who were diagnosed as having type 2 diabetes for more than 1 year, were taking at least one antidiabetic medication, and were at least 18 years of age. Patients were excluded from this study if they were blind, had clinically apparent cognitive impairment (i.e., moderate or severe dementia), or had severe hearing impairment. Participants must have had a previous visit with the same physician in the clinic within 6 months of the index study visit. Of the 539 patients with diabetes contacted, useable questionnaires were received from 480 (89%). To minimize response bias, patients were approached outside of the clinics. All patients were guaranteed that participation was entirely
voluntary, that none of their caregivers would see their responses, and that their decision about whether or not to participate would have no effect on their care.

**Measures**

All questionnaires were translated to Chinese using a forward translation/backward translation methodology, followed by bilingual group evaluation and consensus (Guillemin, Bombardier, & Beaton, 1993).

**Trust in the physician.** Trust was measured with 11 items from a scale developed by Anderson and Dedrick (1990). Consisting of domains of loyalty, competency, honesty, and confidentiality, the scale assesses physician attributes that engender patients’ trust. Items were scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), and scores were transformed linearly to a 0 to 100 scale with a higher score indicating a perception of more trust. Sample items included “My doctor is usually considerate of my needs and puts them first” and “My doctor is a real expert in taking care of medical problems like mine”. When completing the items, respondents were instructed to think of the diabetes doctor who provided their care. Thom et al. (1999) provided evidence for the construct and predictive validity of the scale. The internal consistency reliability (Cronbach’s alpha) of the measure was .81 in our study.

**Self-efficacy expectations and outcome expectations.** We measured self-efficacy and outcome expectations using subscales of the Multidimensional Diabetes Questionnaire (Talbot, Nouwen, Gingras, Gosselin, & Audet, 1997). The self-efficacy scale contains seven items measuring patients’ confidence in their ability to perform behaviors for diabetes self-care. Items included “How confident are you in your ability to keep your blood sugar level under control”
and “How confident are you in your ability to follow your diabetes treatment”. The outcome expectations were measured with six items that assessed patients’ perceptions of the effects of diabetes self-care behaviors on metabolic control and prevention of complications. Sample items included “To what extent do you think that taking your medication as recommended (pills, insulin) is important for controlling your diabetes” and “To what extent do you think that following your diabetes treatment is important for delaying and/or preventing long-term diabetes complications”. Items on both scales were scored on a 5-point Likert scale, and scores were transformed linearly to a 0 to 100 scale. Cronbach's alpha was .79 for the self-efficacy expectations scale and .89 for the outcome expectations scale.

**Adherence to physician’s recommendations.** We assessed adherence with the eight-item Disease-Specific Adherence Scale (1 = none of the time; 5 = all of the time), which was developed for the Medical Outcomes Study (Kravitz et al., 1993). The scale consists of a subset of behaviors recommended for most patients with diabetes, including following a low-fat or weight loss diet, checking your blood for sugar, taking prescribed medications, etc. The accuracy of self-reported adherence was maximized by maintaining confidentiality of the data and promoting a cooperative relationship between patients and research assistants. Patient adherence to these behaviors was averaged for those with the condition, and scores were transformed linearly to a 0 to 100 scale. Cronbach’s alpha of this scale was .61, indicating only modest internal consistency. However, Sherbourne et al. (1992) have argued that internal consistency substantially underestimates the reliability of this adherence measure.

**Objective outcome variables.** Our objective health outcomes included: (a) diabetes-related complications; (b) body mass index (BMI); (c) glycosylated hemoglobin (HbA1C); and (4) blood
lipid control, including triglycerides (TG), low-density-lipoprotein (LDL) cholesterol, and high-density-lipoprotein (HDL) cholesterol. Because BMI, HbA<sub>1C</sub>, TG, LDL cholesterol, HDL cholesterol, and diabetes-related complications are well accepted as crucial for metabolic control and long-term physiologic outcomes (American Diabetes Association, 2003; Buse et al., 2007), these variables can be conceived as indicators of adherence-related performance.

As reported by the Diabetes Control and Complications Trial (Diabetes Control and Complications Trial Research Group, 1993), close adherence to recommended self-care activities can significantly reduce the risk of diabetes-related complications. We generated a complication score (0–7) based on the number of additional diabetes-related diseases—including hypertension, coronary artery disease, non-traumatic amputation, nephropathy, neuropathy, peripheral vascular disease, and retinopathy—identified during patient chart review.

HbA<sub>1C</sub> is the best measure of recent (last three months) glycemic control and is a guide to clinical management (Goldstein et al., 2004). A high value of this measure indicates poor glucose control. While treatment for diabetes has focused on control of glycemia to reduce vascular complications, growing evidence highlights the importance of controlling body weight and blood lipid levels (Saydah, Fradkin, & Cowie, 2004). In our study, BMI was calculated as the patient weight in kilograms divided by the square of height in meters. A lipid profile including plasma triglycerides, HDL cholesterol, and LDL cholesterol was determined with enzymatic colorimetric assays. Plasma HbA<sub>1C</sub> levels were determined using high-performance liquid chromatography at each hospital whose patients were recruited. Both laboratory test data and BMI were obtained from medical records in a 4-month period after the survey was administered. If a patient had more than one blood test reading within this period, the most recent result was used. The research assistants searched the electronic medical record to identify these values.
Self-reported outcome variables. Health-related quality of life (HRQoL) is increasingly recognized as another useful criterion for assessing the outcomes of treatment of diabetes and other chronic illnesses. HRQoL refers to functioning and well-being in physical, mental, and social dimensions of life. The 12-item Short-Form Health Survey (SF-12) is one of the most frequently used multi-item HRQOL instruments (Ware, Turner-Bowker, Kosinski, & Gandek, 2002). We operationalized self-reported health status with SF-12 (version 2, standard form), which was developed to assess physical and mental health-related quality of life (Ware, Kosinski, & Keller, 1996). Scoring for the SF-12’s mental component summary scale (MCS-12) and physical component summary scale (PCS-12) from the 12 questions on health is outlined in the SF-12 manual (Ware et al., 2002). The scoring algorithm is a composite score of weighted item responses to 12 questions on self-reported physical and mental health status. All 12 items enter into the computation of both scores. Sample items included “Does your health now limit you in activities such as climbing several flights of stairs”, “During the past 4 weeks, how much did pain interfere with your normal work”, and “Have you felt downhearted and depressed”.

Control variables. Three control variables were measured: age in years, sex coded as 1 = female and 0 = male, and duration of diabetes in years after initial diagnosis.

Data Analyses

Table 1 shows descriptive statistics for each construct measured in this study. Table 1 also shows the inter-correlation among the various scales. The average reliability of the multiple-item measures displayed a good internal consistency of .78. Confirmatory factor analyses were undertaken using linear structural relations (LISREL) VIII program (Jöreskog & Sörbom, 1996) to assess the discriminant validity of the multiple-item measures. The measurement model had a
marginally acceptable fit: comparative fit index (CFI) (Bentler, 1990) of .89, incremental fit index (IFI) (Gerbing & Anderson, 1993) of .89, root-mean-square residual (RMSR) (Jöreskog & Sörbom, 1993) of .06, and root-mean-square error of approximation (RMSEA) (Browne & Cudeck, 1993) of .08. Normally, RMSR values of .10 or less are considered indicative of acceptable model fit. RMSEA values between .06 and .08 indicate a good fit.

Data were analyzed in four major phases. First, we investigated the relationship between trust and outcomes. Next, we examined the mediating effects more closely with Baron and Kenny’s (1986) mediation procedures. Following this, we used LISREL to estimate the hypothesized model shown in Figure 1. Finally, since some of the data came from similar response scales (5-point paper-and-pencil scales) and from the same source (the patients), we evaluated the extent to which the relationships among these constructs might be due to common method variance. Because HDL cholesterol and LDL cholesterol were not correlated with any psychometric or behavioral variables, these two variables were excluded. Plasma triglyceride was the only blood lipid included in subsequent analyses.

**RESULTS**

The regression results of trust on outcomes are shown in Table 2. As expected, trust had a positive effect on self-reported physical ($\Delta R^2 = .01$, $\beta = .11$) and mental ($\Delta R^2 = .06$, $\beta = .24$) HRQoL. H1a was supported. In relation to objective outcomes, trust had a positive effect on triglycerides ($\Delta R^2 = .01$, $\beta = -.09$) but minimal effect on body mass index and complications. Although trust was associated with HbA$_{1C}$ in the bivariate model, the effect was not statistically significant in multivariate regression. Therefore, H1b was only partially supported.
Hypothesis 2 stated that self-efficacy expectations and outcome expectations mediate the relationship between patient trust and adherence to recommendations. Baron and Kenny’s (1986) mediation procedures, which require three conditions to be met, were followed. First, the predictor (trust) must be related to the mediators (self-efficacy and outcome expectations). When controlling for age, gender, and duration of diabetes, trust was related positively to self-efficacy and outcome expectations. Condition 1 was therefore satisfied (Table 1).

Second, the predictor (trust) must be related to the dependent variable (adherence). The regression results, shown in Table 3, indicate that at step 2, trust was positively related to adherence. Condition 2 was also met.

Third, when both the predictor and the mediator are simultaneously added to the regression equation, the relationship between the predictor and the criterion must become weaker or non-significant, while the relationship between the mediator and the criterion remains significant. The results of the regression analysis showed partial mediation for self-efficacy (step 3) and full mediation for outcome expectations (step 4). In a separate regression analysis when the two issues were included in the regression equation predicting adherence (step 5), both proved to be significant predictors. In addition, trust did not significantly predict adherence. Hence, condition 3 is satisfied and confirms full mediation for the two mediators.

We tested hypothesis 3 by regressing four objective outcome variables on the control variables and adherence. As shown in Table 4, adherence was positively related to body mass index ($\Delta R^2 = .01, \beta = -.10$), plasma HBA$_{1c}$ ($\Delta R^2 = .02, \beta = -.13$), triglycerides ($\Delta R^2 = .02, \beta =$
-.14), and complications of diabetes ($\Delta R^2 = .01, \beta = -.12$). Hence, hypothesis 3 was supported.

Hypothesis 4 proposed that the self-efficacy mediates the relationship between patient trust and self-reported health status. The regression analyses, using the medication procedures described above, are presented in Table 5. When trust and self-efficacy were included in the regression equation predicting physical and mental health-related quality of life (step 3), self-efficacy proved to be a significant predictor. Further, the relationship between trust and self-reported outcomes became weaker (physical HRQoL) or non-significant (mental HRQoL), providing support for Hypothesis 4. The equation explained 5% of the variance in physical HRQoL and 16% of the variance in mental HRQoL.

We were aware that relationships among variables in our study could be artificially inflated based on common source. To provide an additional check that our relationships were not a function of common method, we conducted a Harmon’s single-factor test on the 32 items in the five Likert scales (see Podsakoff, MacKenzie, Jeong-Yeon, & Podsakoff, 2003, for a review). If a substantial amount of common method variance exists, we would expect the unrotated factor solution to show one general factor accounting for the majority of covariance. In this analysis, no general factor emerged, and the first factor explained only 23% of the variance. This indicates that common method was not a serious problem in our analyses.
Structural Equation Results

In order to test our integrated model, the model presented in Figure 1 was tested using a single indicator approach with LISREL. All subsequent analyses were based on the covariance matrix. In this model, all the manifest variables were treated as single indicators of latent factors. Following recommended procedures (Barrick, Mount, & Strauss, 1993; Bollen, 1989), the error variances of the manifest variables were set equal to \( \sigma_i^2 \times (1 - \alpha) \), where \( \sigma_i^2 \) is the observed variance of the manifest variable and \( \alpha \) is its reliability. The paths from the latent factors to the manifest variables were set equal to \( \sigma_i^2 \times \alpha \). Reliability of outcome variables was assumed to be 1.00 because of the relatively objective nature of the measures (see Schmidt, Hunter, & Outerbridge, 1986). To examine model fit and compare alternative models, we used additional aids to interpretation, such as the chi-square difference test (Bentler & Bonnet, 1980) and Goodness-of-Fit Index (GFI) (Bollen, 1989).

Results of the structural model are shown in Figure 2. The hypothesized mediated model provided a good fit of the data, with \( \chi^2 (df) = 145.12 (41), p < .001, CFI = .90, IFI = .91, GFI = .95, RMSR = .056, \) and \( RMSEA = .074 \). All hypothesized paths were statistically significant \((p < .05)\) and in the predicted directions. Figure 2 also shows the standardized regression coefficients and the \( R^2 \) for dependent variables.

Insert Figure 2 about here

In addition, we examined the plausibility of an alternative model. Kelloway (1998) recommended that before the model is used, two other nested structural models should be tested. These models include (a) a partially mediated model in which the paths between trust and all outcome variables were added and (b) a nonmediated model in which the paths from self-efficacy,
outcome expectations, and adherence were removed from the partially mediated model. The partially mediated model provided satisfactory fit to the data, with $\chi^2 (df) = 132.09 (35), p < .001$, CFI = .91, IFI = .91, GFI = .96, RMSR = .053, and RMSEA = .077. Conversely, the nonmediated model did not provide an acceptable fit to the data, with $\chi^2 (df) = 324.49 (40), p < .001$, CFI = .73, IFI = .74, GFI = .89, RMSR = .079, and RMSEA = .130. The result of the chi-square difference test showed that the partially mediated model, $\Delta \chi^2 (df) = 13.03(6), p < .05$, provided a significant improvement in fit over the hypothesized model. However, because the direct links between trust and physical HRQoL ($\beta = .07$), boy mass index ($\beta = .11$), HBA$_{1C}$ ($\beta = -.01$), triglycerides ($\beta = -.01$), and complications ($\beta = .01$) were not statistically significant, the partially mediated model is more speculative than the more parsimonious, fully mediated model. Besides, the fully mediated model was found to be a significantly better fit than the nonmediated model, $\Delta \chi^2 (df) = 179.37(1), p < .001$. Therefore, the results of structural equation analysis confirmed the hypothesized (fully mediated) model.

**DISCUSSION**

Our study makes two key contributions to the literature on patient trust. First, we examine the relationship between trust and health, including both objective and self-rated outcomes. Second, we clarify the different types of health outcomes with specific domains, and we show how trust can indirectly link to these outcomes through different mediating processes. As both Hall (2006) and Pearson and Raeke (2000) note, in order for patient’s trust to be strengthened, our ability to identify these outcomes and mediators of trust must mature.

So how and why is trust linked to patient’s health? The structural equation analysis confirmed the study’s overall hypothesized model. Patients who trust their physicians are significantly more likely to have stronger self-efficacy and outcome expectations, which are associated with better
treatment adherence and clinical outcomes. Also, high trusting patients are likely to report better health status through enhanced self-efficacy belief.

Five main aspects help to differentiate theory further. First, our study results support the assumption of trust’s instrumental value, which commonly held by theorists but not empirically tested before, that trust may link to clinical outcomes. While most previous studies looked at a self-reported component, the focus here lays explicitly on therapeutic response. By adding objective measures as key outcomes of interest, our study makes a more robust contribution to the ambiguous relationship between trust and health.

Second, we found that the influence of trust on clinical outcomes was indirect, that is, through the mediating processes of patient adherence. These results extend the findings of Thom et al (2002) by providing some explanations of why patient trust influences objective functioning. In addition to adherence, researchers have suggested that trust may lead to more efficient therapeutic encounters because of patients’ disclosure, maintaining continuity of care, and mind-body interactions underlying placebo effects (Lee et al., 2008; Thom et al., 2004). Although we do not claim that adherence to treatment regimen is the only factor linking trust to clinical outcomes, we believe that this factor is among the most critical drivers of that process.

Third, past research has not addressed the issue of why trust in the physician would be related to patient adherence. Responding to this question, we build on the theoretical work of Bandura (1997) to investigate cognitive factors as possible mediators that might link trust with patient adherence. We stitch together elements of self-efficacy theory and outcome-based perspective to show how they complement each another in explaining the cooperative behavior of trusting patients. The data confirm the importance of the two motivations--self-efficacy expectations and outcome expectations--as important antecedents of adherence. Both factors are associated with patient trust and with patient adherence. Although these two factors are based on previous
research identifying antecedents of adherence and not necessarily tied to trust in one’s physicians (e.g., Sacco et al., 2005), the results of our study reveal that high level of trust is indeed associated with increased appraisal of self-efficacy and high level of outcome expectations.

Fourth, researchers have argued that coarser measures such as global self-rated health may achieve less statistical power (McHorney, 1999) and cannot be considered to be a substitute for more sophisticated health measures (Fleishman & Zuvekas, 2007). Rather than measuring self-rated health with a single item as done in other studies on similar topics, we adopted the more sophisticated SF-12 health survey to assess this construct. In addition, SF-12 allowed us to approach the effect of trust on physical and mental domains of health-related quality of life, which are conceptually distinct constructs of physical and mental health (Hays & Stewart, 1990).

As trust in one’s physician is a psychological state with a strong emotional component (Hall et al., 2001), it is reasonable to expect that trust has stronger effects on self-report health than on clinical response. It is also likely that disease factors such as early diagnosis and response to medications produce stronger effects on clinical outcomes. Thus, our multivariate analysis indicated that trust was significantly related to only one of the four objective measures, in contrast to the significant relationship between trust and self-reported HRQoL. Also, trust explained more of the variance of mental HRQoL than of physical HRQoL, which is consistent with previous research (Préau et al., 2004).

Fifth, we add psychologists’ insights about efficacy belief as a cognitive process that link trust to self-reported health outcomes. This assumption draws on self-efficacy theory and is supported by the results of the mediation procedures. As more research shows that higher trust is correlated with better self-reported HRQoL (Préau et al., 2004; Tarn et al., 2005), it becomes increasingly important that research provides theories to help explain these results. This study contributes to the literature by filling this knowledge gap.
Implications for Management Practice

The analyses suggest that trust is the antecedent of not only patient’s cooperative behavior but also patient’s objective medical conditions and perceptions of their health, at least among patients with type 2 diabetes. These findings have important implications for practitioners. First, as disease occurrence has shifted toward a high prevalence of chronic diseases, there is increasing recognition that what matters most to patients is how well they are able to function in their day-to-day life. An improvement in quality of life is now considered to be a primary outcome in the determination of health care benefit. Given the importance of trust for patient’s quality of life, building trust among chronic disease patients is critical. Providing health care that meets the needs of an aging population with multiple and complex chronic illnesses must be a health services priority.

Second, effective disease management, particularly for chronic conditions, is often assessed by adherence to physician’s advice. A prevalent problem of patients with chronic disorders, nonadherence to treatment regimen, worsens health conditions and raises medical costs. About half of chronic disease patients have trouble following their prescribed regimen to the extent that they do not obtain optimum clinical benefit (Dunbar-Jacob et al., 2000). Adherence rates are much lower for lifestyle prescriptions and other more behaviorally demanding regimens than for drug prescriptions (Kravitz et al., 1993). As the psychosocial benefits of trusting relationships may contribute to adherence and thus to disease control, policy makers and health care providers should try to foster patients’ trust. Actually, trust-building is technology that can be developed through both organizational strategies and individual skill development (Scott & Aiken, 1995). Physicians and others who teach medical students and residents should emphasize the elements of physician characteristics that can enhance trust, such as caring, agency, technical competency,
and honesty (Thom et al., 2004).

Third, although trust may affect therapeutic outcomes through adherence, illness and knowledge may impair a patient's competency for cooperation, rendering patient adherence impractical. Trusting patients may also feel that they lack knowledge about medical matters and that they receive too little information and too few explanations to adhere to physicians’ recommendations. Physicians should therefore spend more time to communicate with their patients about their treatment in detail so that patients understand the need for adherence and surmount the barriers to performance of healthful behaviors. Also, physicians’ communication techniques for stimulating patients’ active and sophisticated participation in health behavior change should be improved.

Finally, given the mediating role of patients’ expectations, particular attention should be paid to engender beliefs of personal efficacy and outcome expectations. Verbal persuasion, support, and guidance by a trusted physician are particularly useful in enhancing efficacy belief. For example, health care providers may inspire patients by discussions of successful cases, providing information about advanced medical techniques and giving patients encouragement to strengthen patient-perceived self-competence (Liu, Mok, & Wong, 2005). Physicians also are advised to express in easily understood language the importance and values associated with desired outcomes while communicating higher levels of expectations for patients. Raising expectations that are realistic will benefit trusting patients more than will overemphasizing the potential negative results or side effects of treatment (Thomas, 1987).

**Limitations and Future Research**

As trust may affect diabetes control through the mediating processes of expectations and adherence, a potential limitation of our study is the disease pattern and whether these results can
be generalized to other disease conditions. In contrast to acute illness patients, chronic disease patients usually establish a long-term patient-physician relationship. Reliability and dependability in previous interactions with the physician lead to positive expectations about the patient’s intentions. Deeper levels of trust may also develop over time as a function of the formation of attachments based on the experience of a good result. Also, adherence rates are typically higher among patients with acute conditions than in patients with chronic conditions (Jackevicius, Mamdani, & Tu, 2002). Pressure to accept even a low level of trust as the basis of cooperative behavior is stronger in acute conditions simply because the alternatives are worse. Therefore, it would be useful to examine how trust is associated with health outcomes in a population with a broad range of health states and illness conditions.

Some methodological limitations of our study must be acknowledged. (1) The psychometric instrument that we used, SF-12 health survey, is a generic HRQoL tool that may not adequately reflect the impact of disease and symptoms specific to diabetes. (2) We assessed patient adherence with a self-reported measure. Because no universally accepted regimens incorporating all of these domains exist for diabetes treatment, assessment of self-care behaviors is extremely challenging. Currently, most techniques for assessing adherence rely on patient self-reports, which are likely to be unreliable (Kurtz, 1990). Also, the same surveys often consist of both measures of trust and adherence, so a generally positive outlook on the part of the patient may have produced a bias of common method variance. For example, patients may tend to skew responses for physician-specific questions toward the socially accepted response. Accordingly, future research would benefit from acquiring additional information on patient adherence from multiple sources, e.g., pill counts, electronic monitors, diaries, and interviewer-administered questionnaires. (3) Although this study determined that patients with higher level of trust in their physician are more likely to experience better health, the causal direction of this relationship is
not clear, and it may be bi-directional. The strength of this association suggests that this would be a fruitful area for further research.

Armstrong et al. (2006) showed that the mechanism by which trust in the health care system affects health outcomes is the access to health care and amenities. Although increased trust in the physician is possibly also associated with greater willingness to seek care (Trachtenberg et al., 2005), which is likely to be associated with better health outcomes, Balkrishnan and colleagues (2003) found that patient trust in the medical profession, rather than in one’s personal physician, is related to patient’s willingness to seek health care. Future studies are necessary to distinguish different mechanisms and effects on health outcomes among different types of patient trust.

**CONCLUSION**

Our study provides the empirical evidence to our knowledge that trust in physicians is associated with both self-reported and objective health outcomes. As health care organizations continue to devote vast resources to quality of care improvement, the need for a better understanding of effective health care relationships continues to grow. We have sought to develop a framework for understanding trust as a potential contributor to the outcomes of health care, deriving implications for the roles of health care providers and policymakers in the future development of patient trust. This study makes an important contribution by highlighting the importance of patient trust, which we believe is critical to the improvement of health outcomes through patients’ expectations and adherence behaviors. Although not a final statement on the topic, our study adds to the growing body of evidence that health care does well when it relies on trusting patient-physician encounters.
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*Behavioral Medicine*, 30(3): 113-123.


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Blackwell.


**Medicine**, 64(7): 1373-1383.


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Figure 1  Proposed Indirect Effects of Patient Trust on Health Outcomes

![Diagram showing the relationship between patient trust, self-efficacy expectations, adherence to recommendations, and health outcomes.]

Figure 2  Result of Structural Equation (N = 480)

![Diagram showing the result of a structural equation model with patient trust as the independent variable, self-efficacy expectations, and adherence to recommendations as mediators, and various health outcomes as dependent variables.]

Note: All outcome variables were controlled for patients’ age and duration of diabetes.  *p < .05;  **p < .01

HRQoL = health related quality of life
## Table 1  Means, Standard Deviations, and Correlation Matrix Among Variables

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
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<th>10</th>
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<th>12</th>
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<td>7. Adherence</td>
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<td>8. Physical HRQoL</td>
<td>48.48</td>
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<td>.08</td>
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<td>48.78</td>
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<td>.05</td>
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<td>(-)</td>
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<td></td>
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<td></td>
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<td>10. Body mass index</td>
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<td>-.18**</td>
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<td>-.17**</td>
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<td>.03</td>
<td>(-)</td>
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<td>11. HbA1c</td>
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<td>-.08</td>
<td>.17**</td>
<td>-.09**</td>
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<td>-.09**</td>
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<td>(-)</td>
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<td>12. LDL cholesterol</td>
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<td>.02</td>
<td>.09</td>
<td>.02</td>
<td>.03</td>
<td>.02</td>
<td>-.09</td>
<td>.02</td>
<td>.03</td>
<td>.13**</td>
<td>(-)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>13. HDL cholesterol</td>
<td>41.24</td>
<td>9.52</td>
<td>.08</td>
<td>-.24**</td>
<td>10**</td>
<td>.07</td>
<td>.07</td>
<td>.04</td>
<td>.06</td>
<td>.04</td>
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<td>-.01</td>
<td>.14**</td>
<td>(-)</td>
<td></td>
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<td>14. Triglycerides</td>
<td>150.53</td>
<td>99.92</td>
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<td>-.03</td>
<td>-.10*</td>
<td>-.12**</td>
<td>-.23**</td>
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<td>-.16**</td>
<td>-.09</td>
<td>-.10*</td>
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<td>.13**</td>
<td>.01</td>
<td>.01</td>
<td>(-)</td>
<td></td>
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<tr>
<td>15. Complications</td>
<td>1.15</td>
<td>1.05</td>
<td>.28**</td>
<td>.12**</td>
<td>.28**</td>
<td>.02</td>
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<td>-.02</td>
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<td>.16**</td>
<td>.05</td>
<td>.05</td>
<td>.12**</td>
<td>(-)</td>
<td></td>
</tr>
</tbody>
</table>

N = 480. Alpha internal consistency reliability coefficients appear on the main diagonal in parentheses

* p < .05; ** p < .01;  Two-tailed test.

HRQoL = health related quality of life; HbA1c = glycosylated hemoglobin; LDL cholesterol = low-density-lipoprotein cholesterol;
HDL cholesterol = high-density-lipoprotein cholesterol.

## Table 2  Regression Results of Trust on Health Outcomes, Cognitive and Behavioral Variables (Hypothesis 1,2)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Physical HRQoL</th>
<th>Mental HRQoL</th>
<th>Objective health outcomes</th>
<th>Cognitive and behavioral variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BMI</td>
<td>HbA1c</td>
<td>TG</td>
<td>Complications</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>Outcome expectations</td>
<td>Adherence</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.15**</td>
<td>.21**</td>
<td>-.17**</td>
<td>-.23**</td>
</tr>
<tr>
<td>Sex</td>
<td>.10*</td>
<td>.01</td>
<td>.05</td>
<td>-.06</td>
</tr>
<tr>
<td>Duration of diabetes</td>
<td>-.06</td>
<td>-.06</td>
<td>-.12**</td>
<td>.26**</td>
</tr>
<tr>
<td>Independent variable Trust</td>
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<td>.24**</td>
<td>.03</td>
<td>-.06</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>.01*</td>
<td>.06**</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>F-value</td>
<td>5.22**</td>
<td>16.51**</td>
<td>6.87**</td>
<td>11.61**</td>
</tr>
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</table>

N = 480. Tabled values are standardized regression coefficients.

* p < .05; ** p < .01;  Two-tailed tests.

BMI = body mass index; TG = triglycerides.
### Table 3  Hierarchical Regressions examining the Effect of Trust on Adherence (Hypothesis 2a,2b)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Adherence to recommendations</th>
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<td>Sex</td>
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<tr>
<td>Duration of diabetes</td>
<td>.06</td>
</tr>
<tr>
<td>Trust in the Physician</td>
<td>.21**</td>
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<tr>
<td>Self-efficacy</td>
<td>.56**</td>
</tr>
<tr>
<td>Outcome expectations</td>
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<tr>
<td>$\Delta R^2$</td>
<td>.03</td>
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<tr>
<td>Adjusted $R^2$</td>
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<tr>
<td>$F$-value</td>
<td>5.84**</td>
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N = 480. Tabled values are standardized regression coefficients.

* $p < .05 $;  ** $p < .01 $; Two-tailed tests.

### Table 4  Hierarchical Regressions examining the Effect of Trust on Objective Health Outcomes (Hypothesis 3)

<table>
<thead>
<tr>
<th>Variables</th>
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<td></td>
<td>BMI</td>
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<td>Age</td>
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<tr>
<td>Sex</td>
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<tr>
<td>Duration of diabetes</td>
<td>-.11*</td>
</tr>
<tr>
<td>Independent variable</td>
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</tr>
<tr>
<td>Adherence</td>
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</tr>
<tr>
<td>$\Delta R^2$ (adherence)</td>
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<tr>
<td>Adjusted $R^2$</td>
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</tr>
<tr>
<td>$F$-value</td>
<td>8.17**</td>
</tr>
</tbody>
</table>

N = 480. Tabled values are standardized regression coefficients.

* $p < .05 $;  ** $p < .01 $; Two-tailed tests.

### Table 5  Hierarchical Regressions Examining the Effect of Trust on Self-reported Health Outcomes (Hypothesis 4)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Physical HRQoL</th>
<th>Mental HRQoL</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Step 1</td>
<td>Step 2</td>
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<tr>
<td>Age</td>
<td>-.13*</td>
<td>-.15**</td>
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<tr>
<td>Duration</td>
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<td>-.06</td>
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<tr>
<td>Trust in the Physician</td>
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</tr>
<tr>
<td>Self-efficacy</td>
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<td>.15**</td>
</tr>
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<td>.01*</td>
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<tr>
<td>Adjusted $R^2$</td>
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<td>.03</td>
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<tr>
<td>$F$-value</td>
<td>5.00**</td>
<td>5.22**</td>
</tr>
</tbody>
</table>

N = 480. Tabled values are standardized regression coefficients.

* $p < .05 $;  ** $p < .01 $; Two-tailed tests.