STIGMA, SELF-EFFICACY, AND ADHERENCE BEHAVIORS IN PEOPLE WITH TYPE 2 DIABETES: UNEXPECTED OUTCOMES

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Abstract

Type 2 diabetes mellitus is a health condition treated with behavioral modifications including changes in diet, exercise, foot care regimens, and medication. Stigma associated with type 2 diabetes negatively effects health outcomes, whereas patient-provider relationships positively affects health outcomes. The growing literature base on type 2 diabetes stigma and health outcomes is mostly conducted outside of the United States.

The present study used online crowdsourcing methods to gather cross-sectional survey data from people (n=152) who have been diagnosed with type 2 diabetes and are living in the United States. Participants completed the survey battery measuring stigma, self-efficacy, patient-provider relationships, and health behaviors. It was predicted that 1) internalized stigma would have a negative impact on self-care behaviors including diet, exercise, foot care, and medication adherence as well as glycated hemoglobin [HbA1C] levels 2) self-efficacy would mediate each of those relationships, and 3) the patient-provider relationship, characterized by trust in providers would moderate the relationship between stigma and self-efficacy thus indirectly moderating self-care behaviors and HbA1C. To test these hypotheses, a set of five moderated-mediation analysis were conducted to test each outcome variable of diet, exercise, foot care, medication adherence, and HbA1C.

Main findings of this study revealed paradoxical relationships between stigma, self-efficacy, and trust in providers, although consistent with psychological reactance theory. Stigma was associated with medication non-adherence and worse HbA1C, which is consistent with literature. Results of this study suggest that patients who exhibit psychological reactance may struggle to adhere to recommendations despite being more likely to report that everything is okay. This dynamic may make it difficult for providers to accurately gauge patient engagement

in care, ability, or progress in health behavior change. However, one could argue responding to stigma with reactance may be protective in other ways. There was some evidence to suggest providers can attend to reactance by attuning to trust within the patient-provider relationship. In summary, this study adds to the pool of literature on stigma and type 2 diabetes, specifically within the US which is important considering variances in social climates and health care systems across nations. Future research should corroborate our suppositions about the relationships between stigma, self-efficacy, and psychological reactance.

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Chapter I: Introduction

In the United States (US) alone, over 30 million people have been diagnosed with Type 2 Diabetes Mellitus (T2DM; Center for Disease Control [CDC], 2017). It is thought that at least another eight million go undiagnosed and another eighty-four million are considered to have pre-diabetes (CDC, 2017; American Diabetes Association [ADA], 2018b). T2DM is typically recognized as a biological disease state which stems from psychosocial issues (ADA, 2018b). Globally, T2DM is recognized as an overwhelming cause of mortality, morbidity, and grave expense of health care costs. In fact, the T2DM epidemic is so overwhelming the United Nations have set a target goal to stop the rise in T2DM as well as reduce the number of deaths related to this disease (NCD Risk Factor Collaboration [NCD-RisC], 2016). In order to meet this goal, it is necessary to target biomedical, psychological, and social points of intervention; as such, it is important to conduct research seeking to understand psychosocial phenomena that affect health outcomes for persons with T2DM living in the US.

Considering annual costs associated with T2DM within the US health care system, it is imperative to consider low-cost targeted points of intervention. The US spends approximately one out of every seven health care dollars on diabetic treatment, around $327 billion annually (ADA, 2018a). It is estimated another $90 billion is spent due to reduced productivity and missed work days associated with diabetes complications (ADA, 2018a). Similarly, individual health care costs are increased for persons with T2DM. For example, people with T2DM typically spend 2.3 times more on health care, averaging over $10,000 in yearly expenses (ADA, 2018a).

Some research suggests over half of patients with diabetes experience social stigma related to T2DM, which has been shown to affect health outcomes such as glycemic control and quality of life (Brazeau et al., 2018; Brown et al., 2013; Liu et al., 2017; Schabert et al., 2013; Shiu, Kwan, & Wong, 2003). Persons with T2DM are often characterized as fat, lazy, and unhealthy (Schabert, 2013). These labels affect employment, education opportunities, access to health care, limitations in travel, and interpersonal struggles including romantic relationships (Kalra & Baruah, 2015; Potter et al, 2015; Schabert et al., 2013; Shiu, Kwan, & Wong, 2003). Further, the psychological effects of such stigmas including fear, embarrassment, and low self-esteem contribute to conditions such as depression, anxiety, and emotional distress, which in turn, affect physical health and overall health outcomes (Schabert et al., 2013). The negative impact of social stigma on the intra-personal construct of self-efficacy is of particular concern for patients with T2DM given the relationship between self-efficacy and behavior change (Bandura, 1977; Kato et al., 2017). Research indicates self-efficacy is associated with patients' ability to implement health changes and adhere to recommended health behaviors such as diet, exercise, foot care, medication management, and overall ability to control blood glucose levels (Brown et al., 2013; Corrigan, Larson, & Rusch, 2013; Kato et al., 2016; Kwan, & Wong, 2003; Shiu, Kwan, & Wong, 2003). On a positive note, there is some evidence to indicate positive patient-provider relationships may be effective in increasing patients' levels of self-efficacy which may lead to better patient adherence and consequently better health outcomes (e.g., Beverly et al., 2012; Funnell, 2006; Maddigan, Majumdar, & Johnson, 2005; Van Dam et al., 2003; Gredig & Bartelsen-Raemy, 2016; Polonsky et al., 2017; Schillinger, Bindman, Wang, Stewart, & Piette, 2003). In the current study, it was theorized that patients with low self-efficacy in relation to managing T2DM would be less likely to follow through with health recommendations.

Background and Significance

The Diabetes Attitudes, Wishes, and Needs (DAWN) study (Funnell, 2006; Peyrot et al., 2013) was seminal for providing cross-sectional data of over 4,000 participants from 13 different countries, regarding the wants, needs, and barriers for those living with T2DM. This study laid the foundation for understanding the psychosocial aspects of managing T2DM beyond health literacy and biomedical treatments (Funnell, 2006). Study results confirmed adherence to diet and exercise recommendations are low. Only about 16.2% of patients were able to make necessary behavioral changes (Funnell, 2006). In addition, rates of diabetes-related stress (which refers to the stress of a diagnosis as well as managing lifestyle changes) and self-blame were high among patients who struggled to implement necessary lifestyle changes (Funnell, 2006). However, the DAWN study revealed positive relationships with primary care providers were associated with better health outcomes (Funnell, 2006). This study also revealed physicians were interested to know more about the psychosocial consequences of T2DM, as they felt this knowledge would assist them to better help their patients (Funnell, 2006). More recent studies continue to corroborate the impact of the patient-provider relationship on health outcomes (Polonsky et al., 2017; Stuckey et al., 2015).

A second DAWN2 study, including over 7,228 participants from 17 different countries with T2DM, used qualitative analysis to understand the psychosocial concerns of patients with T2DM (Nicolucci et al., 2013; Stuckey et al., 2014). Emerging themes included stress related to diabetes such as anxiety/fear, depression, negative mood, and worry about complications (Stuckey et al., 2014). Second, this study demonstrated people with diabetes experience discrimination at work and in other public arenas (Stuckey et al., 2014). Patients with T2DM seemed to exhibit an overriding desire to feel understood in regard to T2DM diagnosis as well as feel normal (Stuckey et al., 2014). In addition, successful management of diabetes was correlated with intrapersonal qualities such as a positive outlook, peaceful life, hope in the future, and resilient attitude despite wanting to give up (Stuckey et al., 2014). Successful management of diabetes was also associated with interpersonal dynamics such as caring support systems including family, friends, others with diabetes, and health care professionals (Dietrich, 1996; Holt et al., 2013; Peyrot et al., 2005a; Polonsky et al., 2017; Stuckey et al., 2014; Stuckey et al., 2015).

Essentially, successful management of T2DM requires patients to overcome intense psychosocial forces in order to navigate complex behavioral health changes necessary to re-balance endogenous metabolic systems. Research continues to demonstrate that health education is simply not enough for patients to exhibit the desired health behaviors that are necessary for successful management of the disease (Funnell, 2006; Shin & Lee, 2017). Social forces such as stigma seem to interfere with the ability of patients to manage the complexities of living with T2DM (Funnell, 2006). In fact, research from outside the US demonstrates associations between internalized stigma and blood glucose levels, lower medication adherence and fewer self-care behaviors (e.g., Brazeau et al., 2018; Brown et al., 2013; Corrigan, Larson, & Rusch, 2013; Kato et al., 2016; Kwan, & Wong, 2003; Schabert et al., 2013; Shiu, Kwan, & Wong, 2003). It is known that social stigma negatively affects intrapersonal constructs such as self-efficacy (Corrigan, Bink, Schmidt, Jones, & Rusch, 2016). Self-efficacy is a known conduit of behavior change (Goffman, 1963). Lower levels of self-efficacy mean that patients will have a harder time implementing changes despite having been educated on these recommendations (e.g., Corrigan et al., 2016; D’Souza et al., 2015; Hernandez-Tejada et al., 2012). To this end, it is important to clarify points of intervention that are likely to increase patients’ levels of self-efficacy, for example the patient-provider relationship (Dietrich, 1996; Polonsky et al., 2017; Stuckey et al., 2015). Research outside the US has demonstrated associations of health behaviors such as self-care and medication adherence with the patient-provider relationship (Dietrich, 1996; Polonsky et al., 2017). However, research on this topic within the US is lacking.

This is important to note, considering the variance in cultural norms and social influences unique to each nation and distinct health care systems. Regardless, it is known that stigma has deleterious effects on self-efficacy and is correlated with poorer health outcomes (e.g., Brown et al., 2013; Corrigan, Larson, & Rusch, 2013; Goffman, 1963; Kato et al., 2017; Kwan, & Wong, 2003; Scrambler, 2009; Shiu, Kwan, & Wong, 2003; Weiss, Ramakrishna, & Somma, 2006). It is also known that patient-provider relationships have been associated with self-efficacy and health outcomes (Dietrich, 1996; Polonsky et al., 2017; Schillinger et al., 2003; Schneider et al., 2004; Young-Hyman et al., 2016). The goal of the current study was to explore self-efficacy as a medium through which social stigma negatively impacts health behaviors (e.g., diet, exercise, and foot care, medication adherence) as well as glycemic control. Further, I aimed to explore the indirect influence of the patient-provider relationship on health behaviors and glycemic control.

Problem Statement

As previously discussed, T2DM accounts for billions of health care spending all over the world, including within the US (ADA, 2018a). T2DM is a biomedical condition that stems from psychosocial issues that is often treated with behavioral modifications (Funnell, 2006). T2DM is preventable, reversible if caught early, and manageable through exogenous health behaviors (e.g., diet, exercise, medication). Yet, approximately two thirds of patients with T2DM are unable to follow through with necessary life-saving health behavior modifications (Maddigan et al., 2005). Psychosocial factors such as social stigma seem to contribute to this unfavorable outcome (Funnell, 2006; Kalra & Baruah, 2015). Targeted points of interventions should be low cost, culturally relevant, and applicable to those living in the United States and using the US health care system. In the current study, I proposed the patient-provider relationship as an important intercessory point in which to address negative effects of stigma via self-efficacy.

Design and Purpose

In the current study, a cross-sectional, moderated mediation model was used to better understand the capability of the patient-provider relationship to indirectly moderate the negative impact of social stigma on T2DM health adherence. Participants (n=152) were gathered via purposive sampling by way of public, online recruitment efforts. Participants were asked to complete an online survey quantifying the constructs of internalized stigma related to T2DM, self-efficacy, the quality of patient-provider relationships, level of engagement in recommended self-care behaviors (diet, exercise, and foot care), medication adherence, and a self-report of most recent glycated hemoglobin (HbA1C) levels. I also gathered demographic and psychosocial information regarding race, income, education level, age, primary health insurance, as well as relevant health information to contextualize population characteristics for which study results may be generalized. Research was limited to participants residing in the US to better understand the relationships between these variables within the context of the US cultural environment and health care system.

Similar to Varni et al. (2018), I controlled for demographic and psychosocial variables that exhibited predictive associations with outcome variables. To do this, a set of simple regression analyses included race, income, education level, therapy regimen, and primary source of insurance, as related to outcome variables were conducted. Variables that exhibited a predictive relationship with outcome variables were then controlled for in the moderated-mediation analysis (Varni et al., 2018). This analytical step was important in order to control for constructs typically associated with health outcomes (Brazeau et al., 2018; Fritz, 2017; Vallis et al., 2003; Williams et al., 1997; 2003; Williams & Mohammed, 2010; Young-Hyman et al., 2016).

Research suggests higher levels of internalized stigma are associated with lower self-efficacy (Corrigan, Bink, Schmidt, Jones, & Rusch, 2016) as well as negative health outcomes (Gredig & Bartelsen-Raemy, 2016; Potter et al., 2015). However, higher levels of self-efficacy have been correlated with increased health behaviors and subsequent better health (e.g., D'Souza et al., 2015; Mohebi et al., 2013; Sarkar, Fisher, & Schillinger, 2006; Young-Hyman et al., 2016). Further, research suggests positive patient-provider relationships are correlated with improved self-efficacy (Dietrich, 1996; Polonsky et al., 2017; Schillinger et al., 2003; White et al., 2015; Young-Hyman et al., 2016). It is possible the relationship between patients and providers may buffer the negative impact of social stigma (as related to T2DM) on self-efficacy. If this is true, patient-provider relationships may indirectly influence health behaviors resulting in better health outcomes. The overarching aim of this study was to make inferences about the contributing relationships between social stigma and health behaviors by way of self-efficacy, as moderated by the patient-provider relationship for patients with T2DM.

To summarize the broad body of literature, high self-efficacy is essential for patients to successfully engage in health-related self-care behaviors. It is known that that both patient-provider relationships as well as stigma affect self-efficacy. Therefore, I theorized positive patient-provider relationships will function to deter the negative impact of stigma on self-efficacy. In turn, self-efficacy will determine whether patients engage in self-care behaviors or not. Information discerning these kinds of nuances may give insight on how to better support patients who experience stigma and also struggle to follow health recommendations.

Based on theory outlined above, I hypothesized the patient-provider relationship would buffer the negative impact of internalized stigma on self-efficacy thus indirectly influencing health behaviors (e.g., self-care behaviors including diet, exercise and footcare; medication adherence; HbA1C levels). Further, I speculated that race, income, education level, therapy regimen, and primary health insurance will significantly predict each of self-care activities, medication adherence, and self-reported HbA1C levels. This study hypotheses were tested using five separate moderated mediation analysis for each outcome variable while controlling for relevant covariates (see Figure 1). The specific hypotheses of this study were as follows:

H1: Internalized stigma will result in higher HbA1C and less frequent self-care behaviors including diet, exercise, foot care, and medication adherence.

H2: Self-efficacy will mediate each of the relationships between stigma and self-care behaviors of diet, exercise, foot care, and medication adherence as well as stigma and HbA1C. More specifically, higher stigma will result in diminished self-efficacy. Low levels of self-efficacy will be associated with lower self-care behaviors and higher HbA1C.

H3: The patient-provider interaction will buffer the negative relationship between stigma and self-efficacy, and thus exhibit an indirect moderation of self-care behaviors and HbA1C. High stigma will result in less frequent self-care behaviors, worse medication adherence, and higher HbA1C, but only when trust in providers is low. Conversely, high trust in providers will result in more frequent self-care behaviors, better medication adherence, and lower HbA1C despite the presence of stigma.

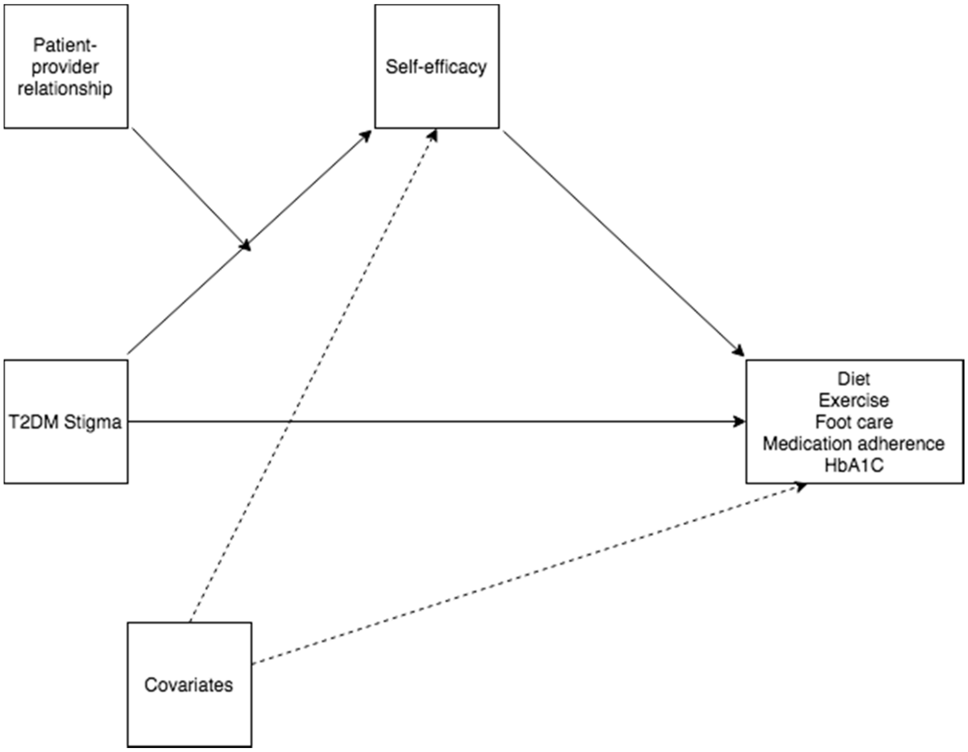

Figure 1. Conceptual model.

Chapter II: Literature Review

Section A: Type 2 Diabetes Mellitus

Type 2 Diabetes Mellitus (T2DM)

T2DM is a non-congenital, multifaceted disease characterized by an inability of peripheral tissue to appropriately respond to insulin as well as an inadequate insulin secretion due to a beta cell dysfunction in the pancreas (Kumar, Abbas & Aster, 2013). More specifically, excess glucose and free fatty acids trigger secretion of pro-inflammatory cytokines. Over time, the constant activation of inflammatory markers results in cell dysfunction and eventual death of pancreatic beta cells, essentially killing off cells necessary for endogenous insulin secretion.

Pre-diabetes refers to the period of cellular dysfunction resulting in insulin resistance. Insulin resistance denotes a dysfunction in the insulin pathway but is prior to cellular death and overt pancreatic dysfunction (Kumar et al, 2013). Symptoms of pre-diabetes may go undetected for years, whereas the shift from a pre-diabetic state to a full-blown diabetic state may occur suddenly and is typically hallmarked by severe infections, polyuria (excessive need to urinate), polydipsia (excessive thirst), polyphagia (excessive hunger), and/or ketoacidosis (metabolic status marked by excess keto acids which can be fatal; Kumar et al, 2013).

Disruptions of the insulin pathway likewise trigger disruptions of other metabolic pathways, especially the metabolism of all macronutrients including glucose, fat, and protein (Kumar et al., 2013). The dysfunction of these pathways results in an imbalance in metabolic function of the entire body, increasing the risk of acute problems such as hyperglycemia, hypoglycemia, and dehydration. Long-term imbalance of metabolic functions is likely to result in additional disease states such as cardiovascular disease, renal disease, diabetic nephropathy, and infections of the skin (Kumar et al., 2013; American Diabetic Association [ADA], 2016).

To avoid both acute and chronic complications, exogenous control over endogenous metabolic pathways is required. This control is managed, in part, through engaging in recommended health behaviors such as healthy eating, regular physical activity, losing excess weight, and taking medications (CDC, 2017; ADA, 2016). Notably, behavioral changes such as diet, exercise, and medication management can reverse the effects of pre-diabetes and insulin resistance but not correct overt pancreatic dysfunction (Kumar et al, 2013).

Self-management of T2DM/Self-Care

It is known that genetic, epigenetic, and life style factors including diet, obesity, and a sedentary routine, may contribute to the development of T2DM (Kumar et al., 2013). As such, the first line of defense in treating patients who have been diagnosed with T2DM is to target lifestyle factors such as diet and exercise habits to reverse effects of insulin resistance for those in a pre-diabetic state (Garcia-Perez et al., 2013; Kumar et al., 2013; ADA, 2016). Changes implemented in the pre-diabetic and/or in the early overt diabetic stages may suffice to halt or moderate the progression of the disease (Kumar et al., 2013). The overarching goal of these changes is to achieve glycemic control.

For those with overt T2DM, glycemic control can be accomplished through a combination of pharmaceutical and life style changes (Garcia-Perez et al., 2013; Kumar et al., 2013). However, managing diabetes with medications is a complex process that may include insulin injections (Garcia-Perez et al., 2013). There are many who feel apprehensive or resistant to this level of medication management (Peyrot et al., 2005a; Polonsky et al., 2004; Polonsky et al., 2005; Potter et al., 2015; Schabert et al. 2013, Shah, Butt, & Hussain, 2017). Additional self-care activities such as regular foot care and skin examinations, as well as frequent blood-glucose monitoring are required for successful self-management of T2DM (ADA, 2016; Garcia-Perez et al., 2013; Kumar et al., 2013). Adhering to proper medication management, making lifestyle changes, and engaging in regular self-care activities can be an overwhelming and stressful process (Bailey & Kodack, 2011). However, failure to do so may result in diabetic ketoacidosis, hyper/hypoglycemia, dehydration, and severe infections that may lead to amputations or even death (ADA, 2016; CDC, 2017; Kumar et al., 2013). There is evidence to suggest the quality of the patient-provider interaction directly effects the likelihood a patient will adhere to complex health recommendations (Hernandez-Tejada et al., 2012; Linetzky, Jiang, Funnell, Curtis, & Polonsky, 2016; Maddigan, Majumdar, Johnson, 2005). It is imperative patients are successful in implementing their provider's health recommendations.

Hemoglobin A1C (HbA1C)

Glycemic control is measured by the percentage of glycosylated hemoglobin levels (HbA1C; Kumar et al., 2013). HbA1C levels of 5.5% and below are considered normal. Five point six percent to seven pecent is indicative of pre-diabetes (ADA, 2018b; Kumar et al., 2013; ADA, 2016). Current recommendations for HbA1C guidelines suggest a target goal of <7%, or 53 mmol/L for those diagnosed with T2DM (ADA; 2016). HbA1C levels severely below or above this target goal increase the risk of hyper or hypo-glycaemia which may result in further health complications. Maintaining HbA1C levels of around 7% reduces these complications and decreases risk of micro and macrovascular disease as well as overall mortality (ADA, 2016). Further, HbA1C levels are reflective of long-term (three to six months) health habits (diet and exercise) and are not affected by day to day variances (ADA, 2016; ADA, 2018b). Evidenced based guidelines suggest patients with poorly controlled T2DM should be tested every three months and those with well controlled T2DM, every 6 months (ADA, 2016; ADA, 2018b).

HbA1C levels are recognized throughout behavioral and biomedical research as an important and appropriate biomarker of health outcomes for patients with T2DM (ADA, 2016).

Conclusion

In conclusion, T2DM is a non-congenital disease hallmarked by the inability of the pancreas to properly secrete insulin. The main goal of treatment is to obtain exogenous glycemic control in order to reinstate metabolic balance (ADA, 2016). Failure to do so may result in comorbid health conditions which, left untreated may result in death (Kumar et al., 2013). T2DM is a serious biomedical condition affected by complex psychosocial factors. Socioeconomic status, social support, psychological state, access to resources including health insurance, health literacy, age, and education level to name a few, are known psychosocial correlates of health outcomes (Young-Hyman et al., 2016). It is the position of the ADA to recommend health care providers assess and address psychosocial issues in tandem with treating biomedical correlates of T2DM, to ensure optimal health outcomes (Young-Hyman et al., 2016).

The current study aimed to better understand the relationship between social stigma and health behaviors as moderated by the relationship between providers and patients with the proposed mediator for this relationship being self-efficacy. For example, I theorized that positive-patient provider relationships would buffer the negative impact of stigma on self-efficacy and thus indirectly impact the degree to which patients follow through with life sustaining health recommendations such as routine self-care behaviors, adherence to medication recommendations, and overall glycemic control.

Section B: Psychosocial Correlates of Health

Demographic Characteristics

Almost 100 million Americans are considered to be in a pre-diabetic or diabetic state with about 1.5 million new cases per year (CDC, 2017). About four percent of persons between the age of 18 and 44 have diabetes, seventeen percent of persons between the age of 45 and 64, and at least twenty-five percent of those over 65 years of age are considered diabetic (CDC, 2017). Additionally, men are more likely to be diagnosed with diabetes than women (CDC, 2017). Factors such as diabetes stress (negative emotional response to diabetes, e.g., stress, depression, frustration, discouragement), economic resources, social support, psychological state, poverty, access to healthy foods and a safe place to exercise, access to care and health insurance coverage, health awareness, and race-based discrimination are recognized to have an effect on health outcomes (Fritz, 2017; Brazeau et al., 2018; Vallis et al., 2003; Young-Hyman et al., 2016). For example, inpatient health care costs related to diabetic complications are over 20% higher for minorities and those without health care (ADA, 2018a). Further, social context such as age and literacy/education level also affect the likelihood of successful disease management (Fritz, 2017; Young-Hyman et al., 2016).

Research indicates traditional treatment regimens aimed to improve HbA1C levels impact overall health at modest levels (Young-Hyman et al., 2016). There exists a pool of literature that indicates a more comprehensive approach to care and greater consideration for psychosocial correlates (e.g., SES, social support) of health outcomes is in fact, more likely to help patients obtain glycemic control (Brazeau et al., 2018; Stuckey et al., 2015). For example, the American Diabetes Association (ADA) recognizes the importance of patient centered care, consideration for psychosocial context when treatment planning, and recommends regular psychosocial screenings and assessment of environmental factors when working with patient who are diagnosed with T2DM (Young-Hyman et al., 2016).

Race. According to the CDC (2017), rates of diagnosed diabetes are higher for minority racial groups including about fifteen percent for American Indian/Alaska Native people, almost thirteen percent for non-Hispanic Black persons, 12 percent for Hispanic persons, and eight percent of Asian persons as compared to just seven percent for non-Hispanic Caucasian persons. People who belong to race-based minority groups are more likely to experience disparaties related to health outcomes (e.g., ADA, 2018a; Williams, Neighbors & Jackson, 2003). Health disparities related to race are thought to be rooted in issues such as discrimination including cultural barriers and negative stereotyping, in addition to communication issues with providers, geographical limitations related to living in rural areas, and systematic discrimination including a lack of access to both coverage and providers, to name a few (American College of Physicians, 2010). Studies demonstrate that race-based discrimination negatively impacts intra-personal factors necessary for positive health behaviors, such as self-esteem and confidence (Williams, Neighbors & Jackson, 2003). Research suggests race related discrimination is also negatively associated with self-rated health status and positively associated with disability status and chronic conditions such as cardiovascular disease (Williams, Neighbors & Jackson, 2003). Conversely, people who ascribe to dominant social groups (e.g., white) do not face similar inter- and intrapersonal barriers to health (e.g., stress related to discrimination), and have better access to care and health education (e.g., ADA, 2018a; Williams, Neighbors & Jackson, 2003). As such, I sought to control for race-based experiences that may affect outcome variables (self-care activities, medication adherence, and self-reported HbA1C levels) in the current model.

Socioeconomic Status (SES). A report of the National Health Interview Survey conducted in the US demonstrated that those living below the poverty line are twice as likely to die from diabetes related illness (Sayday & Lochner, 2010). Similarly, those with less than a high school education or equivalent were also twice as likely to die from diabetes related illness (Sayday & Lochner, 2010). A review of the literature corroborates significant differences in health outcomes based on SES (Bijlsma-Rutte et al., 2016). More specifically, research continues to demonstrate a significant relationship between SES and known correlates of health outcomes including self-care behaviors, medication adherence, and HbA1C levels (Bijlsma-Rutte et al., 2016). As such, I also sought to control for SES as indicated by income and education level to account for the influence of SES on outcome variables (self-care activities, medication adherence, and self-reported HbA1C levels) in our model. Additionally, I controlled for access to care (e.g., primary source of health insurance) as an aspect of SES.

Conclusion

As discussed, the overarching goal of diabetic treatments is to maintain glycemic control and achieve metabolic balance. To more effectively understand the interpersonal aspects of health intervention, this study sought to explore the negative impact of stigma on health adherence through the mediator of self-efficacy, in addition to understanding the moderating power of the patient-provider relationship. The interplay of demographic and socioeconomic factors and the interpersonal process of care make treatment of T2DM very complex (Young-Hyman et al., 2016). To account for these complexities, I gathered data to contextualize the sample population as well as control for relevant demographic and socioeconomic variables such as age, gender, race, income, education level, medication regimen, and health insurance that have been previously related to health outcomes (e.g., ADA, 2018a; Fritz, 2017; Brazeau et al., 2018;

Vallis et al., 2003; Young-Hyman et al., 2016). Demographic and socioeconomic variables that exhibited a predictive relationship on self-care behaviors were controlled for in relevant analysis as covariates.

Section C: Stigma

Stigma

The root of the word, *stigma* refers to “a scar left by a hot iron,” “a mark of shame or discredit,” or “an identifying mark or characteristic” (“Stigma”, 2018). As a social phenomenon, stigma was originally defined as the isolation, ridicule, and moral judgement passed on those who do not conform to societal norms or expectations (Durkheim, 1982; Goffman, 1963). At its most primitive level, social stigma functions akin to a social judiciary system meant to uphold community morals and values (Durkheim, 1982; Goffman, 1963). However, social expectations are fluid and change from one context to the next (Durkheim, 1982; Goffman, 1963). For example, one may feel compelled to act a certain way at work and a different way at home. In another example, an individual may feel obliged to eat large amounts of food yet, may lament their subsequent body shape in another setting.

A more modern definition of stigma divides the construct into three forms each associated with non-conforming attributes of the body, character, or tribal affiliation (e.g., race, religion, political affiliation; Goffman, 1963; Weiss, Ramakrishna, & Somma, 2006). Distinctions in any of these categories brand the individual as different from the in-group and place the individual as members of the outgroup. Distinctions are generalized and exaggerated in order to maintain status quo, regardless of actual fit. Goffman (1963) uses the example of shouting at the blind. In this example, the inability of the blind to see is generalized into an overall dysfunction of physical ability and/or intellect (e.g., inability to hear or comprehend verbal communication). Outgroup members are characterized as less than, inferior, or even dangerous to the in-group. Consequently, social forces work to keep the stigmatized individual(s) in the periphery (Fiske & Taylor, 2017).

The underpinning of stigmatization overlaps the social construct of stereotyping. This term refers to generalized beliefs about a particular group(s) of people (Fiske & Taylor, 2017; Goffman, 1963). Stereotypes tend to be pejorative in nature and typically function to maintain distance between the in-group and the out-group (Fiske & Taylor, 2017). Both stereotypes and stigmatization lead to prejudice, in which one recognizes the content of these beliefs as true in addition to exhibiting negative affect toward the stereotyped persons (Corrigan, Larson, & Rusch, 2013; Fiske & Taylor, 2017). In turn, prejudice leads to discrimination, or the behavioral manifestation of a prejudiced belief (Corrigan, Larson, & Rusch, 2013; Durkheim, 1982; Fiske & Taylor, 2017).

Internalized Stigma

Public stigmatization refers to the beliefs about a stigmatized group held by society. Whereas internalized stigmatization, also known as self-stigma, refers to a phenomenon in which stigmatized individuals believe the stereotypes to be true of themselves leading to feelings of devaluation and surrender to discriminatory actions (e.g., Corrigan et al., 2016; Corrigan, Larson, & Rusch, 2013; Fiske & Taylor, 2017). For example, an overweight individual who has internalized a lazy stereotype is less likely to contest a physician’s disbelief in their efforts to lose weight. As a result, this individual may not receive the help they need to better implement the diet plan they have been working hard to follow. Someone who has not internalized a lazy narrative is more likely to contest the interaction with their provider, as well as more likely to communicate relevant needs, resulting in better care and subsequent health outcomes.

Further, internalized stigma may perpetuate the “why try” effect (Corrigan, Larson, & Rusch, 2013; Corrigan et al., 2016). The “why try” effect has to do with the aspects of internalized stigma that make it harder for persons to meet their life ambitions (Corrigan, Larson, & Rusch, 2013). Stigma results in a loss of self-esteem and self-efficacy, which are necessary to achieve goals (Durkheim, 1982). In essence, the “why try” effect perpetuates negative stereotypes, especially those which emphasize character traits such as lazy, angry, difficult, dumb, etc. (Brown et al., 2013; Corrigan, Larson, & Rusch, 2013; Corrigan et al., 2016). For example, an otherwise ambitious person may be less likely to act on their goals when external cues categorize them as lazy.

In addition, internalized stigma may threaten the social identity of the stigmatized individual, leading to efforts to hide the traits which distinguish them from the in-group. In other words, stigmatized individuals may try to hide behaviors or traits associated with a particular stereotype. For example, individuals diagnosed with a stigmatized disease such as diabetes, HIV/AIDS, or mental illness may make efforts to hide symptoms, conceal crucial health behaviors (e.g., taking necessary medications in public, abstaining from eating certain foods), or fail to disclose status (Weiss et al., 2006; Scrambler, 2009), resulting in a decreased quality of life. In this example, attempts to mask one’s stigmatized illness may lead to additional health complications, feelings of isolation, and additional stress (Weiss et al., 2006; Scrambler, 2009).

Stigma Related to Type 2 Diabetes Mellitus

Research suggests at least half of patients with T2DM living in the US experience stigma directly related to their disease (Benedetti, 2013; Liu et al., 2017). Studies corroborate these results across nations and associate social stigma with psychological insulin resistance (resistance to medication management characterized by refusal to take insulin; Jha et al., 2015;

Liu et al., 2017; Schabert et al., 2013; Potter et al., 2015; Shah, Butt, & Hussain, 2017). Social stigma surrounding patients with T2DM in the lay public do not initially stem from the diagnosis itself, but rather from the accompanying physical and behavioral characteristics that are often associated with the disease (Schabert et al., 2013; Weiss, Ramakrishna, & Somma, 2007). Derogative stereotypes related to this kind of stigma include but are not limited to stereotyping persons as unhealthy, fat, lazy, couch potato, pig, poor, and unintelligent, to name a few (Brown et al., 2013; Brown et al., 2014). These stereotypes often result in restrictions or complications in employment, education settings, health care settings, limitations in travel, and interpersonal struggles including romantic relationships (Brown et al., 2013; Kalra & Baruah, 2015; Potter et al., 2015; Schabert et al., 2013). The psychological effects of such stigmas include fear, embarrassment, low self-esteem, depression, anxiety, and emotional distress (Brown et al., 2013; Brown et al., 2014; Gredig & Bartelsen-Raemy, 2016; Schabert et al., 2013; Shiu, Kwan, & Wong, 2003). Furthermore, reports show that obese persons feel shamed by the word obesity (and would prefer to be called overweight or even fat), noting that the word obese denotes a lack of control or blame for the existence of chronic health conditions (Thomas, Hyde, Karunaratne, Herbert & Komesaroof, 2008). Thomas and colleagues (2008) highlight the importance of language used by providers, as insensitive language may communicate biases to the patient risking the propagation of established stigma.

Evidence suggests that health providers may perpetuate health related stigmas by holding biases toward overweight and obese people (Brown et al., 2013; Kalra & Baruah, 2015; Linetzky et al., 2016; Potter et al., 2015; Schabert et al., 2013). These attitudes act as contributing factors for those patients to avoid engaging in necessary health care protocol, including an unwillingness to be screened for diabetes, cancer, and other weight-associated diseases (Potter et al., 2015;

Schabert et al., 2013). Furthermore, research shows that at least half of overweight patients report receiving pejorative comments from health care providers causing them to feel degraded, shamed, or even isolated by their weight or health care condition (Brown et al., 2013; Kalra & Baruah, 2015; Schabert et al., 2013; Thomas et al., 2008). Studies also show the compounding effects of belonging to multiple stigmatized groups. For example, one study demonstrated that higher levels of self-reported discrimination among African American women was associated with poorer health outcomes such as higher glucose levels (Wagner et al., 2015). Additional studies demonstrated higher levels of diabetes-related stress in African American and Latino populations (LeBron et al., 2014).

Many patients report engaging in drastic efforts to lose weight including unhealthy dieting, pharmaceutical treatments, and other extreme behaviors, some starting as early as twelve years old (Brown et al., 2013; Brown et al., 2014; Thomas et al., 2008). Similarly, patients, when discussing weight loss options with their primary care providers, frequently discuss emotional pain rather than weight loss logistics (Thomas et al., 2008). Reports show that this may lead to the prescription of antidepressant medications rather than health discussions, thus leading to dissatisfaction between patients and providers (Thomas et al., 2008).

In sum, patients with T2DM often feel judged, monitored, and unfairly treated by both treatment providers and others (Brown et al., 2013; Kalra & Baruah, 2015; Schabert et al., 2013; Weiss, Ramakrishna, & Somma, 2007). This is concerning due to the fact that discrimination of T2DM has been associated with decreased metabolic and glycemic control, poorer dietary choices, and increased psychological distress (Gredig & Bartelsen-Raemy, 2016; Potter et al., 2015). Consequences include attempts to conceal the disease, inadequate self-management of symptoms, reduced social or occupational functioning, and even psychological insulin resistance (Brazeau et al., 2018; Gredig & Bartelsen-Raemy, 2016; Schabert et al., 2013).

Empowerment

The concept of empowerment encompasses factors such as power, activism, hope, feelings of control over the future, and knowledge (Corrigan, Larson, & Rusch, 2013; Rodwell, 1996 as stated in Wang, Wu, & Hsu, 2011). It involves the process of taking control, making one's own decisions, and feeling confident to do so; the reverse of internalized stigma (Corrigan, Larson, & Rusch, 2013; Weiss, Ramakrishna, & Somma, 2007). Stigmatized persons who feel empowered are more likely to react to pejorative stereotypes with protective factors such as indignation, anger, and opposition whereas those who internalize stereotypes risk suffering from a decrease in self-efficacy (Corrigan, Larson, & Rusch, 2013).

Empowerment has been demonstrated as a mediator of goal attainment including achievement of health outcomes (Hernandez-Tejada et al., 2012; Nam et al., 2010; Wang et al., 2011; Weiss, Ramakrishna, & Somma, 2007). Research on the negative effects of stigma as related to mental health, demonstrates patients are more likely to meet their goals when providers take a more supportive, positive, and affirmative approach to behavior change rather than dysfunction focus (e.g., "what might be done" vs. "what should be done"; Corrigan et al., 2016; Corrigan, Larson, & Rusch, 2013; Wang et al., 2011). In addition, perceptions of empowerment have been shown to increase self-care behaviors for persons with T2DM (Hernandez-Tejada et al., 2012; Paterson, 2001; Nam et al., 2010; Wang et al., 2011). Further, patients who feel empowered are less likely to experience the frustration and feelings of discouragement typically associated with diabetic distress and are able to gain better glycemic control and maintain a better quality of life (D'Souza et al., 2015; Hernandez-Tejada et al., 2012; Nam et al., 2010;

Wang et al., 2011). In sum, empowered individuals are more likely to meet their health goals despite deleterious effects of psychosocial stress, including stigma.

In the current study I proposed stigma related to T2DM would have a negative impact on self-efficacy thus negatively impact adherence to self-care behaviors (Kato et al., 2017). However, research indicates the quality of the patient-provider relationship can positively impact levels of self-efficacy as well as patient adherence (Bostrom et al., 2014; Beverly et al., 2012; Nam et al., 2010; Paterson, 2001; Polonsky et al., 2017; Schillinger et al., 2003; Van Dam et al., 2003). In the present study, I included the patient-provider relationship as a moderator variable in order to understand how this variable would interact with stigma to impact self-efficacy and subsequently moderate adherence to self-care behaviors. One aim of this study was to make inferences about the contributing relationships between each of these variables, including the capability of the patient-provider relationship to mitigate the negative impacts of social stigma.

Conclusion

In conclusion, stigma is a phenomenon that refers to the social branding of a person or persons as less desirable, typically resulting in feelings of being tainted, devalued, and isolated from the in-group (Durkheim, 1982; Goffman, 1963). Such attributions are allotted based on appearances, behaviors, group memberships, or other characteristics which are typically used to denote or discredit the affected group or individual (Durkheim, 1982; Fiske & Taylor, 2017; Goffman, 1963; Schabert et al., 2013; Weiss, Ramakrishna, & Somma, 2007). The group or individuals are then regarded as different, and discriminated against, based solely on the alleged attribution (Kalra & Baruah, 2015; Schabert et al., 2013). Internalized stigma leads to a decrease in quality of life due to the negative impact on self-efficacy and inability to actualize one’s potential (Corrigan et al., 2016).

T2DM is a stigmatized disease rooted in stereotyped beliefs of fatness, laziness, and a lack of health (Brown et al., 2013; Brown et al., 2014; Weiss, Ramakrishna, & Somma, 2007). Patients who experience stigma related to T2DM often feel unfairly judged and mistreated by those around them. Further, some people may be susceptible to stereotype threat and take strides to avoid any actions that run the risk of confirming negative stereotypes (Carels et al., 2013; Shapiro, 2011). Research delineates empowerment as the antidote to negative effects of internalized stigma. Interestingly, some people respond to perceived discrimination with righteous anger rather than self-deprecation (Corrigan & Rao, 2013; Watson & Larson, 2006). It is also possible for people with T2DM to perceive health recommendations as freedom threats resulting in psychological reactance rather than compliance (Rains, 2013). I theorized the patient-provider relationship may play a role in mitigating phenomenon such as psychological reactance or increasing feelings of empowerment thus moderating the negative effects of stigma to improve overall health outcomes.

Section D: Self-efficacy

Self-efficacy

Bandura (1977) defined self-efficacy in the 1970's as a belief in one's ability to make desired changes and attain goals. To clarify, self-efficacy does not have to do with a belief in a certain outcome but rather a belief in one's self as capable of achieving a behavior that will lead to the outcome or cognitions that directly influence behaviors. Further, beliefs about one's abilities effect emotional responses such as anxiety, stress, and confidence as well as thought patterns such as ruminating about deficiencies or successfully engaging in tasks at hand (Strecher, McEvoy, Becker, Rosenstock, 1986).

Human behavior is often learned through modeling and refined through making sense of contextual feedback about performance (Bandura, 1977). Beliefs about one's behavioral abilities are learned through performance accomplishments, vicarious experience, verbal persuasion, and current psychological state (Strecher, 1986). The development of said beliefs predict future behaviors, cognitions, and consequently the ability to make necessary behavioral adjustments (Bandura, 1977). For example, if a desired outcome is understood as the consequence of a behavior, and reinforced as such, one will likely believe they have ability to affect their context (e.g., make changes, reach goals). As previously stated, environmental cues (e.g., positive interactions/reinforcement from one's health provider) influence the likelihood an individual will cognitively pair the outcome as a result of behavior. Essentially, self-efficacy is the mediator through which a person's beliefs or expectations about their behaviors translates into tangible behaviors.

Self-efficacy is distinguished from self-esteem (the concept of liking one's self), as well as *health locus of control* (a generalized expectation of health outcomes as controlled externally or internally; Strecher, 1986). Similarly, self-efficacy is not determined by affect (Strecher, 1986). For example, one may have high levels of self-efficacy while also experiencing feelings of anxiety about their behavioral efforts (e.g., one may have high self-efficacy but may also feel anxious during a job interview; Strecher, 1986). Self-efficacy is also distinguished from the concept of helplessness, which has to do with a combination of efficacy and expected outcomes (Strecher, 1986). In sum, self-efficacy is one facet of empowerment. It is a concept which relates to perceptions about the ability to successfully employ specific behaviors as they pertain to specific situations and is highly dependent upon external cues and current psychological state (Bandura, 1977; Strecher, 1986; Strickland, 1978).

Self-efficacy is known to play a determining role in choice of behavior (e.g., choice to engage in health behavior changes), effort levels, and length of time employing said behaviors despite stress (Bandura, 1977). Notably, the concept of self-efficacy is a state of being rather than a trait characteristic. As such, people tend to vary in their levels of self-efficacy depending on the specific behaviors and situation (Strecher et al., 1986). For example, one may experience high levels of self-efficacy regarding work-place behavioral changes while also experiencing low self-efficacy when trying to make health behavior change. In this way, outwardly capable people may struggle to successfully employ recommended health behaviors.

There exists a strong pool of literature indicating the predictive nature of self-efficacy on health behavior change (e.g., Corrigan et al., 2016; D'Souza et al., 2015; Hernandez-Tejada et al., 2012) as well as some experimental research to suggest a fundamental relationship between self-efficacy and health behaviors (Sheeren et al., 2016). In general, interventions that target self-efficacy have at least medium-level effects on successful health behavior changes (Sheeran et al., 2016). Further, greater belief about one's ability to make health behavior changes is positively correlated with progression through Prochaska and colleague's (1983) five stages of change (pre-contemplation, contemplation, preparation, action, and maintenance; Hevey, Smith, & McGee, 1998; Norcross, Krebs & Prochaska, 2011; Sheeran et al., 2016). In sum, there exists strong evidence to suggest those with low self-efficacy are less likely to change, whereas those with higher self-efficacy are more likely.

Self-efficacy and T2DM

As previously described, self-efficacy is a concept related to the conglomerate of behavioral, personal, and environmental factors affecting the confidence to exhibit desired health behaviors (Bandura, 1977; Hevey, Smith, & Mcgee, 1998; Mohebi, Azadbakht, Feiz, Sharifirad, & Kargar, 2013; Sarkar, Fisher, & Schillinger, 2006; Strecher et al., 1986; Sheeran et al., 2016). T2DM is a disease which requires constant performance and engagement in desired health activities to maintain health (Mohebi et al., 2013). Key components of T2DM management include dietary changes, regular exercise, and medication recommendations, as well as regular self-care behaviors (e.g., routine foot care, regular physician visits, self-monitoring of blood glucose, and other individualized health behaviors; Mohebi et al., 2013).

Research suggests self-efficacy as an integral component to managing diabetes, independent of typical mediators of health (e.g., health literacy, complexity of medication regimens, health care costs, and access to resources; e.g., D'Souza et al., 2015; Mohebi et al., 2013; Sarkar, Fisher, & Schillinger, 2006; Young-Hyman et al., 2016). Additionally, Nam et al. (2010) found a strong relationship between self-efficacy and health outcomes such as Hba1C levels and self-monitoring of blood glucose. Further, cross-sectional studies did not exhibit an interaction effect between self-management behaviors and sex, low SES, race, or ethnicity, meaning self-efficacy did not appear to be affected by demographic characteristics (Sarkar, Fisher, & Schilling, 2006). However, theoretically, factors such as age, SES, and education level may affect health outcomes, albeit independent of self-efficacy levels. Overall, a synthesis of the literature suggests self-efficacy as a point of intervention to improve health outcomes for all patients with T2DM (D'Souza et al., 2015; Gredig & Bartelsen-Raemy, 2016; Nam et al., 2010; Mohebi et al., 2013).

Conclusion

The term self-efficacy refers to the confidence necessary to exhibit a desired set of behaviors (Bandura, 1977). Research demonstrates the predictive ability of self-efficacy on health outcomes for patients diagnosed with chronic disease such as T2DM (D'Souza et al., 2015; Nam et al., 2010; Mohebi et al., 2013). In the current study, I conceptualized self-efficacy as one intrapersonal construct with a direct effect on patients' abilities to adhere to a provider's health recommendations (e.g., routine self-care activities, medication recommendations, glycemic control). Research indicates self-efficacy can be negatively impacted by social stigma and positively impacted by strong patient-provider relationships (e.g., Nam et al., 2010; Sarkar, Fisher, & Schillinger, 2006; Bostrom et al., 2014; Beverly et al., 2012; Nam et al., 2010; Paterson, 2001; Polonsky et al., 2017; Schillinger et al., 2003; Van Dam et al., 2003). The aim of the current study was to make inferences about the contributing relationships between social stigma and health behaviors as mediated by self-efficacy. I proposed that this relationship would be moderated by the quality of relationship between providers and patients.

Section E: Patient-provider Relationships

Interactions between health providers (e.g., physicians, physician assistants, nurse practitioners) and patients have moved from an authoritarian style relationship toward supportive patient focused relationships (Bostrom et al., 2014; Van Dam, Van der Horst, Van den Born, Ryckman, & Crebolder, 2003; Stuckey et al., 2015). Demographic factors that appear to affect the patient-provider relationship include age, race, and gender (Berger, 2008; Mebane et al., 1999). Provider skill level, provider cultural competence, clinic environment, patient mistrust in the health care system, and patient socioeconomic resources also seem to affect the quality of this relationship (Berger, 2008; Mowskowitz et al., 2013; Nam et al., 2010; Pandit et al., 2014;

Sarkar et al., 2006; White et al., 2016). Interestingly, there is evidence to support the notion that both patients and physicians respond differently to each other, depending on these factors (Mebane et al., 1999). Regardless of demographic matching, current health care standards for diabetic treatments recommend a provision of care which is deemed respectful and responsive to patient needs, wants, and values while guiding the patient through clinical decisions (Bostrom et al., 2014; Young-Hyman et al., 2016).

While most patients report satisfaction with their medical provider's knowledge, there is reason to believe many patients struggle with the interpersonal aspect of health care (Linetzky et al., 2016; Paterson, 2001; Schillinger et al., 2003; White et al., 2016). The content of conversation between physicians and patients necessarily focuses on health education (e.g., health recommendations, identifying self-care needs, teaching medication management; Schillinger et al., 2003), whereas the process of this interaction is what promotes important intrapersonal constructs like self-efficacy and empowerment, which are necessary for patient success (Bostrom et al., 2014; Beverly et al., 2012; Nam et al., 2010; Paterson, 2001; Polonsky et al., 2017; Schillinger et al., 2003; Van Dam et al., 2003).

Previous research emphasizes the influence of the interpersonal process of care on health outcomes, especially for patients diagnosed with T2DM (Beverly et al., 2012; Bostrom et al., 2014; Dietrich, 1996; D'Souza et al., 2015; Nam et al., 2010; Schillinger et al., 2003; Stewart, Napoles-Springer, & Perez-Stable, 1999; Stuckey et al., 2015; White et al., 2016). More specific aspects of the patient-provider relationship such as collaborative goals, open communication, trust, and warmth have been associated with known mediators of health and decreased rates of insulin resistance (Dietrich, 1996; Linetzky et al., 2016; Maddigan et al., 2005; Nam et al., 2010;

Piette, Schillinger, Potter, & Heisler, 2003; Paterson, 2001; Polonsky et al., 2017; White et al., 2016; White, Osborn, Gebretsadik, Kripalani, & Rothman, 2013).

As previously discussed, the repercussions of low self-efficacy include a decrease in quality of life and goal attainment (Bandura, 1977; Nam et al., 2010). Research indicates empowerment as the antidote to these deleterious effects (Corrigan, Larson, & Rusch, 2013). The intercession of a positive patient-provider relationship is key for promoting feelings of empowerment patients need in order to achieve their health goals (Dietrich, 1996; Polonsky et al., 2017; Schillinger et al., 2003; White et al., 2015; Young-Hyman et al., 2016). This process is imperative, considering the multitude of decisions that patients with T2DM have to make about their health, without the presence of their provider to guide them (Van Dam et al., 2003). For example, decisions about eating, exercise, medication, and stress reduction are made multiple times an hour. In sum, research strongly suggest patients who feel effective are more likely to field these decisions in a way that moves them toward their health goals and better quality of life (D’Souza et al., 2015; Hernandez-Tejada et al., 2012).

Conclusion

Research affirms the quality of the patient-provider relationship effects patients’ intra-personal constructs of self-efficacy and feelings of empowerment (Dietrich, 1996; Linetzky et al., 2016; Maddigan et al., 2005; Nam et al., 2010; Piette, Schillinger, Potter, & Heisler, 2003; Paterson, 2001; Polonsky et al., 2017; White et al., 2016; White, Osborn, Gebretsadik, Kripalani, & Rothman, 2013). Self-efficacy and empowerment, in turn, directly influence the ability of patients to adhere to recommended health behaviors (Bandura, 1977) and health outcomes (Scrambler, 2009). However, research shows that self-efficacy is negatively impacted by social stigma related to T2DM (e.g., Brown et al., 2013; Corrigan, Larson, & Rusch, 2013; Goffman, 1963; Scrambler, 2009; Shiu, Kwan, & Wong, 2003; Weiss, Ramakrishna, & Somma, 2006). In the current study, I aimed to better understand the moderating capability of the patient-provider relationship to deter the negative impact of T2DM stigma on adherence to self-care behaviors. More specifically, I proposed strong patient-provider relationships would buffer the effects of stigma to positively impact self-efficacy, thus indirectly contributing to better adherence.

Chapter III: Research Design and Methodology

Research Design

All study procedures were approved by the University of Alaska Fairbanks Institutional Review Board. This study was conducted using a cross-sectional moderated mediation model to test the proposed hypotheses. A moderated mediation model was chosen to explore specific aspects of the relationship between internalized stigma and health outcomes and the moderating effects of the patient-provider relationship therein, see Figure 1.

To summarize, it was predicted that 1) internalized stigma would have a negative impact on self-care behaviors including diet, exercise, foot care, and medication adherence as well as HbA1C levels, 2) self-efficacy would mediate each of those relationships, and 3) the patient-provider relationship, characterized by trust in providers, would moderate the relationship between stigma and self-efficacy thus indirectly moderating self-care behaviors and HbA1C.

To test these hypotheses, I conducted a set of five separate moderated-mediation analysis to test each outcome variable of diet, exercise, foot care, medication adherence, and HbA1C. I also controlled for relevant demographic and psychosocial variables (income, education level, therapy regimen, and primary health insurance) that exhibited significant predictive relationships with outcome variables by including them in the moderated mediation analysis as covariates. In sum, it was hypothesized that despite the negative impact of T2DM stigma, those who experience more positive relationships with their providers would be more likely to follow through with recommended health behaviors.

Procedure

Due to variance in cultural norms and social influences unique to each nation and distinct health care systems, this study was limited to those living in the US, who are at least 18 years of age, and report having been formally diagnosed with T2DM by a medical provider. To avoid data that includes gestational diabetes, women who are pregnant or have given birth within the past six months were excluded. In accordance with similar studies, an apriori power analysis using G*Power software (Faul, Erdfelder, Lang & Buchner, 2009) indicated a sample of 146 was necessary to detect a small to medium effect size of $f^2 = .15$ with a power of .95. A total *n* of 352 was collected.

Purposive sampling methods were used to recruit individuals who have been diagnosed with T2DM. Individuals were recruited in online and in-person public forums (e.g., coffee shops, laundromat reader boards, Facebook, Instagram, Craigslist) via an online post or paper flier, see appendix I for examples. In addition, participants were recruited via word of mouth and personal email (e.g., asking family/friends to email the survey to individuals who may be interested to participate; see Appendix I). Notably, in-person recruitment efforts were used first. These efforts included distributing in-person fliers to public locations (e.g., coffee shops) in Alaska, Washington, and California. However, these efforts did not appear fruitful. After a few weeks, a virtual flier was posted on social media including Facebook, Instagram, Reddit, and Craigslist. These efforts appeared to yield the most participants. Therefore, it was assumed most of the participants were sourced from online social media platforms and Craigslist. Fliers, online posts, and email invitations included a short description of the study and a Qualtrics link that led participants to the survey test battery. The survey was administered anonymously via Qualtrics survey software. Participants who chose to complete the survey electronically endorsed informed consent documents before proceeding, see Appendix A. Participants who failed to confirm questions regarding the inclusion criteria were not allowed to progress through the rest of the survey.

Participants who consented and passed inclusion criteria questions began the survey by completing demographic, health, and psychosocial questions, see appendix B. Demographic questions included information about race, age, and gender. To better understand the participant population, information regarding health complications typically related to T2DM (e.g., amputated limb, peripheral neuropathy, high cholesterol) and medication therapy was gathered. Further, information about socioeconomic status (e.g., level of education, income, source of primary health insurance) was also collected. Participants were then instructed to complete each of the identified measures. The survey concluded with a debriefing summary, see Appendix H. Participants were only allowed to progress through the survey by providing answers to each question. However, participants maintained the choice to end their participation at any point throughout the survey by closing the online survey browser.

Participants who completed the survey were compensated with a $5.00 Amazon gift card. If a participant chose to prematurely end participation, they were no longer eligible for this compensation. To ensure anonymity, the last page of the survey guided participants to an additional Qualtrics link. This link requested participants to enter their full name and a personal email address. This email address was not associated with any particular response and was used solely to facilitate compensation of the $5.00 gift card. Compensation was provided to each participant within one month of survey completion.

Sample Characteristics

Table 1 contains the demographic and clinical characteristics of the sample used in this study. After data was cleaned, a total of 152 participants with T2DM, age 18 and above, who receive health care in the US, and have not been pregnant in the past 6 months completed each measure in the survey. These surveys were collected from internet crowd sourcing methods, largely harvested from Craig's List (CL) advertisement posted in CL "community forums" section. Overall, this sample appeared to be homogenous and mostly Caucasian, middle class, educated, and with health insurance. Most of the participants reported taking insulin, and the mean HbA1C level was in the "severely elevated" range (ADA, 2016). Notably, the mean age of this sample was 32.75 (sample age range 19-60 with 88% of participants between 25 and 45), which is at least fifteen years younger than most sample populations of people with T2DM (e.g., Kato et al., 2016; Kato et al., 2017; Nam et al., 2010; Varni et al., 2018; Travidi et al., 2017). Due to homogeneity of sample and lower ages, study results were interpreted as not generalizable to the broader US population of people T2DM, which is purportedly more diverse, older in age, and lower in SES (CDC, 2017). However, results may be applicable to a sub-group that ascribes to similar demographics, especially regarding age. For example, about four percent of the US population between the age of 18 and 45 are diagnosed with T2DM (CDC, 2017). As stated, study results will need to be verified across demographic groups to confirm applicability between US sub-cultures.

Table 1.
Demographic and clinical characteristics of participants.

	%	Mean	SD
Age (19-60)		32.75	8.08
HbA1C		8.44	1.02
Gender			
Male	61%		
Female	39%		
Race			
Black	5.9%		
Hispanic	5.3%		
Caucasian	86%		
Other	2.8%		
Income			
<$50,000 per year	32.2%		
$51,000-$100,000 per year	54%		
$101,000+ per year	13.8%		
Education			
High school diploma/equivalent or less	11.2%		
Some college or bachelor's degree	76.3%		
Graduate or professional degree	12.5%		
Insurance type			
Medicaid	30.3%		
Medicare	48%		
Private insurance	18.5%		
Other	3.2%		
Medication Regimen			
Insulin	86.8%		
Pump/MDI	9.2%		
No insulin	4%		

Measures

Stigma. Stigma was measured using the Self-Stigma Scale (SSS), a 39-item scale that measures the level of self-directed stigma as related to specific health related issues (see appendix C for full measure; Kato, Takada & Hashimoto, 2014). This scale uses a 4-point Likert scoring system, ranging from strongly disagree to strongly agree. High SSS total scores indicate higher levels of self-stigma (Kato et al., 2014). Test items included questions related to diabetic disease states such as "Being a diabetic takes away many opportunities from me" (Kato et al., 2014). Historically, the SSS has demonstrated a Cronbach's alpha of $\alpha = 0.96$, as well as good convergent validity when compared to self-esteem, r= -.43, self-efficacy, r=-.38, and depressive symptoms r=.39 using the Rosenberg Self-Esteem Scale, General Self-Efficacy, and the Patient Health Questionnaire-9, respectively (Kato et al., 2014). Due to technical error, this study collected 38 out of 39 questions of the SSS (question 39, "I dare not to make new friends because they might find out that I have diabetes" was entered but not recorded in the Qualtrics survey). However, in this study, the SSS still demonstrated an excellent Cronbach's alpha of $\alpha = 0.93$, which is consistent with literature and thus deemed acceptable for use in the analytical model.

Self-efficacy. In this study, self-efficacy was measured with the Diabetes Management Self-Efficacy Scale (DMSES; see appendix F for full measure). The DMSES was originally developed in collaboration by members of the International Partnership in Self-Management and Empowerment (Van der Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, 1999). This measure is a 20-item instrument aimed to assess levels of self-efficacy regarding health behaviors specific to T2DM treatment protocols (e.g., "I am able to examine my feet", "I am able to maintain my eating plan when I am feeling stressed or anxious"; McDowell, Courtney, Edwards, Shortridge-Baggett, 2005). This scale is scored using a 5-point Likert scale with lower scores indicating lower levels of self-efficacy. The DMSES has been used in over six different countries and shown to demonstrate acceptable psychometric properties including a good internal consistency alpha of $\alpha = .70$ to $\alpha = .90$, as well as good construct validity (Lee, Van der Bijl, Shortridge-Baggett, Han, & Moon, 2015; McDowell et al., 2005; Van der Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, 1999). Due to technical error, this study collected 19 out of 20 questions of the DMSES (question 20, "I am able to maintain my medication when I am ill" was entered but not recorded in the Qualtrics survey). However, the DMSES still demonstrated a Cronbach's alpha of $\alpha = 0.82$ and thus was deemed acceptable for use in the analytical model.

Self-care. Self-care was measured using the Summary of Diabetes Self-Care Activities (SDSCA; see appendix E for measure used). The SDSCA is aimed to assess the general frequency and consistency of recommended self-care activities for patients with T2DM as separated into individual subscales of diet, exercise, blood-glucose testing, routine foot care, and smoking behaviors (Toobert, Hampson, & Glasgow, 2000). This measure is recommended for use by researchers and practitioners to assess diabetes self-management and funded by the National Institutes of Health (Toobert, Hampson, & Glasgow, 2000). For the purpose of this study, only subscales regarding diet, exercise, and foot care were assessed. Specifically, this measure assessed the number of days that participants engaged in specific behaviors over the past week (e.g., number of days engaged in physical activity, number of days followed recommended eating plan). Higher total scores indicated more frequent self-care behaviors (Toobert, Hampson, & Glasgow, 2000). Toobert and colleagues, (2000) recommend using the brief version consisting of 11 items. The SDSCA has been shown to demonstrate appropriate test-retest reliability and good convergent validity (Toobert et al., 2000).

Medication adherence. Medication adherence was measured by the Morisky Medication Adherence Scale (MMAS-8), an 8-item self-report scaled that is scored by a yes/no response where each question is worth one point (see appendix D for full measure; Morisky, Green, & Levine, 1986). The eighth question is scored as a 5-level response where "never" and "rarely" receive a score of zero whereas "once in a while", "sometimes", and "usually" receive a score of one (Morisky et al., 1986). Question 5 is reverse scored. Scores of 0 indicate high adherence, scores of 1-2 indicate medium adherence, and scores of 3 and above indicate low adherence to medication recommendations (Morisky et al., 1986). Reliability for the MMAS-8 has been shown to be good (α=.83) and it has been used in many studies to indicate the level of patient adherence to medication recommendations (Garcia-Perez, Alvarez, Dill, Gil-Guillen & Orozco-Beltran, 2013). In this study, the MMAS-8 demonstrated a Cronbach's alpha of α= 0.56. This is similar to Zongo et al. (2016) who found a Cronbach's alpha of α=.60 in a Canadian sample of *n*=901. Zongo and colleagues found two factors within the MMAS-8 including intentional and unintentional non-adherence to medication treatment suggesting low internal consistency may be appropriate (Zongo et al., 2016). In this study the MMAS-8 was entered into the model as one continuous variable.

Patient-provider relationship. The patient-provider relationship was measured by the Trust in Provider Scale (TPS). The TPS is an 11-item measure used to gather information about the interpersonal process between patients and their physicians. The key aspect of the interpersonal interactions between physicians and patient it assesses involves trust, or the belief that a physician is credible, competent, reliable, and acting in the best interests of the patient (Anderson & Dedrick, 1990). Patients who trust their physicians too little may suffer health consequences whereas those who display too much trust in their providers may exhibit dependent behaviors that may also affect health outcomes (Anderson & Dedrick, 1990). Historically, this scale has been used to gauge the patient's desire for control as well as understand management of illness. The TPS uses a 5-point Likert scale; questions 1, 5, 7, and 11 are reverse scored. Higher scores indicate higher levels of trust in physician (Anderson & Dedrick, 1990). Previous research indicates this scale demonstrates good reliability with Cronbach's alpha ranging from .85 to .90 as well as good construct validity, demonstrated by appropriate correlations with various subscales of the Health Locus of Control Scale (e.g., moderate positive correlations with the powerful other, weak positive correlations with internal and chance locus of control) as well as moderate positive correlations with social desirability (Anderson & Dedrick, 1990). In this study, the TPS demonstrated a Cronbach's alpha of $\alpha = 0.69$ which is similar to findings from Kalsingh, Veliah, and Gopichandran (2017) that yielded an alpha level of .70 in an Indian sample.

Glycated hemoglobin (HbA1C or A1C). A self-report of the participant's most recent A1C level was used as an indicator of health (e.g., Liu et al., 2017; Nam et al., 2010; Travidi et al., 2017; Wang et al., 2011; White et al., 2016). At least one study has explicitly demonstrated the acceptable use of self-reported HbA1C when the majority of participants accurately recalled their levels correctly (Travidi et al., 2017). Travidi et al. (2017) used agreement statistical methods to compare 7,597 participant self-report A1C with laboratory measured A1C. The results from this study found that most individuals had adequate self-knowledge of HbA1C levels. However, individuals who more accurately recalled their A1C seemed to have significantly better glycemic control (Travidi et al., 2017). Other studies demonstrate relative concordance between self-report and medical record information (Jackson et al., 2014; Skinner, Miller, Lincoln, Lee & Katzis, 2005). For the purpose of the current study, HbA1C levels were gathered via self-report and interpreted within the context of self-report limitations.

Covariate Data

Race. This study measured race based on the National Diabetes Statistical Report (CDC, 2017) published by the Center for Disease Control. This report categorized race related data into five categories including Black/non-Hispanic, Hispanic, Asian, American Indian/Alaska Native, and White non-Hispanic (National diabetes statistics report [CDC], 2017). Similar to Liu et al. (2017), this study included an additional category of 'Other' for a total of six race-based categories. Race was entered into the analytical model as a covariate. Prior to data analysis, race was dummy coded using categories of Black, Caucasian, Hispanic, with a reference group of "Other" which was used to allow comparisons between larger categories, given the homogeneity of the sample.

Socio-economic status (SES). Typically, SES is a social construct that denotes access to social and practical resources (e.g., finances as well as prestige; Shavers, 2007). SES is often conceptualized by education level, income, and occupation (Shavers, 2007). However, in research SES is most usually measured by income and education level (Bijlsma-Rutte et al., 2016). Consistent with previous studies, this study gathered self-report information to quantify both categories. To further contextualize SES as it pertains to access to health care, this study gathered information regarding participants primary source of health insurance. To do so, participants were asked to identify primary source of health insurance as it pertains to four relevant categories: Medicaid, Medicare, private, and no insurance. Due to homogeneity of this sample, health insurance was dummy coded into two codes using private insurance as the reference group.

Following previous methods (e.g., Liu et al., 2017), participants were asked to identify total household income as separated into three categories: less than \$50,000, \$50,000-\$100,000, and more than \$100,000. Lastly, participants were asked to identify education level as separated into four categories: High school diploma/equivalent or less, some college or bachelor's degree, and graduate or professional degree (Liu et al., 2017). Both income and education level covariates were dummy coded prior to analytical procedures. The reference group for income was <\$50,000 (D1= \$51,000 - \$100,000, D2= >\$101,000), and the reference group for education level was high school equivalent or less.

Therapy regimen. Similar to Liu et al (2017), this study controlled for differences in varying degrees of medication regimens. Participants were asked to identify whether they were: taking insulin, not taking insulin, or using a pump/Multiple Daily Injections (MDI; Liu et al., 2017). This variable was dummy coded prior to analytical procedures using three groups of non-insulin, insulin, and pump/MDI with the reference group insulin (D1=pump/MDI, D2=no insulin).

Data Analysis

Data from participant responses were collected via Qualtrics software, cleaned, and then uploaded to SPSS for statistical analysis. After data cleaning, analytical procedures occurred in the follow sequence:

1. Using SPSS, descriptive statistics were analyzed to determine means, standard deviations, frequencies, and ranges for each demographic datum and the total scores of each measure. These statistics were used to contextualize the population of this sample. A set of bivariate Pearson correlations were used to determine the significance and strength of correlational relationships between measures (Varni et al., 2018).
2. To determine the predictive effects of demographic and socioeconomic variables on outcome variables, a set of regression analysis were run. Similar to Varni et al. (2018), each variable of age, gender, income, education level, therapy regimen, and primary health insurance were entered into a regression analysis to determine their predictive relationships with each of the outcome variables including self-care behaviors (diet, exercise, and footcare) as well as medication adherence and self-reported HbA1C. Demographic and psychosocial variables that exhibited a significant predictive relationship with outcome variables were controlled for via dummy coding and entered

into relevant moderated-mediation analysis as a co-variate (see Figure 1; Varni et al., 2018). There was no need to include non-significant demographic variables in moderated mediation analysis.

3. Five separate moderated mediation analyses, using the PROCESS macro (Hayes, 2013), were conducted to test the mediating effects of self-efficacy on each of the relationships between internalized stigma and self-care behaviors (diet, exercise, foot care), medication adherence, and HbA1C levels, while controlling for relevant demographic variables (e.g., that exhibited a predictive relationship with outcome variable) at levels of the moderator (patient-provider relationships; see Figure 2). Each analysis was conducted using the PROCESS macro (Hayes, 2013) Model 7 via SPSS using a 5,000-bootstrapping method. The mediating effects of self-efficacy were tested by examining for the presence of a direct effect (*c* path) and indirect effect (*c'* path; which is the product of the *a* and *b* paths) of stigma on each of self-care behaviors (diet, exercise, foot care), medication adherence, and self-reported HbA1C (Hayes, 2013). More specifically, the indirect test examined the effect of the direct interaction as well as the step wise interactions of the mediating variable (M or self-efficacy) of the independent variable (X or stigma) on the dependent variable (Y or medication adherence/self-care/HbA1C levels; Hayes, 2013).

Notably, PROCESS macro was used rather than Baron and Kenny (1986) methods for testing mediation analysis, due the sensitivity of PROCESS to detect indirect or what is known as conditional mediation (Hayes 2012; 2013; Zhao et al., 2010). An indirect-only or conditional mediation exists if there is presence of an indirect effect without a direct effect (Hayes 2012; 2013; Zhao et al., 2010). This is possible due to the resampling process used by bootstrapping

(Hayes 2012; 2013; Zhao et al., 2010). This method produces confidence intervals that directly test the significance of the indirect path (Hayes, 2013). This is different than Baron and Kenny who purported a direct effect must exist prior to testing for indirect effects (Baron & Kenny, 1986). Additionally, Baron and Kenny relied on the Sobel Test to determine the significance of the indirect effect (Baron & Kenny, 1986). However, the Sobel Test relies on normally distributed data which, rarely exists in social research (as stated in Zhao et al., 2010). The bootstrapping method used by PROCESS allowed us to directly test the significance of the indirect test with non-normally distributed data (independent of the direct effect; Hayes, 2013). Another critique of the Baron and Kenny method is the possibility that direct effects can be masked by sample characteristics (e.g., if there is an overrepresentation of participants who do not exhibit a significant relationship between X and Y, the direct effect may appear insignificant; Zhao, 2010). Again, the bootstrapping method allows us to detect small significant indirect effects that may have otherwise been overlooked. (Hayes, 2013) In sum, I was looking at which specific conditions affect the outcome variables. To reiterate, the bootstrapping method afforded us the sensitivity necessary to detect significant conditional indirect effects regardless of the presence of a direct effect (Hayes 2012; 2013; Zhao et al., 2010).

Similarly, I used PROCESS over structural equation modeling because the bootstrapping method allowed us to resample from a smaller collected sample (Kline, 2005). This was a practical decision in order to maximize accessible funds for this study. As recommended by Preacher and Hayes (2012; Hayes 2013) a bootstrap sample of 5,000 was used to yield bias corrected confidence intervals of 95%.

The moderating effects of the patient-provider relationship (as measured by the TPS) were analyzed for the interaction(s) with the independent variables (X and M) and influence on the predictive power for the indirect effect. A moderated mediation exists if a significant indirect effect significantly varies across levels of the moderator(s). The significance of the total model was determined by the index of moderated mediation. Again, confidence intervals of significant effects do not cross the integer zero (Hayes, 2012; 2013).

To summarize, separate moderated mediation analyses were conducted to better understand nuances of the relationship between stigma and specific health behaviors as moderated by the patient-provider relationship. Demographic and psychosocial variables were controlled for by first, running a set of regression analysis to confirm a significant predictive relationship with outcome variables. Significant covariates were entered into relevant moderated mediation analyses. In conclusion, the aim of this set of analysis was to make inferences about the contributing relationships between social stigma and specific health behaviors by way of self-efficacy, as moderated by the patient-provider relationship for patients with T2DM.

Chapter IV: Results

Data Cleaning

352 total surveys were collected. The data was then cleaned by excluding participants who failed to complete the survey, failed to provide typed information (e.g., height, weight), or exhibited a patterned response (e.g., choosing “always” for every answer). The survey was expected to take less than thirty minutes to complete and study authors were able to complete the survey between five- and twelve-minutes during test runs. To this end, surveys completed in less than eight minutes were excluded in the data analysis. In addition, surveys with IP addresses outside of the US or more than three IP address duplicates were excluded. Only surveys with three or fewer duplicate IP address were included due to the possibility of multiple members of a household taking the survey. To make sure participants were paying attention they were instructed to choose their health diagnoses from a list of eight potential health problems (e.g., heart disease, high cholesterol, stroke, etc.). Surveys that did not endorse having been diagnosed with T2DM were excluded from the analysis. Lastly, participants were instructed to enter their HbA1C values at the beginning and end of the same survey. Surveys were only included in the study if both of these HbA1C values were within .2% of each other. This exclusion was used based on the assumption that participants who entered drastically different HbA1C values (e.g., larger than .2%) may not have taken the survey seriously, may not have truly remembered their most recent A1C value, or may not have diabetes at all. After the data was cleaned, the total remaining *n* was 152. After reviewing skewness and kurtosis of measures for stigma, trust in providers, and self-efficacy, it was determined these scales were not significantly skewed.

Further Analysis for Trust in Provider Scale

To further understand the lower than expected alpha of the Trust in Provider scale, the item to item correlation for each of the 11 items on the TPS was calculated and found to correlate by at least .4, suggesting appropriate inter-item construct validity, see Table 2. Notably, item 10 correlated by .443 and item 11 correlated by .414 and the Cronbach's alpha was re-run without these two items. However, rather than increasing the alpha level, it was reduced to $\alpha = 0.65$. As such, all items of the TPS were included in data analysis. In addition to the face validity of the TPS for measuring the construct of trust, there is an abundance of evidence demonstrating good psychometric properties of this scale (Anderson & Dedrick, 1990; Kalsing et al., 2017; Thom et al., 1999). As suggested by Kalsing and colleagues, a limitation of the TPS relevant to the current study may be that it does not account for all facets of the patient-provider relationship. In addition, a large portion of literature that uses the TPS involves a sample mean age higher than the sample mean age in the current study (Anderson & Dedrick, 1990) which may be a contributing factor to low alpha levels.

Table 2.

Item to total correlation of the TPS.

	Question	Item to total correlation
1.	I doubt that my doctor really cares about me as a person.	.541
2.	My doctor is usually considerate of my needs and puts them first.	.505
3.	I trust my doctor so much I always try to follow his/her advice.	.579
4.	If my doctor tells me something is so, then it must be true.	.555
5.	I sometimes distrust my doctor's opinion and would like a second one.	.652
6.	I trust my doctor's judgements about my medical care.	.520
7.	I feel my doctor does not do everything he/she should for my medical care.	.718
8.	I trust my doctor to put my medical needs above all other considerations when treating my medical problems.	.562
9.	My doctor is a real expert in taking care of medical problems like mine.	.545
10.	I trust my doctor to tell me if a mistake was made about my treatment.	.443
11.	I sometimes worry that my doctor may not keep the information we discuss totally private.	.414

Correlation Analyses

Correlations, means, and standard deviations for all study measures are illustrated in Table 3. However, it is important to note study variables did not correlate as expected. First, the SSS was positively correlated with DMSES and the TPS. This means that high stigma was correlated with greater self-efficacy and more trust in providers. Second, the DMSES was negatively correlated with the TPS. This means that low trust in providers was correlated with better self-efficacy. Neither of these correlations were consistent with our study hypotheses which predicted the converse of these. Next, I noticed that trust in providers was positively correlated with stigma which is another paradoxical relationship that is inconsistent with study theory. High self-efficacy and high stigma were both correlated with higher prevalence of diet and exercise. However, I note the mean number of days engaged in exercise and healthy dieting was higher than what would be expected (e.g., ADA, 2018a, 2018b). Lastly, stigma was positively correlated with the MMAS and HbA1C as predicted. This means that high stigma was associated with worse medication adherence as well as worse HbA1C indicating poorer health status, which is consistent with literature (ADA, 2018b; Corrigan et al., 2009; Funnell, 2006).

Table 3.

Means, standard deviation, and Pearson correlation matrix for continuous variables (n=151).

	M	SD	1	2	3	4	5	6	7
1. SSS	82.71	15.50							
2.TPS	28.52	4.48	.167*						
3.DMSES	70.86	8.94	.256**	-.189*					
4.SDSCADiet	4.81	1.0	.290**	-.120	.451**				
5.SDSCAExercise	4.59	1.20	.171*	.358**	.290**	.152			
6.SDSCAFoot care	4.65	1.24	.132	.243**	.047	.132	.607**		
7.MMAS	3.98	2.12	.423**	.014	.144	.244**	.186*	.042	
8.HbA1C	8.44	1.02	.434**	.027	.007	.120	.212**	.137	.268**

*$p<.05$, **$p<.01$

Note. M mean, SD standard deviation. *SSS=Social Stigma Scale; TPS= Trust in Provider Scale; DMSES=Diabetes Mellitus Self-Efficacy Scale; SDSCA=Summary of Diabetes Self-Care Activities. MMAS=Morisky Medication Adherence Scale.*

Model Covariates

Before conducting the moderated mediation analysis, simple regression analyses were used to test which covariates of education, income, insurance, medication regimen, age, gender, and race significantly predicted each outcome variable of diet, exercise, foot care, medication adherence, and HbA1C. Table 4 denotes regression analysis outcomes for the outcome variable of diet. Education (R^2=.076, *F*(2,149)=6.11, *p*=.003), income (R^2=.102, *F*(2,149)=8.479, *p*<.001), age (R^2=.121, *F*(2,149)=20.617, *p*<.001), gender (R^2=.042, *F*(2,149)=6.502, *p*=.004), and race (R^2=.084, *F*(3,148)=4.552, *p*=.004) significantly predicted diet and were included in subsequent moderated mediation analysis. More specifically, male participants, increasing age, an income of $51,000 or more, non-Caucasian, and higher education were associated with a higher mean of self-reported healthy dietary behaviors.

Table 4.
Regression analysis of covariates for outcome variable self-care behaviors: SDSCA sub-scale diet.

	R	R^2	*F*	*p*
Education**	.274	.076	6.110	.003
Income**	.320	.102	8.479	.000
Insurance	.181	.033	2.435	.091
Medication Regimen	.169	.029	2.201	.114
Age**	.348	.121	20.617	.000
Gender*	.204	.042	6.502	.012
Race*	.291	.084	4.552	.004

*p<.05, **p<.01

Regression analyses were used to test which covariates significantly predicted exercise, see Table 5. Only income (R^2=.062, *F*(2,149)=4.935, *p*=.008) significantly predicted this variable. More specifically, income over $100,000 was predictive of greater self-report of exercise behaviors. As such, income was the only covariate included the moderated mediation model for the outcome variable of exercise.

Table 5.
Regression analysis for covariates on outcome variable self-care behaviors: SDSCA sub-scale exercise.

	R	R^2	*F*	*p*
Education	.175	.031	2.355	.098
Income**	.249	.062	4.935	.008
Insurance	.156	.024	1.790	.171
Medication Regimen	.193	.037	2.878	.059
Age	.110	.012	1.827	.179
Gender	.045	.002	.299	.585
Race	.225	.050	2.622	.053

*p<.05, **p<.01

Regression analyses were used to test which covariates significantly predicted foot care, see Table 6. No covariates significantly predicted this variable. As such, no covariates were included in the moderated mediation model for the outcome variable of foot care.

Table 6.
Regression analysis for covariates on outcome variable self-care behaviors: SDSCA sub-scale foot care.

	R	R^2	F	p
Education	.069	.005	355	.702
Income	.131	.017	1.301	.275
Insurance	.149	.022	1.640	.197
Medication Regimen	.195	.037	2.900	.058
Age	.108	.012	1.773	.185
Gender	.092	.008	1.268	.262
Race	.135	.018	922	.432

*$p<.05$, **$p<.01$

Regression analyses were used to test which covariates significantly predicted medication adherence, see Table 7. Significant analysis included income ($R^2=.051$, $F(2,149)=4.0169$, $p=.02$) and race ($R^2=.150$, $F(3,148)=8.693$, $p<.001$). More specifically income over $100,000 and being non-Caucasian were predictive of higher levels of non-adherence. As such income and race were included as covariates in the moderated mediation model for outcome variable of medication adherence.

Table 7.
Regression analysis for outcome variable medication adherence: MMAS.

	R	R^2	F	p
Education	.145	.021	1.597	.206
Income*	.226	.051	4.016	.020
Insurance	.034	.001	.081	.922
Medication Regimen	.051	.003	.191	.826
Age	.070	.005	.749	.388
Gender	.135	.018	2.781	.097
Race**	.387	.150	8.693	.000

*$p<.05$, **$p<.01$

Regression analyses were used to test which covariates significantly predicted HbA1C, see Table 8. Significant analysis included income ($R^2=.08$, $F(2,151)=6.462$, $p=.002$), insurance ($R^2=.059$, $F(1,152)=6.462$, $p=.002$), and race ($R^2=.076$, $F(3,148)=4.048$, $p=.008$). More specifically, an income of less than $51,000, having Medicare insurance, and being Black were predictive of higher HbA1C levels. As such, income, insurance, and race were included as covariates in the moderated mediation model for outcome variable of HbA1C.

Table 8.
Regression analysis for covariates on outcome variable: HbA1C.

	R	R^2	*F*	*p*
Education	.097	.009	.704	.496
Income**	.283	.080	6.462	.002
Insurance*	.244	.059	5.553	.012
Medication Regimen	.128	.016	1.249	.290
Age	.136	.018	2.818	.095
Gender	.031	.001	.147	.703
Race**	.274	.076	4.048	.008

**p<.05, **p<.01*

Moderated-Mediation Analyses

This section outlines the estimated regression coefficients for five moderated-mediation analyses. Moderated mediation analysis controlled for the moderating effects of the patient-provider relationship in addition to relevant covariates (see figures 3-7). Moderated mediation analyses were completed using PROCESS (Hayes, 2013) with a bootstrap resample of 5,000 to yield bias corrected confidence intervals of 95% (Hayes, 2013). Effects are only considered to be significant if the confidence interval does not include zero. Specifically, Hayes model 7 was used to predict the amount that the patient-provider relationship will modify the path between social stigma and self-efficacy (see Figure 1). Figure 2 represents the statistical model, demonstrating the interaction between social stigma and the patient-provider relationship as a moderating variable.

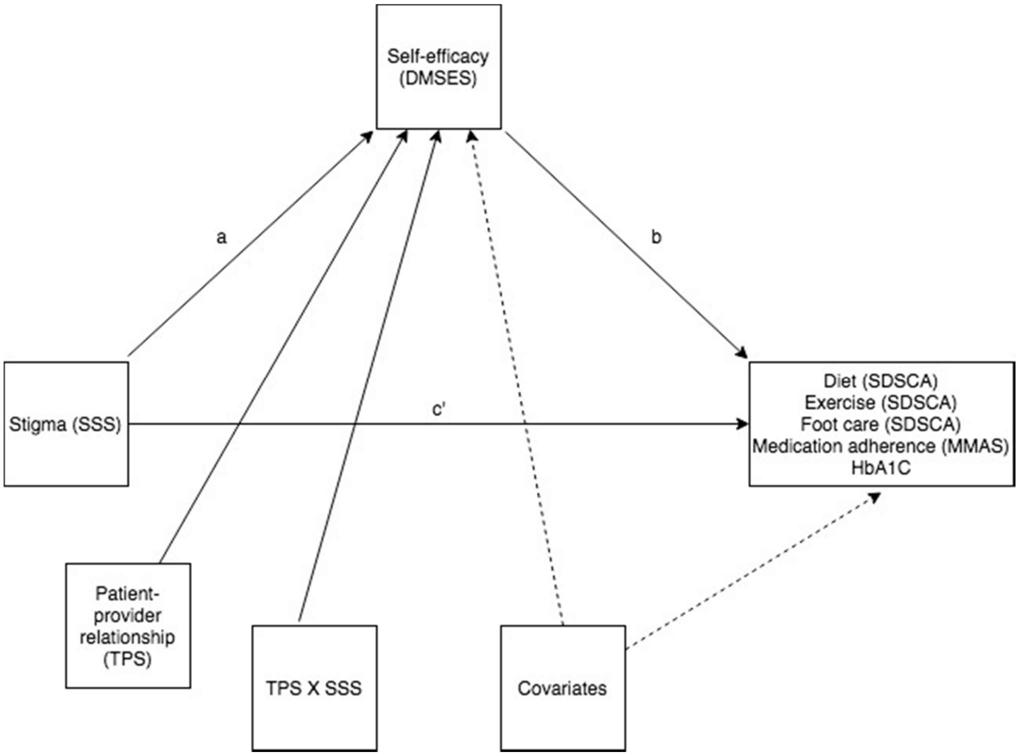

Figure 2. Statistical Model.

Diet

Table 9 depicts the moderated mediation summary for the outcome variable of dietary behaviors without controlling for relevant covariates (see Table 3). This analysis exhibited a significant direct effect of stigma on exaggerated self-reports of dietary behaviors (c’ path). This means higher stigma resulted in more frequent dietary behaviors. Results of this analysis also demonstrated significant a and b paths which means that self-efficacy mediated the relationship between stigma and dietary behaviors. This means higher levels of stigma predicted higher levels of self-efficacy resulting in more frequent dietary behaviors. In sum, stigma directly (c’ path) as well as indirectly (a and b paths) resulted in more frequent healthy dietary behaviors.

Results of this analysis also exhibited a significant negative interaction between trust in providers and stigma (TPS x SSS). This suggests that high stigma predicts high self-efficacy when trust in providers is low. However, the interval of the index of moderated mediation for the total model included zero indicating the total model was not significant (see Tables 10 and 12). This means trust in providers moderated the effects of stigma on self-efficacy but did not moderate the overall effect of stigma on self-report of dietary behaviors.

To summarize, prior to controlling for covariates, this model demonstrated a direct effect of stigma on self-report of dietary behaviors (c' path), self-efficacy mediated this relationship (a and b paths), and trust in providers moderated the relationship between stigma and self-efficacy (TPS x SSS). However, trust in providers did not moderate the effects of stigma on the outcome variable of self-reported dietary behaviors meaning there was moderation and mediation but no moderated mediation of the total model.

Table 9.
Model summary for outcome variable: SDSCA subscale diet. No model covariates were included in this analysis.

	Effect	S.E.	*t*	*p*	LLCI	ULCI
Constant	1.47	.61	*2.39*	.02	.25	2.69
Direct Effect	.01	.01	2.52	.01	.003	.02
SSS on DMSES	.19	.04	4.15	<.001	.1	.27
TPS on DMSES	-.51	.15	-3.30	.001	-.81	-.20
DMSES on Diet	.04	.01	5.45	<.001	.03	.06
TPSxSSS	-.02	.01	-2.40	.02	-.04	-.004

Note. *DMSES=Diabetes Mellitus Self-Efficacy Scale; SSS=Social Stigma Scale; TPS= Trust in Provider Scale.*

Table 10.
Conditional indirect effects of patient-provider relationship on outcome variable: SDSCA subscale diet. No model covariates were included in this analysis.

TPS	Effect	Boot SE	BootLLCI	BootULCI
43.72	.01	.006	.01	.03
51.87	.01	.003	.004	.02
60.01	.004	.004	-.002	.01
Index of Moderated Mediation		.008	-.003	.000

Note. *TPS= Trust in Provider Scale.*

When controlling for model covariates of race, education, income, age, and gender (see Table 3), the direct path from stigma to diet becomes non-significant. Similarly, the interaction effect between stigma and trust in providers on self-efficacy also becomes non-significant (see table 11). Relevant significant covariates included age (coeff = .17, 95% CI [.01, .34], p= .005) and graduate education (coeff= .15, 95% CI [-4.52, 15.84], p<.001) which were positively associated with self-efficacy. Similarly, age (coeff= .09, 95% CI=.01, .04], p=.01) and income over $100,000 (coeff= .01, 95% CI [.11, .78], p=.01) were positively associated with higher reports of dietary behaviors.

In sum, when controlling for covariates, this model did not exhibit a direct effect of stigma on self-reported dietary behaviors. However, the model that included covariates still exhibited significant a and b paths, see figure 3. Per Hayes (2013), significant a and b paths, regardless of a significant direct effect indicate conditional mediation. This means self-efficacy conditionally mediated the relationship between stigma and self-reported dietary behaviors. It is possible the inclusion of covariates masked significant relationships (Hayes, 2013), thus providing more evidence to suggest the presence of conditional effects.

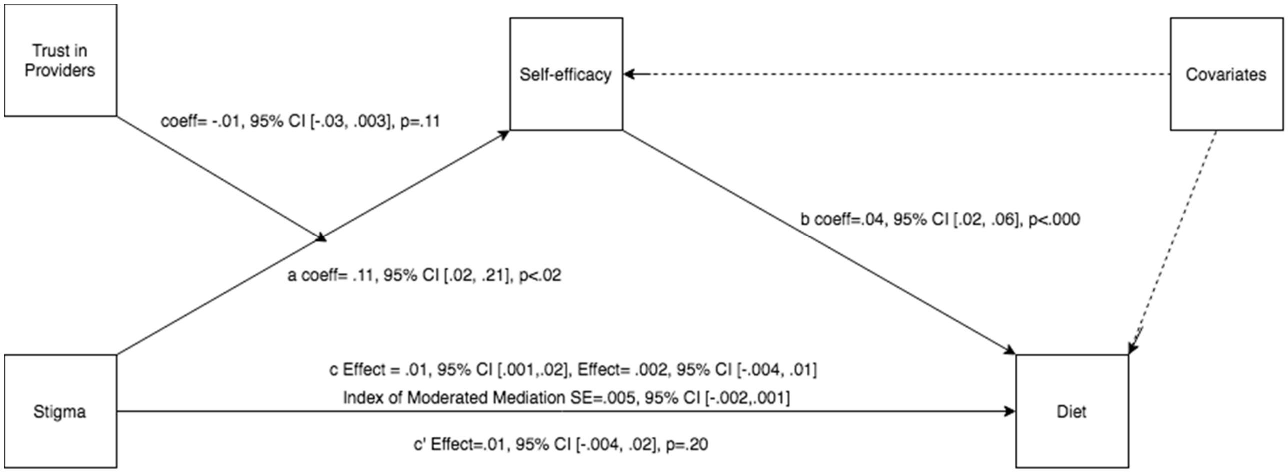

Figure 3. Moderated mediation analysis for outcome variable of diet including covariates of race, gender, age, income, and education.

Table 11.

Model summary for outcome variable: SDSCA subscale diet. This model controlled for race, education, income, age, and gender.

	Effect	S.E.	*t*	*p*	LLCI	ULCI
Constant	1.45	.80	1.81	.07	-.12	3.02
Direct Effect	.01	.01	1.27	.20	-.004	.02
SSS on DMSES	.11	.05	2.30	.02	.02	.21
TPS on DMSES	-.23	.16	-1.46	.15	-54	-.08
DMSES on Diet	.04	.01	4.25	<.001	.02	.06
TPSxSSS	-.01	.01	-1.62	.11	-.03	.003

Note. *DMSES=Diabetes Mellitus Self-Efficacy Scale; SSS=Social Stigma Scale; TPS= Trust in Provider Scale.*

Table 12.

Conditional indirect effects of patient-provider relationship on outcome variable: SDSCA subscale diet. This model controlled for race, education, income, age, and gender.

TPS	Effect	Boot SE	BootLLCI	BootULCI
43.72	.01	.004	.001	.02
51.87	.01	.003	.000	.01
60.01	.002	.003	-.004	.01
Index of Moderated Mediation		.005	-.002	.001

Note. *TPS= Trust in Provider Scale.*

Exercise

Table 13 depicts the moderated mediation summary for outcome variable of exercise behaviors without controlling for relevant covariables. This analysis exhibited a significant direct effect from stigma to self-reported exercise behaviors (c' path). This means that high stigma results in higher self-reported exercise behaviors. This analysis also demonstrated significant a and b paths suggesting full mediation by self-efficacy on the relationship between stigma and self-reported exercise behaviors. This means high stigma resulted in high self-efficacy which then led to reports of more frequent exercise. In sum, this model exhibited both a direct effect (significant c' path) of stigma on self-report of exercise behaviors as well as an indirect effect (significant a and b paths) indicating self-efficacy as a mediator of this relationship.

This model exhibited a significant negative interaction between stigma and trust in providers (TPS x SSS) suggesting a moderating effect of trust in providers on the relationship between stigma and self-efficacy. This means that high stigma predicts high self-efficacy when trust in providers is low. However, the interval of the index of moderated mediation for the total model included zero indicating the total model summary was not significant (see Tables 14 and 16). This means trust in providers moderated the effect of stigma on self-efficacy but did not have an effect on self-report of exercise behaviors.

In summary, prior to controlling for covariates, this model demonstrated a direct effect of stigma (c' path) on self-report of exercise behaviors, self-efficacy mediated this relationship (a and b paths), and trust in providers moderated the relationship between stigma and self-efficacy (TPSx SSS). However, trust in providers did not moderate the effects of stigma on the outcome variable of self-reported exercise behaviors meaning there was moderation and mediation but no moderated mediation of the total model.

Table 13.

Model summary for outcome variable: SDSCA subscale exercise. No model covariates were included in this analysis.

	Effect	S.E.	*t*	*p*	LLCI	ULCI
Constant	2.08	.77	2.68	.008	.54	3.60
Direct Effect	.01	.01	1.28	.20	-.004	.02
SSS on DMSES	.19	.04	4.16	<.000	.10	.27
TPS on DMSES	-.51	.15	-3.30	.001	-.81	-.20
DMSES on Exercise	.04	.01	3.27	.001	.01	.06
TPS x SSS	-.02	.01	-2.39	.02	-.04	-.004

Note. *DMSES=Diabetes Mellitus Self-Efficacy; SSS=Social Stigma Scale; TPS= Trust in Provider Scale.*

Table 14**.**

Conditional indirect effects of patient-provider relationship on outcome variable: SDSCA subscale exercise. No model covariates were included in this analysis.

TPS	Effect	Boot SE	BootLLCI	BootULCI
43.72	.01	.004	.003	.02
51.87	.006	.003	.002	.01
60.01	.003	.003	-.001	.01
Index of Moderated Mediation		.006	-.002	.000

Note. *TPS= Trust in Provider Scale.*

When controlling for model covariate of income (see Table 3), the direct path from stigma to exercise becomes non-significant (see Figure 4). The only significant covariate included an annual income of over $100,000 which was positively associated with self-reports of exercise behaviors (coeff= .87, 95% CI [.28, 1.46], p=.004). As stated, it is possible model covariates have an effect on the predictor variable of stigma which would account for the change in significance between stigma and self-reported exercise (Hayes, 2013).

In sum, when controlling for model covariates, this analysis did not exhibit a direct effect of stigma on self-reports of exercise. However, there was still an indirect effect as indicated by significant a and b paths. This means there was a conditional mediation of self-efficacy on the relationship between stigma and self-reported exercise behaviors. There was also a significant interaction between stigma and trust in providers indicating trust in providers moderated the relationship between stigma and self-efficacy. However, there was not a significant moderation effect on the full model. To conclude, there was conditional mediation and moderation but not moderated mediation in this analysis.

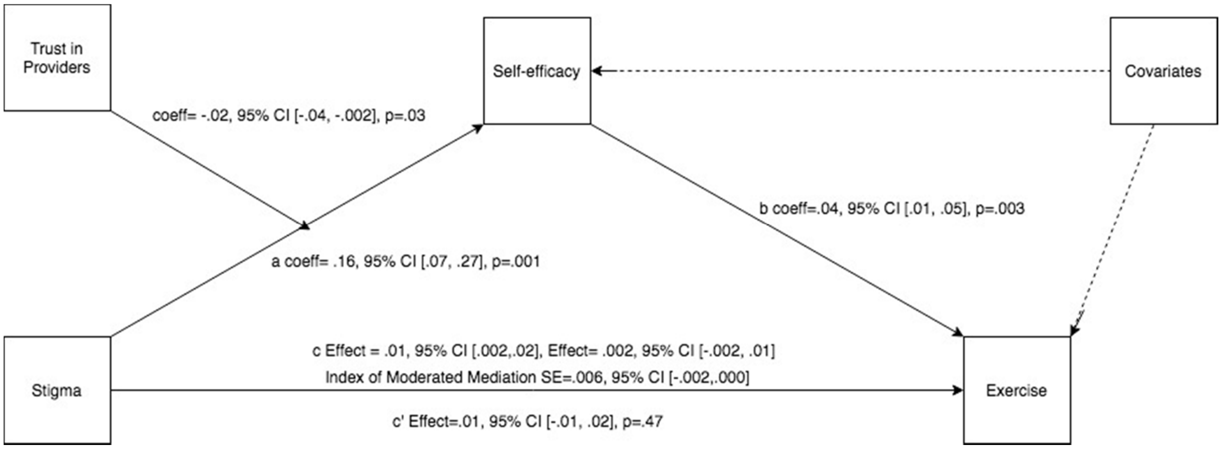

Figure 4. Moderated mediation analysis for outcome variable of exercise including the covariate of income.

Table 15.

Model summary for outcome variable: SDSCA subscale exercise. This model controlled for income.

	Effect	S.E.	*t*	*p*	LLCI	ULCI
Constant	2.00	.92	2.16	.03	.17	3.82
Direct Effect	.01	.01	.72	.47	-.01	.02
SSS on DMSES	.16	.05	3.24	.001	.07	.27
TPS on DMSES	-.48	.16	-3.06	.003	-.80	-.17
DMSES on Exercise	.04	.01	3.03	.003	.01	.05
TPSxSSS	-.02	.01	-2.15	.03	-.04	-.002

Note. *DMSES=Diabetes Mellitus Self-Efficacy Scale; SSS=Social Stigma Scale; TPS= Trust in Provider Scale.*

Table 16**.**

Conditional indirect effects of patient-provider relationship on outcome variable: SDSCA subscale exercise. This model controlled for income.

TPS	Effect	Boot SE	BootLLCI	BootULCI
43.72	.01	.004	.002	.02
51.87	.01	.003	.002	.01
60.01	.003	.003	-.002	.01
Index of Moderated Mediation		.006	-.002	.000

Note. *TPS= Trust in Provider Scale.*

Foot Care

Table 16 depicts the moderated mediation summary for the outcome variable of foot care. This model did not control for any covariates (see Table 5). This analysis did not exhibit a significant direct effect (c' path) from stigma to foot care. Similarly, this analysis did not exhibit a significant indirect effect as the b path from self-efficacy to foot care was not significant (see Figure 5). This indicates self-efficacy did not mediate the relationship between stigma and self-reported foot care behaviors, despite a significant a path. This suggests predictor variables including both stigma and self-efficacy do not seem to have an effect on self-reported foot care behaviors.

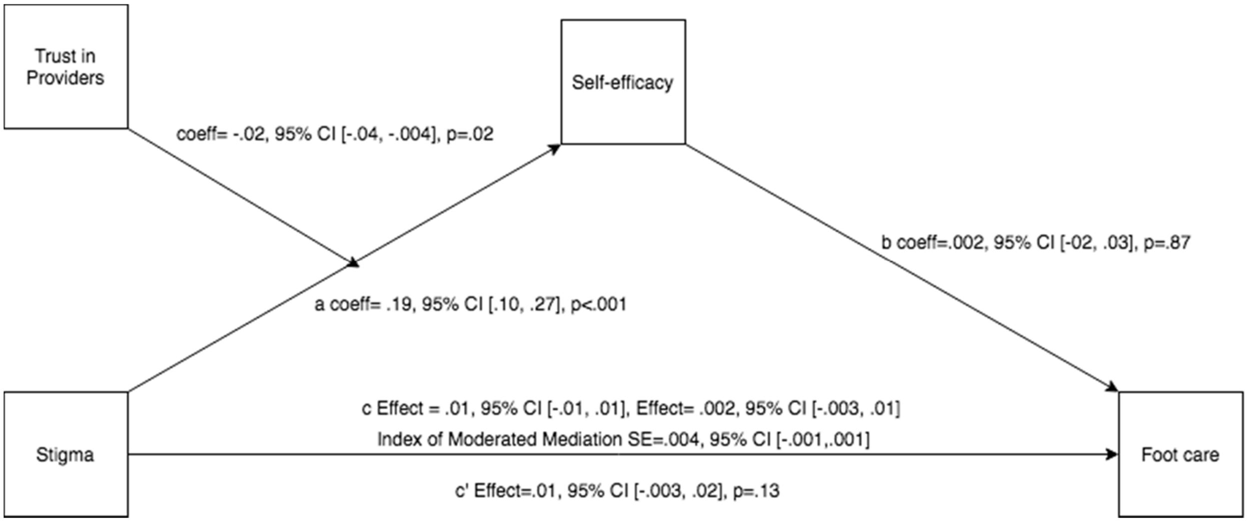

Figure 5. Moderated mediation analysis for outcome variable of foot care.

This analysis demonstrated a significant positive relationship between stigma and self-efficacy (a path). Further, there was a significant negative interaction between trust in providers and stigma. This means that high stigma predicts high self-efficacy, but only when trust in providers is low. However, the index of moderated mediation included the integer of zero meaning trust in providers did not moderate the outcome variable of self-reported foot care (see Table 18). In summary, trust in providers moderated the relationship between stigma and self-efficacy but not the total model (see Figure 5).

In summary, there was neither a direct or an indirect effect of the total model in this analysis. There was a significant effect of stigma on self-efficacy as well as a significant negative interaction between stigma and trust in providers indicating trust in providers moderated this relationship. To conclude, this model demonstrated moderation but no mediation and no moderated mediation of the total model.

Table 17.
Model summary for outcome variable: SDSCA subscale foot care. This model did not include covariates.

	Effect	S.E.	*t*	*p*	LLCI	ULCI
Constant	4.51	.83	5.42	<.000	2.87	6.16
Direct Effect	.01	.01	1.53	.13	-.003	.02
SSS on DMSES	.19	.04	4.16	<.000	.10	.27
TPS on DMSES	-.51	.15	-3.30	.001	-.81	-.20
DMSES on Foot care	.002	.01	.17	.87	-.02	.03
TPSxSSS	-.02	.01	-2.39	.02	-.04	-.004

Note. *DMSES=Diabetes Mellitus Self-Efficacy Scale; SSS=Social Stigma Scale; TPS= Trust in Provider Scale.*

Table 18.
Conditional indirect effects of patient-provider relationship on outcome variable: SDSCA subscale foot care. This model did not include covariates.

TPS	Effect	Boot SE	BootLLCI	BootULCI
43.72	.01	.005	-.01	.01
51.87	.004	.003	-.01	.01
60.01	.002	.002	-.003	.01
Index of Moderated Mediation		.004	-.001	.001

Note. *TPS= Trust in Provider Scale*

Medication Adherence

Table 18 depicts the moderated mediation summary for the outcome variable of medication adherence while controlling for relevant covariates (see Table 6). In this analysis, the MMAS is purported to be reflective of actual medication adherence. Notably, there were no significant differences in model outcomes with or without the inclusion of covariates.

The direct effect (c' path) exhibited a significant positive relationship between stigma and medication adherence (see Figure 6). This suggests higher levels of stigma are predictive of higher levels of non-adherence. Conversely, there was not a significant indirect effect (a and b paths). While there was a positive significant a path from stigma to self-efficacy, there was not a significant b path from self-efficacy to medication adherence. This suggests self-efficacy did not mediate the relationship between stigma and medication adherence.

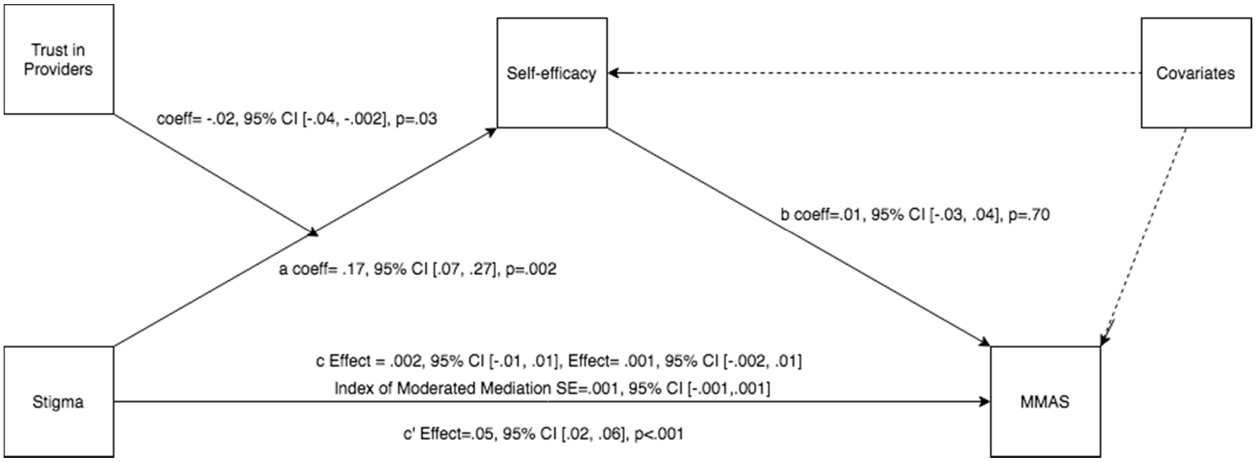

Figure 6. Moderated mediation analysis for outcome variable of exercise including covariates of race and income. MMAS= Morisky Medication Adherence Scale.

This analysis demonstrated a significant positive relationship between stigma and self-efficacy (a path). Further, there was a significant negative interaction between trust in providers and stigma (TPS x SSS). This means that high stigma predicts high self-efficacy, but only when trust in providers is low. However, the index of moderated mediation included the integer of zero meaning trust in providers did not moderate the outcome variable of medication adherence (see Table 20). In sum, trust in providers moderated the relationship between stigma and self-efficacy but not the total model (see Figure 6).

In sum, there was a direct effect meaning high stigma resulted in medication non-adherence. However, there was no evidence to suggest self-efficacy mediated this relationship. Notably, there was a significant effect of stigma on self-efficacy as well as a significant negative interaction between stigma and trust in providers indicating trust in providers moderated this relationship. However, there was no moderation effect on the outcome variable of medication adherence. To conclude, this model demonstrated a direct effect as well as moderation but no mediation and no moderated mediation of the total model.

Table 19.

Model summary for outcome variable: medication adherence (MMAS). This model controlled for race and income.

	Effect	S.E.	*t*	*p*	LLCI	ULCI
Constant	4.56	1.53	2.98	.003	1.53	7.58
Direct Effect	.05	.01	3.84	<.001	.02	.06
SSS on DMSES	.17	.05	3.24	.002	.07	.27
TPS on DMSES	-.48	.16	-3.07	.003	-.80	-.17
DMSES on MMAS	.01	.02	.39	.70	-.03	.04
SSS x TPS	-.02	.01	-2.15	.03	-.04	-.002

Note. *DMSES=Diabetes Mellitus Self-Efficacy Scale; SSS=Social Stigma Scale; TPS= Trust in Provider Scale.*

Table 20.

Conditional indirect effects of patient-provider relationship on outcome variable: medication adherence (MMAS). This model controlled for race and income.

TPS	Effect	Boot SE	BootLLCI	BootULCI
43.72	.002	.005	-.01	.01
51.87	.001	.003	-.04	.01
60.01	.001	.002	-.002	.01
Index of Moderated Mediation		.001	-.001	.001

Note. *TPS= Trust in Provider Scale.*

HbA1C

Figure 7 depicts the moderated mediation analysis with the inclusion of model covariates including race, income, and insurance (see Table 7). Notably, there were no significant differences in model outcomes with or without the inclusion of covariates. Significant covariates included having Medicare insurance was associated with self-efficacy (coeff= -4.10, 95% CI [-7.85, -.35], p=.03). Having an income of at least $51,000 or Medicare insurance were associated with worse HbA1C (coeff= .48, 95% CI [.06, .61], p=.02; coeff=.44, 95% CI [.10, .78], p=.01). Race did not exhibit any significance in this moderated-mediation model. Differences in regression analysis, see Table 7, and this moderated mediation analysis may be due to multicollinearity between independent variables (to include covariates) but do not have bearings on study results as we are not interested in these relationships (McClelland, 2016). Further, there were no differences in significance between the moderated mediation analysis for the outcome variable including covariates versus no-covariates. Therefore, only the model including covariates was reported in this section.

This analysis demonstrated a significant direct effect (c' path) of stigma on HbA1C (see Figure 7). This means higher stigma resulted in worse HbA1C. Conversely, there was not a significant indirect effect (a and b paths). While there was a positive significant a path from stigma to self-efficacy, there was not a significant b path from self-efficacy to HbA1C. This means self-efficacy did not mediate the relationship between stigma and HbA1C (see Figure 7).

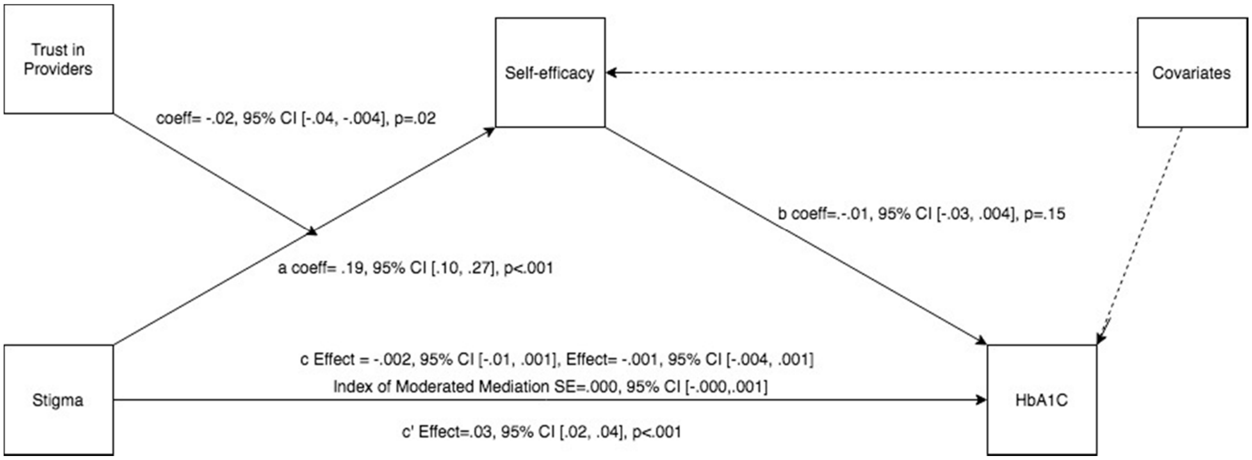

Figure 7. Moderated mediation analysis for outcome variable of HbA1C including covariates of race, income, and insurance.

This analysis demonstrated a significant positive relationship between stigma and self-efficacy (a path). Further, there was a significant negative interaction between trust in providers and stigma (TPS x SSS). This means that high stigma predicts high self-efficacy, but only when trust in providers is low. However, the index of moderated mediation included the integer of zero meaning trust in providers did not moderate the outcome variable of HbA1C (see Table 22). In sum, trust in providers moderated the relationship between stigma and self-efficacy but not the total model (see Figure 7).

In sum, there was a direct effect in which high stigma resulted in worse HbA1C. However, there was no evidence to suggest self-efficacy mediated this relationship. Notably, there was also a significant effect of stigma on self-efficacy as well as a significant negative interaction between stigma and trust in providers indicating trust in providers moderated this relationship. However, there was no moderation effect on the outcome variable of HbA1C. To conclude, this model demonstrated a direct effect as well as moderation but no mediation and no moderated mediation of the total model.

Table 21.
Model summary for outcome variable: self-report HbA1C. This model controlled for race, income, and primary source of health care insurance.

	Effect	S.E.	*t*	*p*	LLCI	ULCI
Constant	8.49	.68	12.52	<.001	7.14	9.83
Direct Effect	.02	.01	4.08	<.001	.01	.03
SSS on DMSES	.14	.06	2.58	.01	.03	.25
TPS on DMSES	-.40	.01	-2.49	.01	-.72	-.08
DMSES on HbA1C	-.01	.01	-1.46	.15	-.03	.004
TPSxSSS	-.02	.01	-1.78	.08	-.04	.002

Note. *DMSES=Diabetes Mellitus Self-Efficacy Scale; SSS=Social Stigma Scale; TPS= Trust in Provider Scale.*

Table 22.
Conditional indirect effects of patient-provider relationship on outcome variable: self-report HbA1C. This model controlled for race, income, and primary source of health care insurance.

TPS	Effect	Boot SE	BootLLCI	BootULCI
43.72	-.002	.002	-.01	.001
51.87	-.001	.001	-.01	.000
60.01	-.001	.001	-.004	.001
Index of Moderated Mediation		.000	-.000	.001

Note. *TPS= Trust in Provider Scale.*

Chapter V. Discussion

This study used a cross-sectional moderated mediation model to better understand the capability of the patient-provider relationship to mitigate the impact of social stigma on self-efficacy to indirectly influence health behaviors and health outcomes. To date, most of the research outlining the relationships between these variables has been conducted outside of the US (e.g., Funnell, 2006; Peyrot et al., 2005b). This is problematic considering the complex differences in social environment as well as health care systems between nations (e.g., Funnell, 2006; Peyrot et al., 2005b). To remedy this issue, the present study used internet crowd sourcing methods to sample solely from a US population.

The sample was largely homogenous and characterized as non-Hispanic Caucasian, middle class, educated, and with health insurance. The CDC (2017) indicates Americans of color, those considered low income, and those with less education are more likely to be diagnosed with T2DM. The mean age of the present study sample population was 32 years old which also differs from the typical onset of T2DM in the US which is usually between the ages of 45 and 65 years (CDC, 2017). Because the sample population is not reflective of the broader US population, results of this study were not generalizable across demographic and socioeconomic groups. However, study results may be applicable to a subset of the US population to include younger (e.g., 30’s), affluent, Caucasian persons who are diagnosed with T2DM.

Zero-Order Correlations

It is possible the uniqueness of this sample is responsible for the paradox of the zero-order correlations between predictor variables. For example, higher stigma was correlated with higher trust in providers and higher self-efficacy. Similarly, more trust was correlated with lower self-efficacy. None of these correlations were consistent with the study hypothesis which predicted the converse of these. Although, the overall sample was relatively high in stigma and low in trust in providers which is a dynamic that is consistent with literature (e.g., ADA, 2018a; Perrin et al., 2009; Verhaeghe & Bracke, 2011). Similarly, self-efficacy scores were seemingly high when compared to similar studies or what would be consistent with what is known about health behaviors and T2DM (ADA, 2018a; Freitas et al., 2014; Funnell, 2006).

On another note, the self-reported prevalence of exercise and healthy dieting was higher than what would be expected (e.g., ADA, 2018a, 2018b). Therefore, these measures are probably indicative of inflated self-reports. This is consistent with Toobert et al., (2000) who indicated the SDSCA subscales of diet and exercise, like other self-report measures, may be vulnerable to desirability bias. Further, it may be surmised that participants who are truly engaging in frequent exercise and healthy eating would exhibit lower HbA1C levels than what was reported in this study (ADA, 2016). As such, self-care behaviors of diet and exercise were probably exaggerated self-reports.

It is possible this sample exhibited apparent competence which is when people present themselves as more capable than they are (Dimeff, Koerner, & Koerner, 2007). This is distinguished from the concept of perceived self-efficacy outlined in self-determination theory which is characterized by the need to feel effective in order to experience motivation to engage in behavior change (Rogers et al., 2013). Self-determination theory posits that high perceived self-efficacy would be correlated with positive health behaviors however, this is not reflected in the HbA1C levels, which is a biomarker that reflects the past three to six months' worth of health behaviors (Rogers et al., 2013). Therefore, I surmised this sample exhibited apparent competence rather than high perceived self-efficacy due to the incongruence between high levels of self-efficacy and HbA1C levels that indicate the sample generally does not have well-controlled diabetes. Further, higher stigma was correlated with worse medication adherence and worse HbA1C, which is consistent with literature (ADA, 2018b; Corrigan et al., 2013; Funnell, 2006). This indicates that the sample reported unexpectedly high levels of self-efficacy and diet/exercise behaviors when in reality there was evidence to suggest stigma had a negative impact on adherence behaviors and overall health outcomes.

As stated, it is possible sample characteristics are responsible for the paradoxical relationships observed in the zero-order correlations. For example, this sample was almost fifteen years younger than what the CDC denotes as more likely to be diagnosed with T2DM (CDC, 2017). Younger people have been shown to be more reactant or resistant to health recommendations and have also been known to be less likely to reach out for help with health issues (Hong et al., 1994; Rains & Turner, 2007; Thompson et al., 2016; Woller, Buboltz & Loveland, 2007). It is possible that some younger people feel the need to prioritize other areas of life ahead of diabetes management (e.g., career, relationships; Sattar et al., 2019). It is also possible that some people do not take health issues seriously for fear of being perceived as weak (Thompson et al., 2016).

Therefore, younger people who do not have a sense of urgency about their health, exhibit reactive tendencies, or feel weak when reaching out for help are probably more likely to experience dissonance around their health status (Dimeff, Koerner & Linehan, 2007; Thompson et al., 2016). This type of health dissonance could be a contributing factor for the development of T2DM at such as young age in the first place. Further, this dynamic could be responsible for the paradox observed in the zero-order correlations, which seemed to paint a picture of apparent competence. It is likely that age is a key contributing factor for this type of health dissonance.

However, it is also possible that these dynamics are related to factors other than age but haven't been observed in the current literature on T2DM because the life expectancy of younger people diagnosed with T2DM is significantly shortened (Sattar et al., 2019). For example, it is possible that people who experience health dissonance as well as struggle to reach out for help may not live long enough to be included in health studies conducted on older people.

Thus, it is possible sample characteristics in addition to age contributed to the paradoxical correlations. For example, Sullivan (2017) discusses the phenomenon in which the 'Millennial' generation seems to be more eager to express opposition in the form of indignation, especially within an internet setting. For example, questions related to stigma and health adherence may have inadvertently triggered indignance rather than accurate reporting (Rains & Turner, 2007; Sullivan, 2017). Similarly, it is possible that people who are willing to take an online survey posted on social media platforms like Instagram, Reddit, and Craig's List could have felt more comfortable presenting positively (e.g., high self-efficacy) due to the anonymity of the online platform (Sullivan, 2017).

Discussion of Analysis

This study theorized that positive patient-provider relationships would mitigate the negative effect of stigma on self-efficacy (e.g., Beverly et al., 2012; Funnell, 2006; Maddigan, Majumdar, & Johnson, 2005; Van Dam et al., 2003; Gredig & Bartelsen-Raemy, 2016; Polonsky et al., 2017; Schillinger, Bindman, Wang, Stewart, & Piette, 2003). I then predicted high self-efficacy would be associated with better adherence to self-care behaviors as well as better health outcomes (Brown et al., 2013; Corrigan, Larson, & Rusch, 2013; Kato et al., 2016; Kwan, & Wong, 2003; Shiu, Kwan, & Wong, 2003). Lastly, I purported trust in providers would moderate the ill effects of stigma on self-efficacy thus indirectly resulting in more frequent health behaviors and better health outcomes, as long as relationships are positive (Funnell, 2006; Polonsky et al., 2017). As previously discussed, I observed the measurement tools intended to quantify self-efficacy, diet, and exercise revealed higher scores than expected (e.g., Paulhus, 1984; Toobert et al., 2000). Again, this was evidenced by the sample mean for self-efficacy, diet, and exercise being higher than what would be expected given the sample mean HbA1C was reflective of uncontrolled diabetes (ADA, 2018a; Freitas et al., 2014; Funnell, 2006; Perrin et al., 2009). Further, I observed paradoxical relationships between stigma, self-efficacy, and trust in providers that was not consistent with the study theory. For example, I predicted stigma would be negatively associated with self-efficacy but in this study, they were positively associated. This means that higher stigma resulted in higher self-efficacy. To make sense of these paradoxical relationships, I theorized the response pattern of the data was consistent with patterns indicative of psychological reactance theory (Brown et al., 2013; Dowd, 2002). This theory suggests that when some people feel threatened (e.g., limited by social rules such as stigma or confined to health recommendations) they respond with indignance (e.g., annoyance or righteous anger) rather than compliance or self-effacement (Dowd, 2002). Further, Watson and Larson (2006) observed that some people respond to perceived discrimination with vigor, righteous anger, and indignation rather than self-deprecation.

Further, the unique demographics of this sample could explain the reactant patterns observed in the data set. It is possible sample participants in this study acquire self-worth from other sources of social privilege (e.g., younger, affluent, Caucasian, educated, with health insurance) and thus generalized a high sense of efficacy to include health efficacy, despite reporting an HbA1C level that suggests the contrary (Watson & Larson, 2006). Therefore, these participants were probably more apt to respond with indignation rather than self-deprecation when faced with perceived discrimination (Sullivan, 2017; Watson & Larson, 2006). Although, it is not to say that those who belong to non-privileged demographics would not also respond in this way (Watson & Larson, 2006). Rather, additional research is necessary to better understand the generalizability of these results beyond the demographics of this sample. Again, it is also possible the young age of this sample may be reflective of a population of people who prioritize other things above health, exhibit reactive tendencies, and are less likely to reach out for help regarding their health status (Sattar et al., 2019; Thompson et al., 2016). I surmised such feelings of indignance led participants to present themselves in an overly competent manner despite evidence of not well controlled diabetes, hence the term apparent competence.

To summarize, I theorized that both the privileged nature of this sample as well as the younger age both contributed to what seemed to be psychological reactance. The following sections discuss the results of this study in terms of hypothesis, followed by more in-depth discussion around psychological reactance and conceptualization of main outcomes, clinical implications and directions for future research, and concludes with a description of study strengths and limitations.

Discussion of Hypotheses

H1. The first hypothesis originally stated that higher stigma would predict lower adherence to diet, exercise, foot care, and medication adherence as well as lower HbA1C. Based on results, the null hypothesis was rejected for two outcome variables including medication adherence and HbA1C. This means that high stigma predicted lower medication adherence and higher HbA1C, as predicted. However, stigma did not predict foot care meaning the null hypothesis was accepted for this outcome variable. Lastly, stigma significantly predicted outcome variables of diet and exercise prior to including covariates. However, after relevant covariates were included this relationship becomes non-significant. Further, higher stigma was associated with higher self-reports of diet which is the opposite direction of what I predicted in the hypothesis. Further, it is likely self-reports of diet and exercise were inflated so it was interpreted that higher stigma significantly predicted exaggerated reports of diet and exercise behaviors, prior to inclusion of covariates. Therefore, I accept the null hypothesis for the outcome variables of self-reported diet and exercise behaviors.

H2. The second hypothesis originally stated that self-efficacy would mediate the relationship between stigma and each of diet, exercise, foot care, and HbA1C. I observed that self-efficacy significantly mediated the relationship between stigma and self-reported behaviors of diet and exercise but not foot care, medication adherence or HbA1C. However, significant relationships did not emerge in the way I originally predicted. For example, higher stigma predicted higher self-efficacy which then predicted more frequent self-reported diet and exercise behaviors. Whereas the original hypothesis assumed that higher stigma would predict lower self-efficacy which would then predict less frequent self-care behaviors. Because the direction of both of these relationships were in opposition to the original hypothesis, I accept the null hypothesis for all the outcome variables. Further, it is important to note most of the items in the self-efficacy measure used in this study were related to beliefs about diet and exercise abilities and less so about medication adherence and foot care. Therefore, it is possible a relationship between self-efficacy and foot care/medication adherence exists but was not picked up in this study due to limitations of study measures.

H3. The third hypothesis originally stated that the patient-provider interaction would moderate the relationship between internalized stigma and self-efficacy thus indirectly moderating outcome variables. There was a significant negative interaction between trust in providers and stigma on self-efficacy. This means that high stigma predicted high self-efficacy when trust in providers was low. Again, the direction of each of these relationships were paradoxical to the original hypothesis. Further, there were no significant moderating effects of the total model for any of the outcome variables. This means that self-reports of diet, exercise, foot care, medication adherence, and HbA1C were not affected by trust in providers. Therefore, I accept the null hypothesis for all the outcome variables.

Hypotheses summary. To summarize, I rejected the null hypothesis for H1 for outcome variables of medication adherence and stigma. This means that higher stigma predicted worse medication adherence and higher HbA1C (high HbA1C indicates worse health status), which is consistent with study theory. However, I accepted the null hypothesis for H1 for outcome variables of diet, exercise, and foot care. Further, I accepted the null hypothesis for all the outcome variables for H2 and H3. Although self-efficacy mediated the relationship between stigma and self-reported diet/exercise behaviors, the directions of these relationships were paradoxical to study theory. Similarly, trust in providers significantly moderated the relationship between stigma and self-efficacy in each model, but not in the direction I predicted. While I can certainly draw informative conclusions about psychological reactance theory based on these significant relationships, they did not directly support the study hypothesis.

Psychological Reactance

Psychological reactance was first described in 1966 by J. Brehm (Rains, 2013) who observed the need for humans to obtain autonomy and control. This construct is operationalized as a sentiment of anger that is triggered by a freedom threat and followed by negative cognitions (Dillard & Shen, 2007; Quick, 2011; Rains, 2013; Rains & Turner, 2007). It is thought that persuasive messages can unintentionally instigate reactance (Gardner & Leshner, 2015). For example, it is common for unsolicited advice to generate feelings of anger. Similarly, some people feel rebellious when told what to do (Gardner & Leshner, 2015). It is purported that psychological reactance can also be activated by stigma or discrimination (Watson & Larson, 2006). For example, stigma is rooted in stereotypes that are essentially social messages about one's ability to actualize their potential (e.g., Brown et al., 2013; Corrigan, Larson, & Rusch, 2013; Goffman, 1963; Kato et al., 2017; Scrambler, 2009; Shiu, Kwan, & Wong, 2003; Weiss, Ramakrishna, & Somma, 2006). I insinuate these kinds of discriminatory social messages can be perceived as freedom threats and result in a reactive response (Dillard & Shen, 2007; Rains, 2013; Quick, 2011; Rains & Turner, 2007). For example, stereotyping a person with T2DM as lazy suggests this person does not have the inherent ability to attain their goals. It is then possible for the stereotyped person to perceive this social message as a threat to social freedoms which then causes the stereotyped person to respond with reactance that stems from emotions such as anger, rebellion, annoyance, indignation, etc.

Interestingly, there is some debate within the literature as to whether psychological reactance is reflective of state versus trait factors (Rosen & Siegel, 2018). For example, some personality types might be more apt to respond with reactance (e.g., Type A personalities are more likely to exhibit reactance; Brehm & Brehm 1981 as cited in Rosen & Siegel, 2018). Age has also been shown to posit a curvilinear relationship with reactance although generally, younger populations seem to exhibit more reactance when compared to older populations (Woller, Buboltz, & Loveland, 2007). Interestingly, range of this study sample was 19 to60 years old with 88% of the sample being between the age of 25 and 45 (Woller, Buboltz, & Loveland, 2007). Therefore, it is possible that the mean age of the sample (32 years old) was a significant factor contributing to the paradoxical relationships observed between predictor variables.

Indignation. While the concept of indignation is not included in the original hypothesis, it is important to discuss the small but notable pool of evidence that suggests some people respond to discrimination with righteous indignation rather than internalized self-deprecation (Corrigan & Rao, 2013; Watson & Larson, 2006). Indignation, defined as a particular type of righteous-anger or annoyance in response to perceived unfairness (Corrigan & Rao, 2013; Gardner & Leshner, 2015; "Indignation", 2019) is considered a moral emotion elicited by social, political, or economic injustice (Drummond, 2017). This definition of indignation closely aligns with the theory of psychological reactance described above (Dillard & Shen, 2007; Rains, 2013; Quick, 2011; Rains & Turner, 2007;). Literature suggests this type of response occurs when one is acutely aware of stigma, actively rejects stereotypes, and/or procures self-esteem from multiple data points (Watson & Larson, 2006). People who respond to unfairness with indignation may be more likely to respond to injustice or disagreement with energized rebellion (Corrigan & Rao, 2013; Watson & Larson, 2006). This phenomenon could mean that higher incidence of stigma could in fact, result in a greater sense of empowerment or self-efficacy, as illustrated by the paradoxical relationships observed in this study between stigma, self-efficacy, and trust in providers (Corrigan & Rao, 2013; Watson & Larson, 2006).

Stereotype threat. On another note, indignation may be associated with the concept of stereotype threat which encompasses the fear of being perceived in a way that confirms a negative stereotype to be true (Carels et al., 2013; Shapiro, 2011). It is possible that defense mechanisms such as annoyance or indignation could be triggered by stereotype threat (Shapiro, 2011). Indignation then leads to rejection of anything that could potentially confirm the pejorative stereotype, as delineated by psychological reactance theory (Dillard & Shen, 2007 Rains, 2013). However, research shows that stereotype threat has a negative impact on both performance and health outcomes (Schmander & Johns, 2003 as cited in Shapiro, 2011; Steele & Aronson, 1995 as cited in Shapiro, 2011). I surmised that a person with T2DM who fears being stereotyped as incompetent could thus present themselves in an overly competent manner as a means of rejecting the stereotype (Carels et al., 2013). I also surmised that people who are susceptible to T2DM stereotypes could feel apprehensive about reaching out for help for fear that the mere act of needing help would be construed as incompetence (Carels et al., 2013). This is unfortunate because, presenting one's self in an overly capable manner or failing to reach out for help when needed can limit access to vital supports. In the end, precautions taken to avoid being seen as incompetent leave the stereotyped individual without the necessary support to gain competence and thus, confirms the T2DM stereotype of incompetence (Carels et al., 2013). This is dangerous because people who are stigmatized can start to generalize perceived confirmation of stereotypes as inherent characteristic traits (Corrigan et al., 2013, 2016). In this example, one may start to believe they are inherently incompetent rather than recognizing they are in fact, capable of gaining competence (e.g., "I am an incompetent person" versus "I do not yet have competence in some areas"; Corrigan et al., 2013, 2016; Shapiro, 2011). Therefore, it is plausible that a person with T2DM who is stereotyped could report high levels of self-efficacy related to self-care behaviors yet still experience deleterious effects of internalized stigma on adherence behaviors and HbA11C (Dillard & Shen, 2007; Rains, 2013; Quick, 2011; Rains & Turner, 2007;).

Self-efficacy. As depicted above, I used psychological reactance theory to understand the paradoxical relationships between stigma, self-efficacy, and trust in providers. Most notably, I purported that the participants in this sample are probably more apt to respond to perceived discrimination (e.g., stigma) with indignance, rather than self-deprecation or effacement (Watson

& Larson, 2006). If this is true, then stigma would theoretically result in higher reported self-efficacy, which is what was observed in the data. I further theorized that indignation was likely a mediating variable between stigma and self-efficacy. However, I did not anticipate this response and therefore did not control for this variable in the study. I presumed this type of indignant response is related to the unique sample characteristics (Hong et al., 1994; Woller et al., 2007). For example, this sample is fifteen or more years younger than the typical American who is diagnosed with T2DM (CDC, 2017) and is in the age range of people who are more likely to respond with reactance (Hong et al., 1994; Woller et al., 2007).

Self-efficacy and reporting behaviors. Stigma was indirectly associated with more frequent reported diet and exercise behaviors. Self-efficacy mediated this relationship. This suggests that both high stigma and high indignance predicted seemingly better diet and exercise behaviors. However, this does not make theoretical sense and is inconsistent with literature which suggests stigma should result in worse self-care behaviors and worse health outcomes (Brazeau et al., 2018; Brown et al., 2013; Liu et al., 2017; Schabert et al., 2013; Shiu, Kwan, & Wong, 2003). Further, mean scores of self-efficacy, diet, and exercise were higher as compared to similar studies, higher than what would be expected given what is known about the struggles of people with T2DM to adhere to health recommendations, and questionable considering the sample mean HbA1C was indicative of uncontrolled diabetes (ADA, 2018a; Al-Khawaldeh, Al-Hassan & Froelicher, 2012; Freitas et al., 2014; Funnell, 2006; Perrin et al., 2009). Therefore, I purported that both diet and exercise reports were likely inflated. This could indicate participants responded to questions such as “I am able to choose foods that are good for my health” and “How many of the last seven days have you followed a healthful eating plan?” in a favorable manner but not necessarily reflective of true self-confidence or true account of behaviors (McDowell et al., 2005; Toobert et al., 2000).

I purport some people may perceive health recommendations as freedom threats and respond with psychological reactance around these topics (Dillard & Shen, 2007; Rains, 2013; Quick, 2011; Rains & Turner, 2007). Further, stigma is essentially a socially based freedom threat that is known to trigger indignation (Watson & Larson, 2006). To this end, both stigma and topics of exercise and diet probably felt threatening to participants and triggered feelings of indignation. To neutralize this threat, participants may have responded in an overly positive manner, a phenomenon known to occur when lifestyle recommendations are given (Dillard & Shen, 2007; Rains, 2013; Quick, 2011; Rains & Turner, 2007). There is some research that depicts a positive relationship between reported self-efficacy and exercise/diet intention but a discrepancy between behavior intention and follow through (Fung et al., 2019; Seacat & Mickelson, 2009; Ong et al., 2017a, Ong et al., 2017b). Therefore, it is possible study participants endorsed behaviors they hope to do rather than what they are actually doing. Endorsing planned behaviors rather than actual behaviors could also be considered an attempt at neutralizing a perceived freedom threat related to health recommendations (Dillard & Shen, 2007; Quick, 2011; Rains, 2013; Rains & Turner, 2007).

Further, it is known that self-reports of diet and exercise are especially vulnerable to desirability bias (Toobert et al., 2000). Unfortunately, I did not include this type of control and recommend future studies to consider at least one desirability bias measure (Paulhus, 1984). However, these results are not surprising given that, of the studies that actually include a desirability bias control (only about ten percent of studies include this), at least half are shown to demonstrate bias effects in their data (Van de Mortel, 2008). Because I did not overtly control for desirability bias, I can only strongly infer psychological reactance as the reason that stigma significantly predicted more frequent dietary and exercise behaviors, which is paradoxical to what theory suggests.

Interestingly, the other variables (trust in providers, stigma, foot care, medication adherence, and HbA1C) did not appear to succumb to this same desirability bias. For example, the mean number of days participants report engaging in foot care is relatively similar to what other studies have reported (e.g., Perrin et al., 2009; Toobert et al., 2000). Although, some research shows that foot care among populations age seventy and older is somewhat less frequent (Freitas, et al., 2014). This incongruency in accuracy of self-reporting is actually consistent with the general body of literature that shows staunch inconsistencies in self-reporting (Fung et al., 2019; Ong, A. Frewer, & Chang, 2017a and 2017b).

Conclusion. To summarize, psychological reactance is characterized by an emotional state such as anger or indignation and is triggered by a threat to one’s freedom of choice (Dillard & Shen, 2007; Rains, 2013; Quick, 2011; Rains & Turner, 2007). This response is then followed by adverse cognitions and behaviors that function to resolve the freedom threat and re-gain control over choice (Dillard & Shen, 2007; Rains, 2013; Rains & Turner, 2007; Quick, 2011). Neutralizing the threat is accomplished by discrediting the persuasive message, taking a stark opposition, or increasing the threatened behavior (Dillard & Shen, 2007; Rains, 2013; Quick, 2011; Rains & Turner, 2007). For example, a provider who recommends a patient to make dietary changes may inadvertently trigger the patient to feel as if their autonomy or choice of said behaviors is threatened. In order to regain control over dietary autonomy, patients may become indignant and respond by discrediting the message (“I could change my diet if I wanted to…"), taking an opposing view ("…but I don't need to change"), or increasing the undesired behavior (e.g., eating foods opposite of what was recommended).

It is possible the online survey platform triggered a perception of discrimination by the mere act of inquiring about sensitive topics such as self-stigma, diet, and exercise. Further, demand characteristics were present in both the recruitment materials as well as the informed consent. This means that these materials revealed pertinent information about the study hypothesis. Knowing this information beforehand could have influenced participant responses. For example, some participants may have been instigated to react against the expectation of being negatively impacted by stigma. This dynamic could have motivated some participants to respond in an overly positive manner. Additionally, asking about health adherence may have inadvertently elicited feelings of stigmatization for participants (Brown et al., 2013; Brown et al., 2014; Thomas et al., 2008). These questions may also have come across as unintended persuasive messages, consequently resulting in psychological reactance (Dillard & Shen, 2007; Rains, 2013; Quick, 2011; Rains & Turner, 2007). If this is true, this dynamic may have caused participants to respond with emotion (e.g., indignance) rather than accurate self-reporting. For instance, in an IRB approved pilot project to this study, one participant sent an email to study authors expressing anger and communicated they had felt stigmatized by the mere act of the survey inquiring about similar topics of self-stigma and eating habits.

In the present study, it is unclear if indignance and high reported self-efficacy is reflective of righteous anger associated with perceived stigma or a reaction to questions about adherence to health recommendations, or a combination of both (Kalra & Baruah, 2015; Potter et al, 2015; Schabert et al., 2013; Shiu, Kwan, & Wong, 2003). Both of these instances could produce feelings of indignation and result in behaviors such as overly positive self-reporting in an attempt to re-gain control over perceived unfairness (Dillard & Shen, 2007; Quick, 2011; Rains, 2013; Rains & Turner, 2007). However, more research is needed to more fully understand the contributing factors of psychological reactance in relation to T2DM stigma, indignation, and self-care behaviors.

Medication Adherence and HbA1C

Not surprising, in this study demonstrated that higher levels of stigma predicted worse medication adherence as well as higher HbA1C levels. This outcome was expected and is consistent with study theory (Brazeau et al., 2018; Brown et al., 2013; Liu et al., 2017; Schabert et al., 2013; Shiu, Kwan, & Wong, 2003). This makes sense given the research on psychological insulin resistance which posits some people refuse to take medications as prescribed for fear of the social repercussions (e.g., Jha et al., 2015; Liu et al., 2017; Schabert et al., 2013; Potter et al., 2015; Shah, Butt, & Hussain, 2017). However, there is some evidence to suggest medication non-adherence can be categorized into planned (e.g., purposefully doesn't take medication in public for fear of embarrassment) or unplanned (e.g., unintentionally forgets to take medication; Zongo et al., 2016). This study did not distinguish between these types of medication non-adherence. More research is needed to more precisely parse out the relationship between stigma and medication non-adherence.

Notably, medication adherence and HbA1C measures appeared to reflect accurate reporting. One explanation for why self-reporting of diet and exercise appeared to be exaggerated whereas medication adherence and HbA1C appeared the be accurate may be due to differences in precision levels across measures (Gonder-Frederick, Cox & Ritterband, 2002). For example, the MMAS uses a yes/no response to determine whether specific behaviors occurred in the past week (e.g., did you take all of your medication last week?) and seems to be less susceptible to desirable responses (Morisky et al., 1986). Similarly, the survey included a validity check that required participants to enter the same HbA1C level twice in order to reduce fabricated responses. To this end, I believe the MMAS and HbA1C were more reflective of true health behaviors/outcomes. This is contrasted by the self-report of SDSCA sub scales which seems to have more room for embellishment (e.g., how many of the last seven days did you follow a healthful eating plan; Toobert et al., 2000).

Foot Care

In this study, foot care was not affected by stigma, self-efficacy, or trust in providers which contradicts study theory but is actually consistent with some literature (Bailey & Kodack, 2011; Perrin et al., 2009). However, it is important to note the self-efficacy measure in this study had a minimal focus on foot care (only one out of twenty questions asked about foot care; Van der Bijl et al., 1999). Therefore, it is possible self-efficacy does actually affect foot care but, in this study, the relationship was simply not observed. Similarly, there are fewer negative stereotypes related to foot care meaning stigma is not likely to affect foot care in the same way as diet, exercise, medication adherence, and HbA1C (Brown et al., 2013; Kalra & Baruah, 2015; Potter et al., 2015; Schabert et al., 2013). If this is true, it makes sense that foot care was not affected by stigma or self-efficacy. I also theorized that this outcome may be due to the differences in complexity of self-care behaviors (Bailey & Kodack, 2011). For example, diet and exercise adjustments require complex lifestyle changes including taking away valued food or past times (Bailey & Kodack, 2011). I also surmised that diet and exercise recommendations are more apt to trigger feelings of perceived freedom threats or unfairness while recommendations related to foot care do not (Dillard & Shen, 2007; Rains, 2013; Perrin et al., 2009). Foot care recommendations do not require the same overall change of lifestyle habits and are likely less threatening to patients with T2DM (Bailey & Kodack, 2011).

Trust in providers

In this study, trust in providers interacted negatively with stigma to influence self-efficacy. This means that stigma was positively associated with self-efficacy, as long as trust in providers was low. I proposed that patients may be less likely to perceive unfairness from providers they trust and trusting relationships are likely to buffer unfairness associated with broader social stigma (e.g., Dietrich, 1996; Polonsky et al., 2017; Stuckey et al., 2015). Therefore, trusting relationships could assuage feelings of indignance which means that stigma would not affect self-efficacy in the same way (e.g., Bostrom et al., 2014; Beverly et al., 2012; Nam et al., 2010; Paterson, 2001; Polonsky et al., 2017; Schillinger et al., 2003; Van Dam et al., 2003). Conversely, a lack of trust could compound feelings of unfairness and inadvertently increase indignation, especially if one feels stigmatized by their provider (Dietrich, 1996; Polonsky et al., 2017). To this end, I speculate having indignance could potentially function as a protective factor in some situations (Corrigan & Rao, 2013; Watson & Larson, 2006). For example, indignance could theoretically drive a person to request a second opinion or swap out untrustworthy or stigmatizing providers (Watson & Larson, 2006).

Lastly, trust in providers did not have an effect on adherence to self-care behaviors, medication, or HbA1C. However, I expect there are nuances in relationships between these variables not illustrated by this study. For example, self-efficacy in this study seemed to be reflective of indignation, per psychological reactance theory. Whereas self-efficacy rooted in self-examination of one's true ability may associate with self-care behaviors in a different way (e.g., Nam et al., 2010). Similarly, there are nuances in the patient-provider relationship not accounted for in this study. For instance, it is known that collaborative goals, warmth, patient-provider demographic matching, provider cultural competence, and open communication have been associated with better health outcomes and decreased insulin resistance (Dietrich, 1996; Linetzky et al., 2016; Maddigan et al., 2005; Nam et al., 2010; Piette et al., 2003; Paterson, 2001; Polonsky et al., 2017; White et al., 2013; White et al., 2016). Unfortunately, this study only gathered data regarding the construct of trust in providers. Further, the Trust in Provider Scale encompasses questions that may be getting at provider expertise rather than quality of relationship (e.g., My doctor is a real expert in taking care of medical problems like mine), which may be a limitation of this study (Anderson & Dedrick, 1990). Nevertheless, this study indicates that it may be helpful for providers to remain attentive to patient indignance and respond accordingly, especially for patients who ascribe to similar demographics of participants in this study (e.g., younger patients).

Main Findings Summary

To summarize, variables in this study did not interact in the way I predicted they would. For example, high levels of stigma were correlated with high self-efficacy, which did not make theoretical sense (e.g., D'Souza et al., 2015; Mohebi et al., 2013; Sarkar, Fisher, & Schillinger, 2006; Young-Hyman et al., 2016). However, when interpreting self-efficacy through the lens of psychological reactance (Dillard & Shen, 2007; Rains, 2013; Rains & Turner, 2007; Quick, 2011; Watson & Larson, 2006), it was found that indignance may be responsible for the positive relationship between stigma and self-efficacy (Dowd, 2002). I theorized perceptions of unfairness may have been triggered by the mere act of inquiring about sensitive topics such as self-stigma. Additionally, asking about adherence to recommended diet and exercise behaviors may have inadvertently elicited a perceived threat to health autonomy and triggered a second trend of psychological reactance (Dillard & Shen, 2007; Rains, 2013; Rains & Turner, 2007; Quick, 2011). Reactance theory purports that cognitive and behavioral measures are taken to re-gain control in these circumstances including discrediting the message as well as actively taking the opposing view (Dillard & Shen, 2007; Rains, 2013; Rains & Turner, 2007; Quick, 2011). It is possible participants in this study attempted to neutralize perceived threats by presenting themselves in an overly positive manner.

Interestingly, medication adherence and HbA1C did not appear to be susceptible to this same response, likely due to the way questions were phrased in the measures. Stigma was associated with worse medication adherence as well as worse HbA1C, as predicted. However, foot care did not appear to be affected by stigma, self-efficacy, or trust in providers, which is consistent with some literature (Perrin et al., 2009). Lastly, there was an interaction between stigma and trust in providers meaning that stigma increased feelings of self-efficacy when trust in providers was low.

In conclusion, these study results contribute to the literature pool on stigma supporting the notion that stigma is deleterious to health. Further, I theorized that stigma triggered feelings of indignance which led to increased reports of self-efficacy. Self-efficacy was then associated with inaccurate self-reporting. Positive effects of trust in providers did not generalize to outcome variables in the present study however, I purport the model was affected by the variable of indignance, which was not controlled for in the study.

Clinical Implications and Directions for Future Research

First, the findings of this study may be of interest to US clinicians working with patients who fit the demographics outlined above. Most notable is the age of this study sample (e.g., 30’s) being much younger than the average age of a patient who has been diagnosed with T2DM (e.g., typical age around 60; CDC, 2017). Study findings may have unexpectedly captured the paradox of persons who seem to respond to stigma with indignation and subsequent apparent competence (Watson & Larson, 2006). If this were the case, self-efficacy appeared to result in favorable self-reporting of diet and exercise behaviors. However, despite these self-reports, stigma was still positively associated with medication non-adherence and worse HbA1C levels. This means that patients who have indignance may experience cognitive dissonance between their account of self-efficacy versus true ability. These patients would likely struggle to adhere to recommendations despite their saying that everything is going well. This dynamic may make it difficult for providers to accurately gauge patient engagement in care, ability, or progress in health behavior change. As such, providers may help patients reach their health goals by addressing stigma (e.g., referring patients to behavioral health) and/or avoiding interactions that perpetuate the stigmatization of patients or instigation of indignation.

Future research may also wish to clarify if stigmatized patients feel less inclined to reach out for additional support if they are struggling. For example, a Canadian sample which is likely similar to a US sample, found that older people and women are more likely to reach out for health care support versus younger people and men (Thompson et al., 2016). The study sample, in comparison to sample characteristics of similar studies was younger and about sixty percent male which could mean they would be less likely to exhibit health care seeking behaviors (Thompson et al., 2016). Based on the findings of this study, I hypothesize this demographic could be more susceptible to feelings of indignance in the face of perceive unfairness which would explain the unique results of this study. If this is true, it will be important for providers to understand that feelings of indignance may make it more difficult for this demographic to reach out or remain amenable to health recommendations. Further, providers who are insensitive run the risk of compounding this type of apparent competence thus perpetuating the issue. This type of miscommunication can negatively impact health services, preserve harmful stereotypes, and make it less likely for these patients to seek health care services let alone additional supports (e.g., Thompson et al., 2016; Verhaeghe & Bracke, 2011).

I theorize that decreasing feelings of stigmatization in patients will likely reduce psychological reactance and foster more truthful self-reporting (e.g., Dowd, 2002; Seacat & Mickelson, 2009; Verhaeghe & Bracke, 2011; Umphrey, 2004). For example, Gardner and Leschner (2015) advise using a narrative approach when discussing health recommendations as a means of reducing offense. I also suggest providers make efforts to optimize trust within the patient-provider relationships as low trust in providers may magnify the negative effects of stigma. However, I propose that indignation could theoretically be protective in some cases (Watson & Larson, 2006). For example, in some instances, indignation could propel patients to ask for a second opinion or swap out stigmatizing providers. To this end, it may be helpful for providers to remain aware of the positive or negative effects of indignation for patients who face discrimination and act accordingly. However, more research is necessary to corroborate my suppositions about the relationships between stigma, indignance, and exaggerated reporting.

Second, none of the predictor variables including stigma, self-efficacy, and patient-provider relationships were associated with foot care. This finding may be of importance to providers who wish to maximize time with patients by focusing on certain health behaviors. Foot care routines require patients to add something into daily routine whereas diet and exercise changes require patients to take away or sacrifice aspects of daily life. For example, it is not uncommon for people to use food or non-exercise activities (e.g., watching TV, playing video games) to cope with stress (Gardner & Leshner, 2015). The results of this study suggest that health behaviors that require more complex lifestyle changes (e.g., diet and exercise) are more affected by psychosocial and interpersonal phenomenon such as stigma than non-complex behaviors like foot care, which has also been noted in previous research (e.g., Dietrich, 1996; Holt et al., 2013; Peyrot et al., 2013a; Peyrot et al., 2005b; Polonsky et al., 2017; Stuckey et al., 2014; Stuckey et al., 2015). Psychological reactance theory suggests patients who feel they are giving up known coping mechanisms (e.g., food, TV) may feel persecuted for this sacrifice and become even more protective over said way of life (Gardner & Leshner, 2015). Providers who are aware of this dynamic can coordinate care aimed to address these specific issues. For example, one study showed patients who received concurrent psychotherapy to address emotional eating reported a greater increase in non-food coping skills as well as reduced external eating and better dietary adherence (Chesler, Harris, & Oestreicher, 2009). In sum, the current findings suggest that it may be beneficial for providers to spend time tailoring health education to individual patients or providing referrals to patients who may be apt to emotionally eat or engage in non-active forms of coping (e.g., watching copious amounts of TV). Giving patients handouts or having staff provide standard education interventions on foot care may suffice for this recommendation. However, it is also possible the measures used in this study simply did not capture information regarding the relationship between self-efficacy and foot care. Therefore, future research may wish to explicitly measure self-efficacy as it pertains to each specific self-care behavior.

Third, this study adds to the literature pool signifying the deleterious effects of stigma on health outcomes for patients living in the US. This is important considering social climates and health care systems vary across nations (Peyrot et al., 2005b; Stuckey et al., 2014; Stuckey et al., 2015). More specifically, findings of this study suggest stigma may contribute or compound effects of psychological reactance for younger patients. Patients who feel stigmatized may be more apt to feel threatened when providers make recommendations related to diet and exercise changes, thus making it more difficult to follow said advice or truthfully talk about these issues with providers (Gardner & Leshner, 2015; Schabert et al., 2013). The current findings are consistent with the idea that one way to increase adherence may be to reduce stigma in the broader public. This may make it easier for patients to follow recommendations and indirectly promote better health outcomes (e.g., Brazeau et al., 2018; Brown et al., 2013; Liu et al., 2017; Schabert et al., 2013; Shiu, Kwan, & Wong, 2003). Better health outcomes mean lower health care costs (ADA, 2018a). However, it is important to note the homogenous sample of this study means conclusions outlined in this report will need to be validated across demographic groups before they are generalizable to the broader US population.

Fourth, in future research, it may be helpful to use purposive sampling methods to obtain a more diverse sample. Specifically, it may be useful to conduct similar studies with a more racially and economically diverse sample that is reflective of the population of persons living with T2DM in the US. Further, it may be helpful to clarify any compounding effects for individuals who belong to multiple stigmatized groups. In addition, researchers may wish to corroborate inferences about the impact of age/generational on reactions to stigma by obtaining a sample that spans across generational cohorts. Researchers may also wish to understand the experiences of a younger person who is diagnosed with T2DM. This study showed paradoxical relationships between stigma, self-efficacy, and trust in providers that may be unique to younger cohorts of people diagnosed with T2DM. Therefore, future research may wish to confirm these findings as well as explore other possible differences in the inter and intra-personal experience of younger persons diagnosed with T2DM.

Lastly, future research is recommended to continue to explore the intra and interpersonal constituents of behavior adherence for people with T2DM. There is a large pool of literature which speaks to the connection between self-efficacy and health behavior but not much literature that speaks to indignation. Future research is indicated to better understand this phenomenon in hopes of elucidating contributing factors as well as potential risk or protective aspects of indignation. It may also be helpful to more clearly articulate the role of the patient-provider relationship in instigating psychological reactance or feelings of indignation in hopes of identifying ways of discussing health issues in a manner that circumvents or addresses feelings of threat.

Strengths and Limitations

There are some notable limitations to this study. First, this study relied on cross-sectional survey data. This is potentially problematic because survey research relies on self-report, meaning participants are more subject to participant and desirability biases (e.g., as observed in the self-report of diet and exercise behaviors) and/or may not accurately recall all data. For example, this study used self-reported HbA1C as a health outcome marker. While research indicates most patients are able to accurately recall this metric (Travidi et al., 2017), some participants may have had a harder time. However, one strength of this study was the validity check that required participants to recall their most recent HbA1C levels at the beginning and end of the survey. Surveys with HbA1C levels that were not within .2% of each other were excluded from data analysis. Future researchers may wish to include a control specifically for desirability bias (Paulhus, 1984; Toobert at el., 2000).

Second, the sample used in this study was sourced from public online forums (e.g., Instagram, Craigslist). This method of sampling yielded a homogenous sample in terms of demographic and socioeconomic characteristics. As such, I would caution against generalizing study results to the broader population. Future research is recommended to include more purposive sampling strategies to gather data that can then be generalized to the broader US population. Further, the online platform may have contributed to incidence of desirability bias by making it easier to present one's self as overly positive in addition to the fact that recruitment fliers, recruitment social media posts, and informed consents exhibited information about the study hypothesis. Future research may wish to find ways to attenuate the influence of online platforms as well as demand characteristics.

Third, a technical error in data collection resulted in two measures that did not record the entire survey. Question 39 of the SSS and question 20 of the DMSES was not recorded in Qualtrics. However, both of these surveys held up against psychometric analysis conducted to test reliability and were entered in each analytical model. While this error did not appear to affect model outcomes, future research should ensure all survey questions are appropriately recorded. Further, the question left off of the self-efficacy measure was related to medication which could theoretically have mitigated the relationship between self-efficacy and medication adherence. Similarly, two measures including the TPS and MMAS-8 yielded somewhat low Cronbach's alpha levels when compared to the broader literature base. As stated, I believe the TPS may have been affected by sample characteristics that deviate from typical samples found in literature (Anderson & Dedrick, 1990). Further, due to the wording of questions in the TPS this scale may have collected information regarding the expertise of providers rather than the quality of the patient-provider relationship, thus affecting the predicting capacity of this variable within the study model. So, to further elucidate the nature of the patient-provider relationship as it pertains to stigma and self-efficacy, future research should include additional measures that capture nuances in the patient-provider relationship, beyond trust or provider expertise.

Additionally, there was one study that suggested the MMAS-8 may account for two diverging latent variables (e.g., pre-meditated non-adherence and forgetfulness) rather than one more straightforward variable of adherence which may explain the low alpha level (Zongo et al., 2016). It is suggested that future research continue to hone the psychometric properties of both the TPS and the MMAS, as they pertain to a younger sample, in order to better understand research utility as well as interpret outcome data appropriately.

Lastly, this study did not parse out self-efficacy as it pertained specifically to individual self-care behaviors. It is known that levels of self-efficacy can vary depending on the specific task at hand (Bandura, 1977). The self-efficacy measure used in this study was focused more so on self-efficacy as it pertains to diet and exercise self-care. Therefore, significant relationships between self-efficacy and medication adherence or between self-efficacy and foot care may not have been detected in this study due to measurement limitations. Therefore, it is recommended that future studies make efforts to match self-efficacy data as it pertains to specific behaviors (Bandura, 1977).

Despite these limitations, this study exhibited the following strengths. One strength was the chosen analytical model, which used a bootstrapping method to test the moderated mediation analyses (Hayes, 2013). Other possible methods such as Baron and Kenny (1986) or the Sobel test (MacKinnon et al., 2002) have been criticized in current literature for having low statistical power or relying on the assumption of normal distribution. The Hayes (2013) bootstrapping method does not rely on this assumption and has demonstrated appropriate statistical power. Further, the PROCESS macro (Hayes, 2013) has the ability to detect conditional mediation effects. A structural equation model (SEM) could have been used in this study (Kline, 2005) however, bootstrapping methods were chosen due to allowance of smaller sample sizes which allowed for us to maximize study resources (e.g., used for participant compensation).

Another strength of this study was analyzing self-care behaviors separately. Although many researchers choose to assess self-care as one mean score (e.g., Wang et al., 2011), there exists a need to understand these behaviors as separate phenomenon. Further, Toobert and colleagues (2000) as well as other researchers (e.g., Shin & Lee, 2017) assert that self-care behaviors should be measured, scored, and assessed separately rather than combined. Studying behaviors as separate entities allows researchers to better understand the nuances of behaviors and how stigma, self-efficacy, and the patient-provider relationship affect each one separately.

Lastly, I attempted to account for many covariates that could have affected model outcomes although, this data did not significantly impact the trend of study results, due to homogeneity of sample. However, controlling for demographic and SES factors may affect outcome data in a less homogenous sample. As stated above, future research may wish to engage more diverse samples and follow similar methods to better understand the nuanced effects of these constituents of health outcomes.

Concluding Thoughts

As it stands, T2DM is a costly disease accounting for billions of dollars, decreased quality of life, and health and social consequences for many in the US (ADA, 2018a). T2DM is a medical condition that can be treated with behavioral modifications and self-care behaviors such as diet, exercise, foot care regimens, and medication (Funnell, 2006). Yet, most patients are not able to follow through with these recommended health behaviors (Maddigan et al., 2005). Interestingly, stigma seems to serve as a barrier to positive health outcomes (Funnell, 2006;

Kalra & Baruah, 2015). This study used cross-sectional, moderated mediation analyses to better understand the ability of the patient-provider relationship to mitigate the negative effects of social stigma through self-efficacy on individual self-care behaviors for T2DM.

Study results revealed surprising information. For example, data analysis revealed the variable of self-efficacy was likely a reflection of psychological reactance. Similarly, there is a good chance self-reported behavior of exercise and diet were inflated. Moderated mediation analysis demonstrated self-efficacy as a mediator between stigma and inflated self-reports of diet and exercise. Whereas stigma was positively correlated with non-adherence and worse HbA1C. The patient-provider relationship did not appear to have an effect on outcome variables but may buffer the relationship between stigma and self-efficacy.

In conclusion, results of the current study indicate people who have indignance may struggle to adhere to recommendations despite reporting that everything is going well. For example, in this study the number of diet and exercise behaviors were much higher than expected, especially given the sample mean HbA1C which indicated that overall, the sample is not managing their diabetes. Further, this sample was about twenty years younger than most of the population for which diabetes research is based, meaning that younger age may be a contributing factor to the incidence of psychological reactance and indignation observed in this study. This phenomenon may make it difficult for providers to accurately gauge patient engagement in care, ability, or progress in health behavior change. However, providers can attend to reactance by attuning to trust within the patient-provider relationship. Lastly, the findings of this study add to the pool of literature regarding stigma and T2DM within the US. This is imperative considering social climates and health care systems vary across nations (e.g., Funnell, 2006; Peyrot et al., 2005b). However, it is important to note the homogenous sample of this study means results are not necessarily generalizable to the broader US population. Future research should continue to elucidate the relationships between stigma, indignation, and health outcomes as they pertain to individuals diagnosed with T2DM.

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Appendix A: Informed Consent

Informed Consent Form

Stigma and Type 2 Diabetes Mellitus

IRB #:1407816-2
Date Approved: 4/25/2019

Description of the Study:
Many people with diabetes feel stigmatized in a way that negatively impacts their health. The purpose of this study is to explore how relationships with doctors can help offset these bad experiences.

To be eligible to participate you must:

- Be 18 years of age or older.
- Have been diagnosed with type 2 diabetes by a medical provider.
- Report an A1C that was taken within the past 6 months.
- You are not pregnant and have not been pregnant within the past 6 months.
- Live in the United States.

If you decide to take part, you will be asked to fill out a survey asking about your physical and mental health. It will also ask about your relationship with your doctor. The survey should take about 30 minutes to finish. We encourage you to ask questions and take the time to talk about the study before deciding to participate.

Risks and Benefits of Being in the Study:
The risks to you if you take part in this study are small. There are some questions that may cause some discomfort.

Compensation
After finishing the study, you will be asked to click on a second link. This link will ask you to provide your first and last name as well as your email address. This information will not be connected with any of your answers. We will use this email to send you a $5.00 Amazon gift card.

FOR QUALIFYING PARTICIPANTS ONLY: You must have a valid email address AND complete the full survey to receive payment in the form of a $5.00 Amazon gift card.

Confidentiality:

- Information with your name attached will not be shared with anyone outside the research team.
- We will properly dispose of paperwork and store all research records.
- Your name will not be collected or used in reports, presentations, or publications.

Voluntary Nature of the Study:
Your decision to take part in the study is voluntary. You are free to choose whether or not to take part in the study. If you decide to take part in the study, you can stop at any time. You may change your mind and ask to be removed from the study.

Contacts and Questions:
If you have questions now, feel free to ask me(us) now. If you have questions later, you may contact Annie Laweryson at anlaweryson@alaska.edu.

The UAF Institutional Review Board (IRB) is a group that examines research projects involving people. This review is done to protect the people like you involved the research. If you have questions or concerns about your rights as a research participant, you can contact the UAF Office of Research Integrity at 474-7800 (Fairbanks area) or 1-866-876-7800 (toll-free outside the Fairbanks area) or uaf-irb@alaska.edu.

Statement of Consent:
I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I am 18 years old or older, live in the United States, have been diagnosed with type 2 diabetes, and have not been pregnant within the past 6 months.

Yes No

I have been diagnosed with Type 2 Diabetes by a medical provider.
True False

I can provide an A1C value that was taken within 6 months of today's date?
Yes No

I have been pregnant within the past 6 months.
True False

I live and receive most of my healthcare within the United States.
True False

Appendix B: Demographic, health, and socioeconomic demographic questionnaire.

Please answer these questions to the best of your ability:

What is your age?

What is your gender?
Male
Female
Other

What is your race (Liu et al., 2017)?
- Black
- Hispanic
- Asian
- Alaska Native/American Indian
- White Non-Hispanic
- Other

What was your most recent HbA1c %? (e.g., 5.7% or 10.2%)

Was this within the past 6 months?
Yes No

Please choose all health conditions that apply to you:
- Heart disease (e.g., hypertension, heart attack, etc.)
- High cholesterol
- Peripheral neuropathy
- Blindness or trouble with eyes
- Kidney failure or other renal issues
- Stroke
- Type 2 Diabetes
- Amputated limb

What is your highest level of completed education? (Liu et al., 2017):
High school diploma/equivalent, or less
Some college or bachelor's degree
Graduate or professional degree

Please choose the option that best describes your financial position and/or social resources (Liu et al., 2017):
Less than $50,000 per year
$50,000-$100,000 per year
More than $100,000 per year

Please choose your PRIMARY source of health insurance:

Medicaid
Medicare
Private
I do not have insurance

Please select the answer that best describes how you manage your diabetes (Liu et al., 2017):
No insulin
Insulin
Pump/MDI

Appendix C: Self-Stigma Scale (SSS)

Please indicate the extent to which you agree with each of the following items:
Please remember, there is no right or wrong answer

Having diabetes takes away many opportunities from me.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I think that I am less competent than ordinary people because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I feel that my life is unenjoyable because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

No matter how hard I work, I cannot match others because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

Having diabetes is a heavy burden to me.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I have low expectations in life because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I am not qualified to compete with others because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

Having diabetes is a stigma in my life.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

Having diabetes has a negative impact on my financial situation.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I am inferior to others because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

Having diabetes causes inconvenience on my daily life.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I cannot measure up to ordinary people because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I cannot change myself because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I lower my standards of living because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

My life is meaningless because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I need assistance from others because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

My social interactions are limited because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

It is quite normal for me to be alienated by others because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I feel a lot of stress because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I cannot feel confident about who I am because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I am worried about who I am: having diabetes creates obstacles for me.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I have negative feelings about myself because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I am unhappy because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I feel helpless because I have diabetes.
1=strongly disagree, 2=disagree, 3=agree, 4=strongly

I am discouraged because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I hate myself because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I get embarrassed because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I feel angry because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I feel uncomfortable with having diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I feel sorry that I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I feel there is nothing I can do about having diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I fear that people around me would find out that I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I am ashamed of having diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I avoid interacting with others because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I keep my distance from others because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I give up on myself because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I hide myself because I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I make friends only with people who also have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

I dare not to make new friends because they might find out that I have diabetes.
1= strongly disagree, 2=disagree, 3=agree, 4=strongly

Appendix D: Morisky Medication Adherence Scale (MMAS)

Please indicate the extent to which you agree, or disagree with each of these questions:

Do you sometimes forget to take your pills?
0=No, 1=Yes

People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine?
0=No, 1=Yes

Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?
0=No, 1=Yes

When you travel or leave home, do you sometimes forget to bring along your medicine?
0=No, 1=Yes

Did you take all your medicine yesterday?
1=No, 0=Yes

When you feel like your symptoms are under control, do you sometimes stop taking your medicine?
0=No, 1=Yes

Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?
0=No, 1=Yes

How often do you have difficulty remembering to take all of your medicine?
1= Never/rarely, 2=Once in a while 3=Sometimes 4=Usually 5=All the time

Appendix E: Summary of Diabetes Self-Care Activities (SDSCA)

Please answer these questions about your diet as best as you can:

How many of the last SEVEN DAYS have you followed a healthful eating plan? 0……7

On average, over the past month how many DAYS PER WEEK have you followed your eating plan? 0……7

Please answer these questions about your exercise as best as you can:

On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity including walking) 0…….7

On how many of the last SEVEN DAYS did you participate in specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work? 0……7

Please answer these questions about your foot care routine as best as you can:

On how many of the last SEVEN DAYS did you check your feet? 0……7

On how many of the last SEVEN DAYS did you inspect the inside of your shoes? 0……7

Appendix F: Diabetes Management Self-Efficacy Scale (DMSES)

The following questions are asking about your confidence in yourself, that you are able to complete the following:
Please answer as honestly as possible and keep in mind that there is no wrong answer

I am able to check my blood sugar if necessary.
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to correct my blood sugar when the sugar level is too high (e.g., eat different food)
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to correct my blood sugar when the sugar level is too low (e.g., eat different food)
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to choose foods that are best for my health
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to choose different foods and maintain a healthy eating plan
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to keep my weight under control
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to examine my feet (e.g., for cuts or blisters)
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to do enough physical activity (e.g., walking the dog; yoga; gardening; stretching exercise)
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to maintain my eating plan when I am ill
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to follow a healthy eating plan most of the time
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to do more physical activity if the doctor advises me to
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

When doing more physical activity I am able to maintain my eating plan
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to follow a healthy eating plan when away from home
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to choose different foods and maintain my eating plan when I am away from home
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to follow a healthy eating plan when I am on vacation
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to choose different foods and maintain a healthy eating plan when I am eating out or at a party
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to maintain my eating plan when I am feeling stressed or anxious
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to visit my doctor at least once a year to monitor my diabetes
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to take my medication as prescribed
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

I am able to maintain my medication when I am ill
1= No, surely not; 2= Probably not, 3= Maybe yes/Maybe no, 4= Probably yes, 5= Yes, surely

Appendix G: Trust in Physician Scale (TPS)

Please take a moment to think about your interactions with your primary care provider. If you do not have a primary care provider, consider more generally, your interactions with doctors that you have talked about your diabetes with.

The following questions ask about these interactions. Please choose the best answer the you feel fits your experiences:

I doubt that my doctor really cares about me as a person.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

My doctor is usually considerate of my needs and puts them first.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

I trust my doctor so much I always try to follow his/her advice.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

If my doctor tells me something is so, then it must be true.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

I sometimes distrust my doctor’s opinion and would like a second one.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

I trust my doctor’s judgements about my medical care.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

I feel my doctor does not do everything he/she should for my medical care.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

I trust my doctor to put my medical needs above all other considerations when treating my medical problems.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

My doctor is a real expert in taking care of medical problems like mine.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

I trust my doctor to tell me if a mistake was made about my treatment.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

I sometimes worry that my doctor may not keep the information we discuss totally private.
1= Strongly agree, 2= Agree, 3= Neutral, 4=Disagree, 5= Strongly disagree

Scoring instructions: Questions 1, 5, 7, and 11 are reverse scored.

Appendix H: Debriefing statement

Thank you for your participation!

Many people with diabetes feel stigmatized in a way that negatively impacts their health. The purpose of this study is to explore how relationships with doctors can help offset these bad experiences. Your participation in this study will help advance diabetes research.

If you have questions or concerns about this survey, you may contact Annie Laweryson at anlaweryson@alaska.edu.

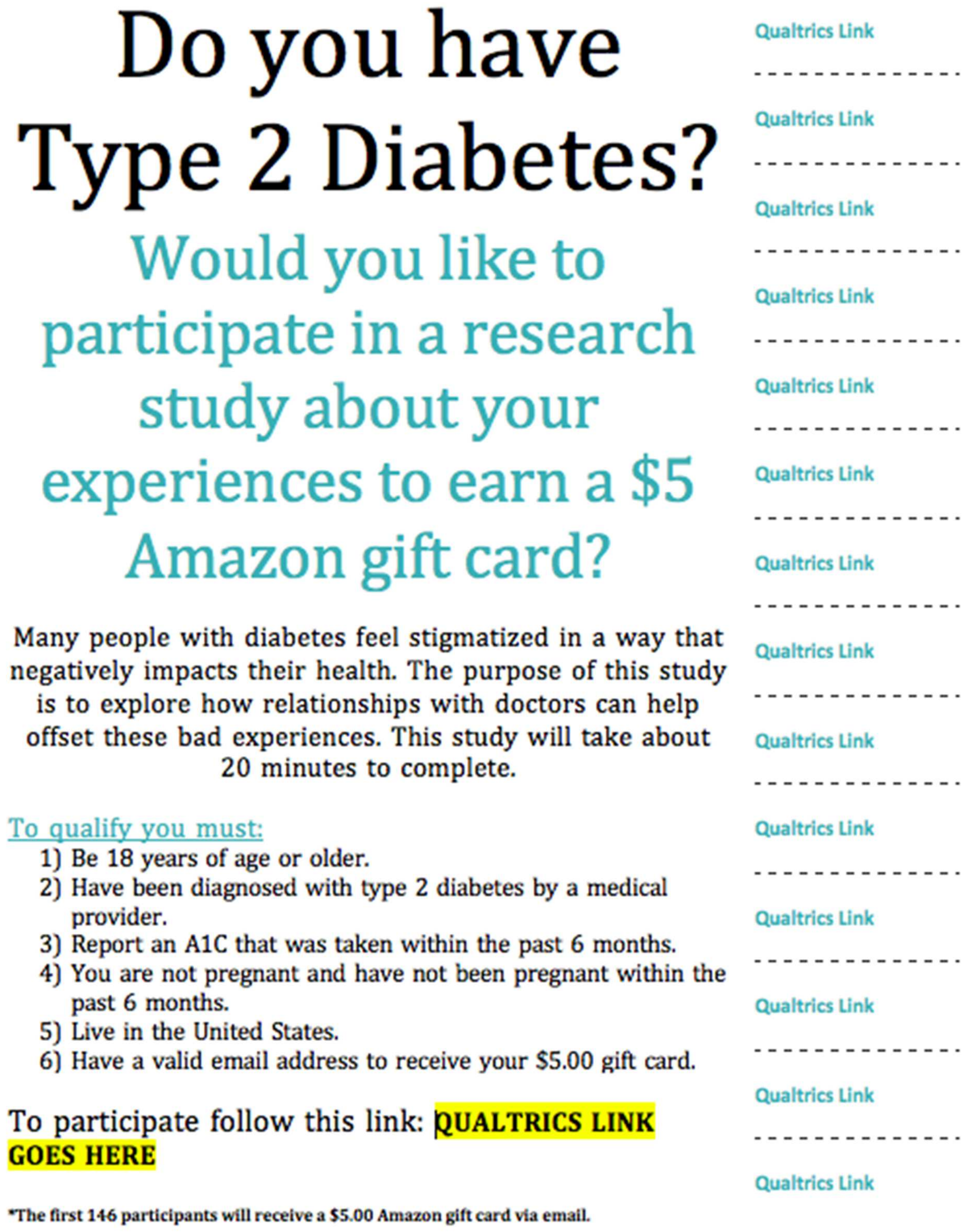
The UAF Institutional Review Board (IRB) is a group that examines research projects involving people. This review is done to protect the people like you involved the research. If you have questions or concerns about your rights as a research participant, you can contact the UAF Office of Research Integrity at 474-7800 (Fairbanks area) or 1-866-876-7800 (toll-free outside the Fairbanks area) or uaf-irb@alaska.edu.

Sincerely,

Annie Laweryson, M.S.

Appendix I: Recruitment fliers, online reposts, and email examples

Recruitment flier for in-person public forum



Do you have Type 2 Diabetes?

Would you like to participate in a research study about your experiences to earn a $5 Amazon gift card?

Many people with diabetes feel stigmatized in a way that negatively impacts their health. The purpose of this study is to explore how relationships with doctors can help offset these bad experiences. This study will take about 20 minutes to complete.

To qualify you must:

1) Be 18 years of age or older.
2) Have been diagnosed with type 2 diabetes by a medical provider.
3) Report an A1C that was taken within the past 6 months.
4) You are not pregnant and have not been pregnant within the past 6 months.
5) Live in the United States.
6) Have a valid email address to receive your $5.00 gift card.

To participate follow this link: **QUALTRICS LINK GOES HERE**

*The first 146 participants will receive a $5.00 Amazon gift card via email.

Qualtrics Link

Qualtrics Link

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Sample online public forum recruitment post
"If you have been diagnosed with Type 2 Diabetes you may be eligible to earn a $5.00 Amazon gift card by participating in this 20-minute research study: Qualtrics Link"

Sample email recruitment
Hello,

My name is Annie Laweryson. I am a Ph.D. student at the University of Alaska Fairbanks where I am conducting research on the social aspects of Type 2 Diabetes. Many people with diabetes feel stigmatized in a way that negatively impacts their health. The purpose of this study is to explore how relationships with doctors can help offset these bad experiences. You are receiving this email as an invitation to participate in this study. You will receive a $5.00 Amazon gift card for your time.

To participate you must:

- Be 18 years of age or older.
- Have been diagnosed with type 2 diabetes by a medical provider.
- Be able to report an A1C that was obtained within the past 6 months.
- You are not pregnant and have not been pregnant within the past 6 months.
- Live in the United States.
- Have a valid email address to receive your $5.00 gift card.

If you choose to partake, this study will take about 20 minutes to finish. Please follow this link to begin the survey: *QUALTRICS LINK GOES HERE*

Thank you in advance your participation in this research. If you have questions, you may contact me (Annie Laweryson) at anlaweryson@alaska.edu. Please be sure to fully complete the survey in order to receive your gift card.

Sincerely,

Annie