SUGAR HIGH: PSYCHOSOCIAL FACTORS OF PATIENTS WITH TYPE 2 DIABETES IN

AN INTEGRATED CARE SETTING

by

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Type 2 diabetes (T2D) places considerable strain on patients, their families, and the healthcare system. To promote improved outcomes, it is necessary to assess psychosocial factors that impede or enhance T2D self-management. Through six chapters, this dissertation project sought to understand associations within the context of rural places of residence and integrated behavioral healthcare (IBHC) settings. The first chapter introduces the key psychosocial factors of interests and the organizational model used to guide the review and analysis. The second chapter is a publishable systematic review of the literature examining psychosocial factors of patients with T2D living in rural places of residence. Gaps found in the literature included the need for research that included multiple psychosocial factors, better measures of social support, and measures of online support. The third chapter and fourth chapter include the literature and methodology that informed the original research in fifth chapter. The fifth chapter is a cross-sectional study examining the associations of psychosocial factors of patients within an IBHC setting. Significant findings included evidence of an association between support from children and improved T2D outcomes. The sixth chapter identifies future research direction, implications for clinical settings, and identifying a place for medical family therapists in this ongoing effort.

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AN INTEGRATED SETTING

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Daniel J. Blocker

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DEDICATION

I must first dedicate this work to my wife. She is my light and my life. Your support has encouraged me and lifted me when I was not sure if I could go any further. You are the reason that I work so hard, and I am so inspired by you. Thank you for being with me every step of this adventure.

In addition, I wish to dedicate this work to the staff of St. Mary's Family Medicine Residency. It has been an honor to serve with you. I am in awe of the care you consistently provide for a patient-base that faces significant challenges. I truly believe the way you practice medicine and your embrace of integrated care is the key to winning the daily battle against type 2 diabetes.

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PREFACE

As a behavioral health provider in an integrated behavioral health care setting, I am commonly brought into medical visits with patients. While I have had the opportunity to meet with a variety of patients self-managing their diabetes to various degrees of success, one case in particular stands out. I was informed before the visit that the patient was depressed and was having difficulty following her medication regimen. The medical provider hoped that I could address the depression symptoms and then find out more information about her medication adherence.

In my visit with the patient, we discussed the strain of diabetes management and the toll it takes on the body and spirit. The patient reported that she did not understand why her hemoglobin A1c (HbA1c) percentages remained so high. As I reviewed the charts, I saw that due to poorly managed diabetes, the patient's vision was impaired. Apparently, during medical visits, the patient would write down information regarding changes in her medical regimen and then provide the information to her adult child. I attempted to read the patient's handwritten notes and found them to be near indecipherable. I asked if the patient's child could read the notes, and she reported that her child has difficulty. I then asked about the patient's mode of transportation and she comes to medical visits. She indicated that her child brings her, and sits in the waiting room. After receiving the patient's permission, I brought her child into the room and recommended that she be present in the room whenever the patient came to the doctor. We discussed the difficulty surrounding medication management. At the end of this interaction, the patient reported feeling supported, and more hopeful and confident about her ability to manage diabetes.

This brief interaction captures the heart of my work as a Medical Family Therapist (MedFT) and some of the concerns that I have seen in the diabetes population. Regardless of

location, the east coast or the mountain west, type 2 diabetes takes an incredible toll on patients and patient families. A patient and their family can feel isolated and overwhelmed such as the one I refer to here. It is my hope that this research provides a next step for others to continue to understand not only the benefits of integrated care settings for patients with type 2 diabetes, but the effect of including family in treatment, the impact of place of residence, and the specific benefits gained from meeting with a behavioral health provider, and specifically a MedFT.

CHAPTER 1: INTRODUCTION

Type 2 diabetes mellitus (type 2 diabetes or "T2D") is a pervasive health concern across the United States (American Diabetes Association, 2016; Center for Disease Control, 2014) with serious fiscal and health consequences (CDC, 2014; Huang et al., 2009; Parchman & Franz, 2014). Fortunately, much of the serious health risks and financial burdens are preventable through glycemic control achieved through the recommended American Diabetes Association self-management regimen (ADA, 2015, CDC, 2014). Thus, it is critical to understand factors that both impede and enhance self-managed glycemic control (Glasgow, Toobert, & Gillete, 2001).

Type 2 diabetes intersects the biological, psychological and social worlds of a person's life, and thus, it is not surprising that self-management efforts are complicated by an array of complex psychosocial factors (Berry et al., 2015; Walker et al., 2014). The most consistently cited factors include emotional distress (e.g., Cummings et al., 2014), self-efficacy (e.g., Sarkar, Fischer, & Schillinger, 2006), social support (e.g., Walker et al., 2015), insurance status (e.g., Garfield, Xenakis, & McBride, 2015; Zhang & Meltzer, 2016), and place of residence (e.g., Gariepy, Smith, & Schmitz, 2013). These psychosocial factors contribute significantly to reduced regimen adherence and increasingly poor diabetes outcomes (Glasgow et al., 2001; Peyrot et al., 2005) and have historically been inadequately addressed in medical visits (Peyrot et al., 2005).

The reduction of costs and the provision of whole-patient care for complicated chronic conditions is primary impetus behind the integration of primary and behavioral health services (Blount, 2003; Peek & National Integration Academy Council, 2013). Whole-patient care consists of the collaboration and coordination of the needed multiple care systems to provide care that adequately addresses the complex multi-systemic needs of the patient (McGaw, 2008).

A variety of service types (e.g., nutrition, pharmacy, case management, dental, behavioral) can qualify as integrated care (Peek & National Integration Academy Council, 2013). This dissertation will focus on integrated behavioral healthcare (IBHC) defined *as* team-based care comprised of primary care and behavioral health providers collaborating with patients and families to provide patient-centered care (Peek & National Integration Academy Council, 2013). The primary objective of this dissertation is to build on a growing body of literature and further examine the effects of behavioral health services in an IBHC setting on emotional distress, self-efficacy, social support, T2S management and Hemoglobin A1c (HbA1c) percentage.

Type 2 Diabetes

Type 2 diabetes (T2D) develops as different cell groups become resistant to insulin (Parchman & Franz, 2014). Eventually, the pancreas is unable to produce sufficient insulin to overcome this resistance resulting in insulin deficiency (Parchman & Franz, 2014). During insulin deficiency, glucose remains in the bloodstream depriving the cell groups of energy and prolonged hyperglycemia is associated with damage to various physical systems including your eyes, kidneys, and heart (ADA, 2015).

At this stage, if left unmanaged, the damage can translate to significant fiscal costs and health risks (CDC, 2014; Garfield et al., 2015). As of 2012, medical costs were twice as high for adults with diabetes at an estimated cost of $176 billion annually (CDC, 2014). Unmanaged T2D health risks for adults include blindness, kidney failure, heart disease, stroke, amputations, and a 50% increased likelihood of premature death (CDC, 2014; Parchman & Franz, 2014). While the majority of patients with diabetes are diagnosed with type 2 diabetes (an estimated 90-95%) (CDC, 2014), the financial and health costs are difficult to obtain as available data do not distinguish between the forms of diabetes.

Through a recommended disease regimen consisting of increased physical activity, improved diet/nutrition (meal planning), and medication management (pills and/or injectable medication) these costs and risks can be significantly reduced (ADA, 2015; CDC, 2014). To increase adherence, a wide range of support may be needed from the medical system (e.g., providers, specialists, and support staff) (Young-Hyman et al., 2016). Integrated care settings, and particularly, IBHC settings may be especially able to offer the support needed through the integration of behavioral and physical health (Blount, 2003; Busetto et al., 2016; Peek & National Integration Academy Council, 2013).

Integrated Behavioral HealthCare

As previously mentioned, this dissertation focuses on the integration of behavioral health services into a medical setting. Broadly, integrated care "seeks to improve outcomes for those with complex chronic health problems by overcoming healthcare fragmentation through linkage or coordination of services of different providers along the continuum of care" (Nolte & Pitchforth, 2014, p.5). Integrated behavioral healthcare (IBHC) is one type of integrated care services where biomedical care and behavioral health are made available to patients (Boon, Mior, Barnesly, Ashbury, & Haig, 2009; Marlowe, Hodgson, Lamson, White & Irons, 2013). The types of IBHC services available can be based on patient need and medical setting varying from coordinated care to co-located care to collaborative care (Doherty, McDaniel, & Baird, 1996). They may include traditional behavioral health therapy visits, co-visits with primary care and behavioral health providers, psycho-education group visits, diabetes education, care management calls, and peer support (Busetto et al., 2016).

Emotional Distress

Emotional distress is a construct consisting of the two more common reactions to T2D: diabetes distress and depression (Fisher et al., 2008). Some studies indicate that anxiety may only be present at the initial diagnosis (Fisher et al., 2010). Diabetes distress provides the context of the emotional distress or the "hidden emotional burdens, stresses, and worries that are part of managing diabetes" (Fisher, 2014; Hessler et al., 2014, p.618). Depression symptoms can be seen as indication of severity for one's emotional distress (Fisher, 2014).

Diabetes distress and depression have been found to have unique effects on both T2D management and outcomes. For example, both are associated with reduced medication adherence and physical activity (Cummings et al., 2014; Hessler et al., 2014; Parada et al., 2012; Walker et al., 2014). Researchers found diabetes distress and depressive symptoms were both associated with reduced glycemic control (Cummings et al., 2014; Hessler et al., 2014; Kogan et al., 2009; Zulman et. al, 2012; Walker et al., 2014; 2015). Integrated care services, without behavioral health providers on site, have been found to impact depression (Ciechanowski et al., 2006; Cully et al., 2014; Katon et al., 2010; Siminerio, Ruppert, & Gabbay, 2013) and diabetes distress (Gabbay et al., 2006). However, these studies included screenings and services performed by healthcare members, distinct from services where behavioral health and medical providers both provide care for patients on-site. According to IBHC researchers, Zulman et al., (2012), diabetes distress and depression not only influenced T2D outcomes, but other psychosocial variables such as self-efficacy.

Self-Efficacy

Self-efficacy is one's perception of his or her ability to manage or succeed at a task (Bandura, 1977). A higher sense of self-efficacy is correlated with increased effectiveness of T2D management (Anderson, Funnell, Fitzgerald, & Marrero 2000; Van der Ven et al., 2003).

Additionally, researchers found higher reports of self-efficacy associated with increased physical activity (Walker et al., 2014), increased reports of self-management (Zulman et al., 2012; Hunt et al., 2012), adherence to dietary restrictions (Whittemore, Melkus, & Grey, 2005), and reduced HbA1c (Beckerle & Lavin, 2013; Mishali, Omer, & Heymann, 2010; Sarkar, Fisher, & Schillinger, 2006; Walker et al., 2014; 2015). The impact of integrated care services, but not specifically, IBHC, on self-efficacy, through the provision of diabetes education only, are inconsistent. Some studies report improvements in self-efficacy while others demonstrate no effect (Carter et al., 2011; Gerber et al., 2005). According to Littlewood et al. (2015), not only is greater self-efficacy associated with improved outcomes, but it is associated with greater perceived social support.

Social Support

Increasing effort has been made to account for the effects of social support on disease management and glycemic control. Over the years, researchers included a wide variety of potential sources of support including providers, peers, partners/spouses, family, community, and online support (Fox & Duggan, 2013; Kogan et al., 2009; Littlewood et al., 2015; Naglekerk, 2006). Provider support has been found to be helpful with some patients (Littlewood et al., 2015) and unhelpful with others (Parada et al., 2012). There is insufficient data to conclude the effect of peer support on T2D management (Dale, Williams, & Bowyer, 2012). Partner/spouse involvement and family involvement can both positively and negatively impact disease management (Johnson et al., 2015; Lida et al., 2012; Mayberry et al., 2016; Mier et al., 2007). Community-wide health initiatives can also improve health behaviors and increase a patient's report of perceived social support (De Groot et al., 2012). Online support intervention studies, where patients were directed to use a specified site to receive information and support did not

improve outcomes or perceived quantity of support (Beatty & Lambert, 2013; Yu et al., 2014). Interestingly, self-guided online efforts increased patients' perceived quantity of social support (Oh, Lauckner, Boehmer, Fewins-Bliss, & Li, 2013).

Residence

Place of residence captures the socio-economic neighborhood characteristics such as food security, perceived safety, and healthcare availability and accessibility (Smalls, Gregory, Zoller, & Egede, 2016). A key component that drives outcome differences between places of residence is lack of urbanization (Eberhadt & Pamuk, 2004). Per the USDA Economic Research Services (ERS) classification codes, rural places of residence can vary from insignificant to modest urbanization where the urban area's population is less than 50,000 (USDA ERS, 2016). Areas classified as rural have a higher prevalence of T2D, less opportunities for diabetes education, and, generally, lower health outcomes (Brown-Guion et al., 2013). These findings are attributed to reduced accessibility to healthcare (Gariepy et al., 2013), limited social support (Gariepy et al., 2013; Shaw, Gallant, Riley-Jacome, & Spokane, 2006), food insecurity (Radcliffe, Kash, Ferdinand, & Schulze, 2015), and community factors (e.g, limited access to safe physical activity) (Gariepy et al., 2013).

Insurance Status

Insurance status is a measure of not only coverage, but is also an indication of socio-economic status and important determinant for quality of care for patients with T2D (Hu et al., 2014; Richard et al., 2011). Insurance options in the United States primarily include uninsured, private, Medicaid, and Medicare (Kaiser Family Foundation, 2015). Of those receiving coverage, patients covered by Medicaid reported worse T2D outcomes than other insurance types (Medicare and Private) (Garfield et al., 2015). The Medicaid population can vary by state, but generally includes those below the poverty line, pregnant women, children, the elderly, and those

with disabilities (SSA.Gov, 2016). Fortunately, IBHC has demonstrated improved outcomes for patients with T2D on Medicaid (Tice et al., 2015). As Medicaid status specifically has been influential on outcomes, in chapter 5, we controlled for Medicaid status. Insurance status and the other variables heretofore discussed are organized in this dissertation using the Transactional Model of Stress and Coping (Lazarus & Folkman, 1987).

Transactional Model of Stress and Coping

This dissertation used the Transactional Model of Stress and Coping to organize its findings (Lazarus & Folkman, 1987). Previous studies have applied variations of Lazarus & Folkman's (1987) Transactional Model of Stress and Coping (TMSC) to T2D (Duangdo & Roesch, 2008; Hocking & Lochman, 2005; Hunt et al., 2012). The TMSC is conceptualized (see Figure 1) as the relationship between person variables (e.g., emotional distress and self-efficacy/locus of control) and environmental variables (e.g., social support) in the appraisal of a threat and the resulting coping response utilized. The model includes five components: primary appraisal, secondary appraisal, appraisal of social support, coping behaviors, and outcomes. In this dissertation, emotional distress is defined as the primary appraisal, self-efficacy as the secondary appraisal, coping behaviors are diabetes self-management behaviors, social support appraisal includes in-person and online sources, and the measurable outcome is the HbA1c percentages. One of the reasons for specifically using this model was that its design permits the testing of associations between appraisals and the effect of appraisals on management behaviors, and outcomes.

Purpose and Design

Despite the high prevalence of T2D across the United States (CDC, 2014), our growing understanding of the effects of psychosocial factors on T2D management, and the advancements

in IBHC services, we still do not understand the full impact of their association. Originally, the purpose of this dissertation was to explore the associations between emotional distress, self-efficacy, social support, T2D management, and outcomes within a rural population. For this reason chapter two is a systematic review exclusively exploring this relationship. However, as noted previously in this chapter, after beginning data collection it became clear that the study site would be unable to include a sufficient number of rural patients to run the required analyses. The decision was then made to still include rural place of residence as a control factor as the study's focus shifted to assess the psychosocial associations with T2D management and outcomes within an IBHC setting. However, the study sample was 98% urban making it unreasonable to include this variable in the final study.

The final version of this dissertation's original study utilized a cross-sectional quantitative approach to assess the associations between emotional distress, self-efficacy, social support, T2D management behaviors, and HbA1c percentages, while controlling for insurance status, and patient engagement with behavioral health providers within an IBHC setting. Specifically, the primary question asked with this study was if participation with behavioral health services available in the IBHC model was associated with emotional distress, self-efficacy, social support, T2D management and HbA1c percentages. Secondary questions captured assumptions about the associations as predicted by the TMSC between emotional distress, self-efficacy, social support, T2D management, and HbA1c percentages.

This first chapter introduced the factors that will receive some attention throughout this dissertation and the model framework that will organize this dissertation, the Transactional Model of Stress and Coping (Lazarus & Folkman, 1987). This dissertation evolves from a systematic review examining these psychosocial factors within rural places of residence (chapter

2) to a literature review (Chapter 3) that examines the impact of integrated care on these psychosocial factors. Building on the findings of chapters 2 and 3, a methodology (Chapter 4) is provides the design for an empirical study including the participants, recruitment procedures, measures, and proposed analysis.

More specifically, the second chapter is a systematic review of the current T2D literature and the aforementioned psychosocial factors within rural places of residence. This review explores the question, "What is known about emotional distress, self-efficacy, social support, and T2D management among rural populations?". After a systematic review of four databases, 20 articles met the inclusion criteria. Findings from this systematic review suggest that within rural populations more research is needed that includes diabetes distress and depression and more research examining self-efficacy. Additionally, the findings suggest that both better measures of social support and the inclusion of online support is needed to better understand the association between social support and T2D within rural places of residence.

The third chapter includes an in-depth literature review of the association between integrated care services and the psychosocial factors of T2D, T2D management and outcomes. This chapter is organized by the Transactional Model of Stress and Coping (TMSC) breaking down the association integrated care and the primary appraisal factors (emotional distress), secondary appraisal (self-efficacy), social support appraisal, coping (T2D management), and outcomes (HbA1c percentages). Gaps in the literature support the need for an analysis that includes all of the factors as indicated by the TMSC, and for the role of IBHC on these variables, T2D management, and HbA1c percentages.

The fourth chapter includes the methodology used for the fifth chapter, or the empirical article. Included in this chapter are the measures and analysis for the empirical article included in

this dissertation. Purposive sampling techniques were used to recruit participants from the mountain west region of the United States. Data was collected via surveys and analyzed using structural equation modeling (SEM).

Chapter 5 is a publishable manuscript building on the literature review in chapter 3 and methodology outlined in Chapter 4. In this chapter, the associations within and between the psychosocial factors, T2D management and HbA1c percentages, while controlling for the impact of an IBCH setting (interactions with BHPs) and insurance status were tested. Significant contributions included a negative association between support from children and HbA1c percentages. In the discussion section, these significant contributions, as well confirmations and contradictions were explored.

Chapter 6 summarizes the findings of the dissertation. This chapter was organized by the three-world view of healthcare (Peek & Heinrich, 1995). Specific recommendations for future research are considered, as well implications for the clinical, operational, and financial worlds of healthcare. The chapter concludes by advocating for the role of Medical Family Therapists (MedFTs) within these implications.

Summary

Despite the prevalence of T2D across the United States (CDC, 2014) our growing understanding of the effects of psychosocial factors on T2D management and the development of integrated behavioral health care, gaps remain in our understanding between emotional distress, self-efficacy, social support, T2D management, HbA1c percentages within an IBHC setting (Busetto et al., 2016). This dissertation project seeks to begin addressing some of these concerns.

This dissertation project consists of six chapters. This first chapter introduced the factors that will receive some attention throughout this dissertation and the model framework organizing

this dissertation. The second chapter is a publishable manuscript. It is the aforementioned systematic review examining these psychosocial factors within rural places of residence. The third chapter consists of a literature review used in the fifth chapter exploring the associations between integrated care services and the psychosocial factors of T2D, T2D management and outcomes. The fourth chapter includes the methodology used for the fifth chapter, or the empirical article. The fifth chapter is the publishable manuscript including the results from cross-sectional methodology outlined in chapter 4. The sixth chapter organized by the three-world view of healthcare (Peek & Heinrich, 1995) further explores the implications from this dissertation project and the role of medical family therapists, specifically within these implications

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Primary Appraisal:
Emotional Distress

Diabetes
Distress

Coping Behaviors

Outcomes

Depression

T2D
Management

HbA1c

Self-
Efficacy

Social
Support

Secondary Appraisal

Social Support Appraisal
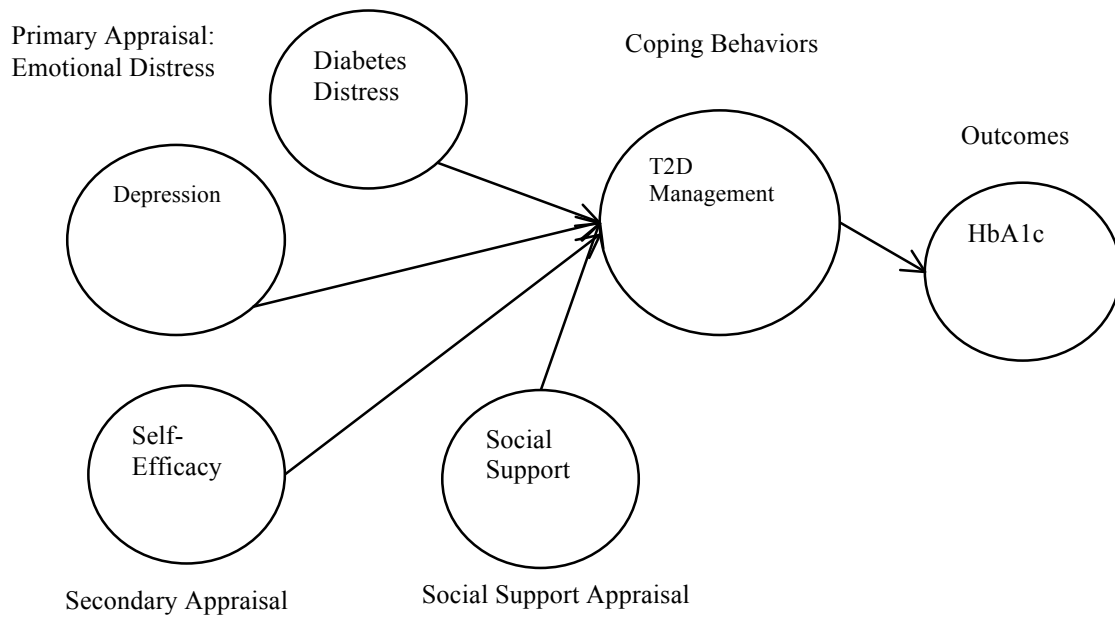
Figure 1. The Transactional Model of Stress and Coping (TMSC)

CHAPTER 2: RURAL SUGAR HIGH: A SYSTEMATIC REVIEW OF THE

RELATIONSHIP AN EFFECT OF EMOTIONAL DISTRESS, SELF-EFFICACY, AND

SOCIAL SUPPORT ON RURAL ADULT TYPE 2 DIABETES MANAGEMENT

Rural medical providers ranked improvement of type 2 diabetes/diabetes mellitus (T2D)

management among the top concerns for rural health outcomes in America (Bolin, Sculze,

Helduser, & Ory, 2015). T2D self-management requires a daily commitment to medication

adherence, dietary intake, and physical activity (ADA, 2015). Poor T2D self-management

contributes to significant annual fiscal burden (an estimated $245 billion in 2012) and increases

likelihood of serious health consequences (Center for Disease Control, 2014). An important

influence on T2D disease self-management, psychosocial factors like self-efficacy, diabetes

distress, depression and social support can inhibit or promote T2D self-management (Glasgow,

Toobert, & Gilette, 2001; Walker, Gebregziabher, Martin-Harris, & Egede, 2015). Thus, it is

important to understand contextual factors that may influence psychosocial factors. One such

contextual factor is place of residence, and specifically, a rural place of residence, or

communities (Eberhardt & Pamuk, 2004; ERS, 2013; Gariepy Smith, & Schmitz, 2013; Hale,

Bennet, & Probst, 2010).

Rural places of residence are defined using the Department of Agriculture Economic

Research Service guidelines, where communities located outside of a metropolitan area with a

population less than 50,000 people are categorized as rural (ERS, 2013; Hale, Bennet, & Probst,

2010). Rural places of residence face unique challenges that can impact T2D disease self-

management (Bolin et al., 2015; Ferdinand et al., 2015). These include healthcare inaccessibility

and unaffordability (Bolin et al., 2015; Ferdinand et al., 2015), inadequate T2D management

education (Bolin et al., 105), limited access to healthy food (Radcliff, Kash, Ferdinand, &

Schulze, 2015), higher than average rates of obesity (Radcliff et al., 2015), limited options for physical activity (Radcliff et al., 2015), and social isolation (Rock, 2003). Furthermore, the demographic landscape of non-metro rural areas has undergone significant changes over the last 10 years with a growing number of minority groups settling in rural areas (Lichter, 2012). However, before it is possible to expand our current understanding of the complex associations between the context of a rural place of residence and psychosocial factors, the literature that has been done must be organized. To this end, this paper will systematically review the literature as organized by the Transactional Model of Stress and Coping (TSMC) (Lazarus & Folkman, 1987).

The Transactional Model of Stress and Coping

Lazarus and Folkman (1987) proposed via the Transactional Model of Stress and Coping (TMSC) that the appraisal of a perceived threat can influence coping or management efforts and outcomes. The appraisal process includes four associated assessments that can occur simultaneously: (a) the primary appraisal (evaluation for potential harm, (b) secondary appraisal (evaluation of potential mastery), (c) appraisal of available social support and coping or the behaviors chosen to respond to it (Glanz & Schwartz, 2008; Lazarus & Folkman, 1987). Not only have previous researchers used this model with T2D (Dungdao & Roesch, 2008; Hunt et al., 2012), but this model appreciates and allows for the control of contextual factors that create stress (i.e., rural place of residence) to be included in the analysis (Saldana, 1993). This systematic review will focus on primary, secondary, and social support appraisals in rural places of residence.

Primary Appraisal: Emotional Distress

The primary appraisal accounts for current and future harm that the threat may cause involving both cognitive and emotional processes (Lazarus & Folkman, 1987). It can be difficult to capture the cognitive process involved in appraisal, and emotional distress can be used in its stead as a measure of the threat severity determined by the cognitive process (Lazarus & Folkman, 1987). In this systematic review, variables including depression, diabetes distress, and anxiety capture the emotional distress the model identifies as associated with the primary appraisal.

The relationship between T2D and emotional distress is complicated. Emotional distress occurs in a wave-like pattern, where peaks and troughs correspond with diagnosis, treatment, and life events (Fisher, Glasgow & Stryker, 2010). The presence of emotional distress increases the risk of T2D and the presence of T2D increases the risk of emotional distress (Mezuk, Eaton, Albrecht, & Golden, 2008; Semenkovich, Brown, Svrakic, & Lustman, 2015). Gaps in our knowledge of the relationships between these variables are attributed to limited screenings of emotional distress in medical visits, emotional distress undetected by screening tools, and emotional distress remains undertreated (Hermaans et al., 2013; Holt, De Groot, & Golden, 2014). These gaps are especially present in rural places of residence (Cummings et al., 2014; Melkus, Whittemore, & Mitchell, 2009).

While there are gaps regarding the relationships between T2D and emotional distress, the known impact is significant. Emotional distress may be one of most important diabetes-specific determinants of patient quality of life (Baek, Tanenbaum, & Gonzalez, 2014). As predicted by the TMSC, emotional distress impacts the primary T2D disease-management behaviors: medication adherence, diet adherence, and physical activity (Lazarus & Folkman, 1987; Young-

Hyman et al., 2016). Specifically, increases in emotional distress are associated with reduced medication adherence (Ciechanowski, Katon, & Russo, 2000; Fisher et al., 2008; Fisher et al., 2010; Fisher et al., 2012; Melkus et al., 2009), diet adherence (Ciechanowski et al., 2000; Fisher et al., 2012), and physical activity (Ciechanowski et al., 2000; Fisher et al., 2012). It is associated with an increased risk of cardiovascular death in patients with diabetes (Cummings et al., 2014). Medical costs of patients with T2D reporting emotional distress (e.g., depression) are 4.5 times higher than those without emotional distress (Egede, Zheng, & Simpson, 2002). Recognizing the significant role emotional distress plays on outcomes and management behaviors, its complication relationship with T2D, and its key role in the TSMC (Lazarus & Folkman, 1987), it was important for studies included in this systematic review to include measures of depression, anxiety, or diabetes distress.

Secondary Appraisal: Diabetes Self-Efficacy

Occurring either simultaneously, or after identifying the presenting stressor, the secondary appraisal is non-conscious self-assessment of one's confidence in their ability to manage the stressor or self-efficacy (Lazarus & Folkman, 1987). T2D self-efficacy is an individual's confidence in his or her own ability to perform tasks to meet the complex demands of a diabetes regimen (Van Der Ven et al., 2003). The TMSC predicts that higher levels of T2D self-efficacy would improve self-management and reduce the effect of emotional distress on self-management (Lazarus & Folkman, 1987). Findings support these associations (Sarkar et al., 2006). T2D self-efficacy is positively associated with T2D resiliency (Mailbach & Murphy, 1995; Van Der Ven et al., 2003), increased glycemic control (Aalto et al., 1997; Hunt et al., 2012), and decreased emotional distress (Aalto et al., 1997; Hunt et al., 2012)).

Self-efficacy, similar to diabetes distress, is a fluid construct suggesting that interventions can potentially augment diabetes management confidence (Van Der Ven et al., 2003). Specifically, improvement in T2D self-efficacy is associated with the provision of T2D education and T2D skill practice (Krichbaum, Aarestad, & Buethe, 2003; Sakar et al., 2006). However, in rural populations with limited access to healthcare sites, there is less access to medical education (Bolin et al., 2015). Advances in telehealth may change this, but current findings suggest reduced self-efficacy within rural populations (Bolin et al., 2015). Fortunately, support from family and friends can serve as a critical moderator between emotional distress, self-efficacy and T2D management and can serve to bridge the gap (Duangdao & Roesch, 2008; Karlsen, Oftedal, & Bru 2012).

Diabetes Social Support

The other appraisal process of the TSMC assesses available social support on whom the patient can rely for support and as both a buffer against the emotional distress and a promotor of self-efficacy and T2D management behaviors (Lazarus & Folkman, 1987). Family, friends, medical providers, and even the community environment can potentially play this role (Shaw, Gallant, Riley-Jacome, & Spokane, 2006), but the efficacy of the support provided can depend on the dynamics of the relationship (Lida et al., 2012). Positive social support is collaborative and non-shaming. Positive social support is associated with improvement in medication and dietary adherence (Franks et al., 2012; Tang et al., 2008), glycemic control (Mayberry & Osborn, 2012), and reductions in emotional distress (Baek et al., 2014). Negative social support is when the perceived supporter is authoritarian (i.e., a regimen enforcer), or permissive (i.e, encourages unhealthy behaviors) (Johnson et al., 2015; Lida et al., 2012; Tang et al., 2008). Negative social support is associated with reductions in dietary adherence and higher relational dissatisfaction

with the support person. Rural communities can consist of close-knit geographically isolated community members (Rock, 2003). This mix of closeness, limited availability and quality of social support could influence T2D management and its outcomes. For this reason and its role within the TMSC (Lazarus & Folkman, 1987), the inclusion of social support is warranted in this systematic review.

Purpose of this Systematic Review

Rural populations are at higher risk for poor T2D outcomes due to multiple factors (Bolin et al., 2015). Of particular interest here are the psychosocial factors: emotional distress, self-efficacy, and social support. Our knowledge of these particular factors within samples of rural populations remains unorganized. In this current state, it is difficult to determine what questions or gaps remain in the literature. For this purpose, a systematic review of the literature was conducted.

A systematic review is a process of gathering all the existing literature found within established inclusion criteria, and then assessing the literature for deficits and other findings (Cooper, 2010). The aim of this systemic review was to answer the following research question: What is known about emotional distress, self-efficacy, social support, and T2D management among rural populations? The author examined and evaluated the articles for: (a) participant and sample characteristics (b) measures of primary and secondary appraisal, (c) measures of self-support, (d) who was included in the measure of social support, and (e) study outcomes. This systematic review adhered to the search and evaluation method outlined in Cooper (2010) and PRISMA-P (Shamseer, 2015). Through evaluation of the T2D research, this study will identify methodological trends and report the most common sample characteristics, variables, and

measures used, with the goal of identifying gaps in the literature and needed areas for future research.

Method

Prior to the conduction of this systematic review, a search was performed within the current listing of prior and ongoing systematic reviews of the Cochrane Library, a systematic review database (Cooper, 2010). A search by topic (Diabetes Mellitus management, Diabetes Distress, Self-Efficacy, Social Support, and rural populations) yielded no previous or current reviews of these variables within this context. Identifying that a systematic review of our research question did not exist, we proceeded with the systematic literature search.

This systematic search included a variety of keyword combinations to ensure the most robust findings (see Table 1). Keywords included: rural population, rural, rural health, rural environment, diabetes mellitus, type II, distress, diabetes distress, self-care, coping, social support, stress, psychological, stress, psychological/etiology, self-efficacy, social support, adaptation, psychological, disease management, and psychosocial support. At times, the searched databases recommended or already used combinations of keywords and these were also utilized. These combination keywords included: diabetes mellitus type 2/psychology stress and psychological/psychology. The keywords were chosen in order to yield all possible articles related to emotional distress, self-efficacy, and social support surrounding T2D management within rural populations. PsycINFO, CINAHL via EBSCO, MEDLINE via OVID, and PUBMED were used as the primary databases for the searches. Keywords were entered into the databases so that articles had to include each keyword to be included in the search. The conjunctions "OR and AND" were applied appropriately to obtain the widest range of information.

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The first step was to review titles and abstracts for possible inclusion according to the inclusion and exclusion criteria (Cooper, 2010). Next, duplicate articles across databases were excluded from the pool of articles. Third, method sections were evaluated to determine whether articles fit the inclusion and exclusion criteria. In the last step, reference lists were searched to find any other articles that fit the criteria.

Inclusion criteria for this systematic review articles required that included studies: (a) specifically addressed Type 2 diabetes or Diabetes Mellitus, (b) sampled from an adult (>18 years of age) rural population in the United States, (c) were peer-reviewed, (d) were qualitative/quantitative research articles (e) were from an English-language journal, (f) included at least two of the three factors considered in this review (emotional distress, social support, or self-efficacy) and, (g) included management outcomes (HbA1c, blood pressure, BMI). There was no limit on the date of the studies included in the review, s no previous systematic review existed. A total of 20 articles met this inclusion criteria and were published between 2000 and 2015.

Studies were reviewed in ascending chronological order and relevant information from the method and results sections were organized into a table for each variable (See Tables 4 and 5). Following established criteria (Cooper, 2010; Shamseer et al., 2015), each study was reviewed for: (a) design, (b) sample, (c) measures, (d) outcome variables, and (e) setting. Study design refers to the type of research method used in the study (e.g. quasi-experimental). To evaluate the population sample of each included study, participant information (total sample size, percent female, percent minority, age range, and study setting). Information about variable measures was extracted and organized based on the target of the assessment (emotional distress, self-efficacy, or social support). The category of social support included the name of the measure and the

specific support group/person targeted by the measure.

Significant and non-significant findings were gathered from each article based on relevancy to the psychosocial measures. An independent reader was used to confirm the inclusion of the articles based on the exclusion criteria used. When any disagreement existed between the independent reader and primary author, a third non-invested party was included to provide the determining vote surrounding the article in question. Article quality was assessed using seven criteria for evaluating observational studies (Hall, Ferreira, Maher, Latimer, & Ferreira, 2010; Sanderson, Tatt, & Higgins, 2007; von Elm et al., 2007) (see Table 5 for criteria and summary of article quality).

Results

354 articles were considered for this systematic review with 20 meeting inclusion criteria (see Table 1 and Figure 1). 8 qualitative studies met inclusion criteria (see Table 3) and twelve quantitative/intervention met inclusion criteria (see Table 4). The twenty articles selected for this review captured some variation of at least two of the psychosocial variables (emotional distress, self-efficacy, and social support) and a T2D management outcome. In total 11 studies included all three variables. Five studies were qualitative in design (Amar et al., 2015; Bhattacharya, 2012; Nagelkerk et al., 2006; Samuel-Hodge et al., 2000; Utz et al., 2006) and six quantitative (Cummings et al., 2013; Littlewood, Cummings, Lutes, & Solar, 2015; Melkus et al., 2009; Parada, Horton, Cherrington, Ibarra, & Ayala, 2012; Siminerio, Ruppert, Huber, & Toledo, 2014; Whittemore, Melkus, & Grey, 2005). For ease of result interpretation, the findings are organized into two separate tables (see table 3 and 4) outlining each admitted study's participant demographics, emotional distress findings, self-efficacy findings, and social support findings.

Race/Ethnicity

There was some diversity in the race/ethnicity of the populations sampled (see Table 6) and several studies highlighted race-related findings. Rural, White, non-Hispanic females compared to urban African American females reported less diabetes distress and had greater glycemic control and social support (Melkus et al., 2009). Rural African American participants recommended community based programs to prevent T2D and increase T2D management (Utz et al., 2006). Another research team suggested that family-based interventions may encourage more physical activity in T2D Mexican American patients (Mier, Medina, & Ory, 2007). Medical provider support was negatively associated with medication adherence among Hispanic non-White males (Parada et al., 2012).

Gender

The qualitative studies reported gender differences in their T2D experience. Men were found to be 1.85x less likely to adhere to medication (Parada et al., 2012). Notably, men and women reported: (a) less social support in making T2D-related lifestyle changes (Bhattacharya, 2012), (b) that T2D was a betrayal of the body (Utz et al., 2006), and (c) financial concerns (Utz et al., 2006). There were some significant associations with gender reported in the quantitative studies (cross-sectional/experimental). As reported, women were more likely to be receptive to support and medical provider counseling (Denham, Manoogian, & Schuster, 2007; Utz et al., 2005).

Age

Most of the studies included a wide age range (see Table 6). None of the studies identified any association between age and emotional distress, self-efficacy or social support.

Study Setting

The majority of rural-based studies were conducted in a rural community center or some other unidentified rural location (30%) (see Table 6). Physical setting was not associated with outcomes. Rural telemedicine was associated with reduced depression and distress scores (Safford et al., 2015; Siminerio et al., 2014), lower blood pressure (Safford et al., 2015), higher reports of quality of life (Safford et al., 2015) and self-empowerment (Siminerio et al., 2014), but not cholesterol (Safford et al., 2015).

Emotional Distress

Of the quantitative studies, less than 70% included a measure of emotional distress. Most common to the studies reviewed were measures to assess depression and diabetes distress (see Table 7). None of the studies used any measures designed to specifically measure anxiety.

Prevalence. The presence of depression and diabetes distress varied. The presence of significant depression ranged from 0 (Cummings et al., 2013) to around 30% (Kogan et al., 2013; Parada et al., 2012). Only one study included those who were positively diagnosed with depression (de Groot et al., 2012). Reported diabetes distress scores ranged from low (Siminerio et al., 2014; Whittemore et al., 2005) to moderate (Siminerio et al., 2014). Prevalence of anxiety was not reported in the included studies.

Findings. Results varied due to study purpose. Some studies identified contributing factors to emotional distress. These contributing factors included fears about T2D health complications (Samuel-Hodge et al., 2000), frustration and helplessness resulting from T2D (Naglekerk, et al., 2006) a sense of body betrayal (Utz et al., 2006), and fears associated with lifestyle changes (Bhattacharya, 2012). Other studies examined the associations between emotional distress and T2D management and outcomes. Depression associated with reduced physical activity (Mier et

al., 2007), and mediated the relationship between community disadvantage and higher HbA1c percentages (Kogan et al., 2009). Three studies found that emotional distress interventions reduced emotional distress and decreased HbA1c percentages (de Groot et al., 2012; Safford et al., 2015; Siminerio et al., 2014).

Self-efficacy

Eight of the studies included a quantitative measure self-efficacy (see Table 7). All of the measures included were used in at least two studies (see Table 7). Seven studies (41%) included open-ended self-efficacy related items.

Prevalence. Participant self-efficacy was found to vary between samples. Among samples of rural African-American women, self-efficacy ranged from low (Safford et al., 2015) to moderate (Cummings et al., 2013). Among a sample of White, non-Hispanic females, self-efficacy was reported as low (Siminerio et al., 2014).

Findings. The open-ended items explored obstacles to T2D self-efficacy. These included poor understanding of the treatment plan (Naglekerk et al., 2006), limited education about nutrition and diet needs (Denham et al., 2007; Jones, Utz, & Williams, 2008) and fears or pessimism about the ability to meet the needs of a T2D management regimen (Bhattachyra, 2012; Nagelkerk et al., 2006). Higher reports of self-efficacy was associated with improved T2D self-care behaviors (Hunt et al., 2012; Whittemore et al., 2005), diet (Whittemore et al., 2005), and emotional distress (Whittemore et al., 2005). The results of intervention studies found that increases in self-efficacy were associated with higher reports of quality of life (Safford et al., 2015), lower blood pressure (Safford et al., 2015), reduced emotional distress (Safford et al., 2015; Siminerio et al., 2014) and higher patient satisfaction with care (Siminerio et al., 2014) in rural, White Non-Hispanic, and African American populations.

Social Support

Ten articles included in the systematic review included quantitative measures on social support to manage T2D (see Table 7). Eight studies (44%) used open-ended items to measure social support. These assessments and open-ended items captured a wide range of support types including family, medical providers, friends, community, financial support, work, church, media, or non-specified support person (see Table 7).

Prevalence. Several research teams reported low perceived social support from family, friends, medical providers, and communities (Aamar et al., 2015; Bhattacharya, 2012; de Groot et al., 2012). The amount of social support was not measured sufficiently to provide a specific amount of prevalence.

Findings. Perceived social support was helpful when the patient felt encouraged by the support person or group (Aamar et al., 2015), and when the support person or group had accurate knowledge surrounding diet and nutrition (Jones et al., 2008). Perceived social support was unhelpful when the support person or group added stress to patient (Aamar et al., 2015; Bhattachyra, 2012; Samuel-Hodge et al., 2000) or when the support person or group lacked knowledge regarding T2D management (Denham et al., 2007; Jones et al., 2008).

Twelve (67%) of the 16 studies that included a measure of social support reported that social support was directly associated with successful T2D management (Aamar et al., 2015; Bhattachyra, 2012; de Groot et al., 2012; Denham et al., 2007; Hunt et al., 2012; Jones et al., 2008; Littlewood et al., 2015; Melkus et al., 2009; Nagelkerk et al., 2006; Samuel-Hodge et al., 2000; Utz et al., 2006; Whittemore et al., 2005) and improved self-efficacy (Littlewood et al., 2015). Three of the studies reporting improvements in T2D management, emotional distress, and self-efficacy provided social support via peer groups or health coaches (Cummings et al., 2013;

Safford et al., 2015; Skelly et al., 2005), social support via rural telemedicine (Safford et al., 2015; Siminerio et al., 2014) or intervening at the community level (de Groot et al., 2012). However, only one study (de Groot et al., 2012) attributed positive change in T2D management, distress, and self-efficacy to increased social support.

Of the types of social support, providers were associated with increased diabetes knowledge and decreased HbA1c percentages (Littlewood et al., 2015; Naglekerk et al., 2006; Utz et al., 2006). When family had sufficient diabetes management knowledge, especially diet and nutrition, it was perceived as very helpful (Denham et al., 2007; Littlewood et al., 2015; Utz et al., 2006). However, if the family expected too much of the individual with T2D in regards to family responsibilities, the social support was reportedly weaker (Samuel-Hodge et al., 2000).

Discussion

The purpose of this systematic review was to organize and identify future directions of the rural T2D management literature as guided by the Transactional Model of Stress and Coping (TMSC) (Lazarus & Folkman, 1987). After a thorough literature review involving 4 databases using practical (English-based) and literature-specific (rural populations, contained at least 2 of the three variables considered) criteria, 20 studies met the inclusion criteria and were reviewed.

Study quality varied (Table 5) and variability within representative sampling, follow-up data, and multivariate analysis limited the generalizability of the findings. Eight of the 20 studies reviewed included a multivariate analysis or more complex analysis. This is partially explained by the inclusion of eight qualitative articles, which are inherently different in methodology and purpose. The studies that used a multivariate analysis were unable to utilize more dynamic statistical analyses because of small sample sizes or significant differences in the construct measures. Despite the limited generalizability, this systematic review identified several

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directions for future research. These directions include a more thorough exploration of emotional distress and self-efficacy, and more expansive measures of social support.

Historically, rural communities are poorly screened for psychological distress, depression, and anxiety (Cummings et al., 2014; Melkus, Whittemore, & Mitchell, 2009). Previous researchers found that diabetes distress, depression, and anxiety are commonly reported occurring simultaneously in patients with T2D (Berry et al., 2015; Fisher et al., 2012; Grigsby et al., 2002). Sample participants of the included studies reported diabetes distress ranging from mild to moderate in severity (Littlewood et al., 2015; Kogan et al., 2007; Parada et al., 2012; Siminerio et al., 2014; Whittemore et al., 2005) and 30-32% endorsed depressive symptoms (Kogan et al., 2007; Parada et al., 2012). Only three included articles accounted for both depressive symptoms and diabetes distress and none accounted for anxiety. As predicted by the TMSC, associations were found between the presence of emotional distress and poor T2D management (Krogan et al., 2009; Parada et al., 2012). Future research would be best served to account for the multiple factors of emotional distress to allow the identification of the specific effects of the variables on T2D management and outcomes (Walker et al., 2014).

Overall, self-efficacy was measured in over 75% (14 of 20) of the included studies and in only 7 of the quantitative studies. T2D self-efficacy is a reflection of patient confidence in their knowledge and ability to disease self-manage (Anderson et al., 2000). Patient populations within the included studies reported low to moderate self-efficacy (Cummings et al., 2013; Safford et al., 2015; Siminerio et al., 2014). This has important implications in the literature. Self-efficacy is associated with increased resiliency and higher reports of T2D self-management in urban and suburban populations. (Aalto, Uutela, & Aro, 1997; Hunt et al., 2012; Mailbach & Murphy, 1995; Van Der Ven et al., 2003). Findings from the included articles were consistent with these

findings. As the TMSC model would predict, reports of higher self-efficacy was associated with reduced emotional distress, increased glycemic control (Hunt et al., 2012; Safford et al., 2015; Siminerio et al., 2014; Skelly et al., 2005), and reduced cholesterol and blood pressure (De Groot et al., 2012; Safford et al., 2015; Siminerio et al., 2014). Conversely, when rural patients reported reduced self-efficacy, they cited limited understanding of the treatment plan, helplessness, and frustration (Nagelkerk et al., 2006). With only a small group of studies (35%) including a quantitative measure of self-efficacy and of these only three included emotional distress and social support, limitations remain in our knowledge of the unique effects of self-efficacy within rural populations, and how emotional distress and social support interact with different levels of self-efficacy.

Social support was the most included psychosocial measure in this systematic review. Social support within both the TMSC model (Glanz & Schwartz, 2008) and the T2D literature can play a critical role moderating the effects of emotional distress and self-efficacy (Baek et al., 2014; Franks et al., 2012; Mayberry & Osborn, 2012; Tang et al., 2008). Among the populations sampled included in this review perceived social support was low (Amar et al., 2015; Bhattacharya, 2012; De Groot et al., 2012). This perception of low support has large ramifications as patients with T2D are more optimistic about successful outcomes when social support is perceived to be available (Amar et al., 2015). Outcomes consistently supported this assertion whether social support was from family (Aamar et al., 2015; Bhattacharya, 2012; Denham et al., 2007; Samuel-Hodge et al., 2000; Utz et al., 2006), friends (Bhattacharya, 2012; Jones et al., 2008; Utz et al., 2006), providers (Littlewood et al., 2015; Nagelkerk et al., 2006; Utz et al., 2006), or the community (De Groot et al., 2012). As the TMSC model would predict,

social support was found to influence self-efficacy and emotional distress (Aamar et al, 2015; Hunt et al., 2012; Littlewood et al., 2015).

Inconsistency and vagueness among the measurement tools limits our understanding of the impact of social support in rural populations. Future studies would be best served by utilizing items that capture the positive and negative effects of social support across multiple domains including friends, family, community, and providers (Gallant, 2003; Jones et al., 2008). Of these different types of social support, peer social support can be complicated in rural communities. Rural populations are a paradox of tight-night geographically isolated community members (Rock, 2003). These community members may not have much in-person social support available (Bolin et al., 2015). Anderson (2003) reported that many were seeking support on-line via chat rooms, support groups, or seeking information. As social interaction becomes less tied to geographic location (Baym, 2015), future researchers could examine on-line support and information gathering by rural TTD patients.

Limitations

This systematic review has two important limitations. Despite efforts to include a variety of search terms to ensure the capture of the most relevant information, it is possible that an article was missed or overlooked. This is a common potential limitation in systematic reviews (Cooper, 2010). Second, searches for this review were restricted to published articles in peer-reviewed journals that were written in English and sampled from the rural United States. The decision to ensure that only published peer-reviewed articles were included was made based on the desire to ensure that included articles were subject to significant rigor. That being said, there may be some dissertation, thesis manuscripts, and other unpublished articles of value that may have been excluded.

Conclusion

Challenges to proper T2D management in for patients living in rural communities are psychological (diabetes distress, depression, and anxiety), confidence-related (poor diabetes self-efficacy), and insufficient social support. Organized by the Transactional Model of Stress and Coping (Lazarus & Folkman, 1987), these constructs become interacting variables labeled primary appraisal, secondary appraisal, and social support. It is essential that we understand how these constructs interact and influence rural patients. To this end, this systematic review examined the current literature to identify gaps and extant knowledge in the literature. Recommendations for future research include adding measures of anxiety, consistently using valid and broad measures, using representative samples, and widening the exploration of social support in the context of primary and secondary appraisal.

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PsycInfo (*N* = 26)
MEDLINE via Ovid (*N* = 74)
Cinahl (*N* = 11)
PubMed (N=147)

Removed
(N= 53)
Total
(N=205)

Key Word Search

Reviewed by title

Removed
(*N* = 152)
Total
(*N* =69)

Removed duplicates

Removed
(*N* = 33)
Total
(*N* =36)

Removed by Abstract

Removed
(*N* = 18)
Total
(*N* =18)

Evaluated method sections

Met Inclusion Criteria
(*N* = 17)

Searched Reference Lists

Met Search Criteria
(*N* =3)

Final
(*N* = 20)
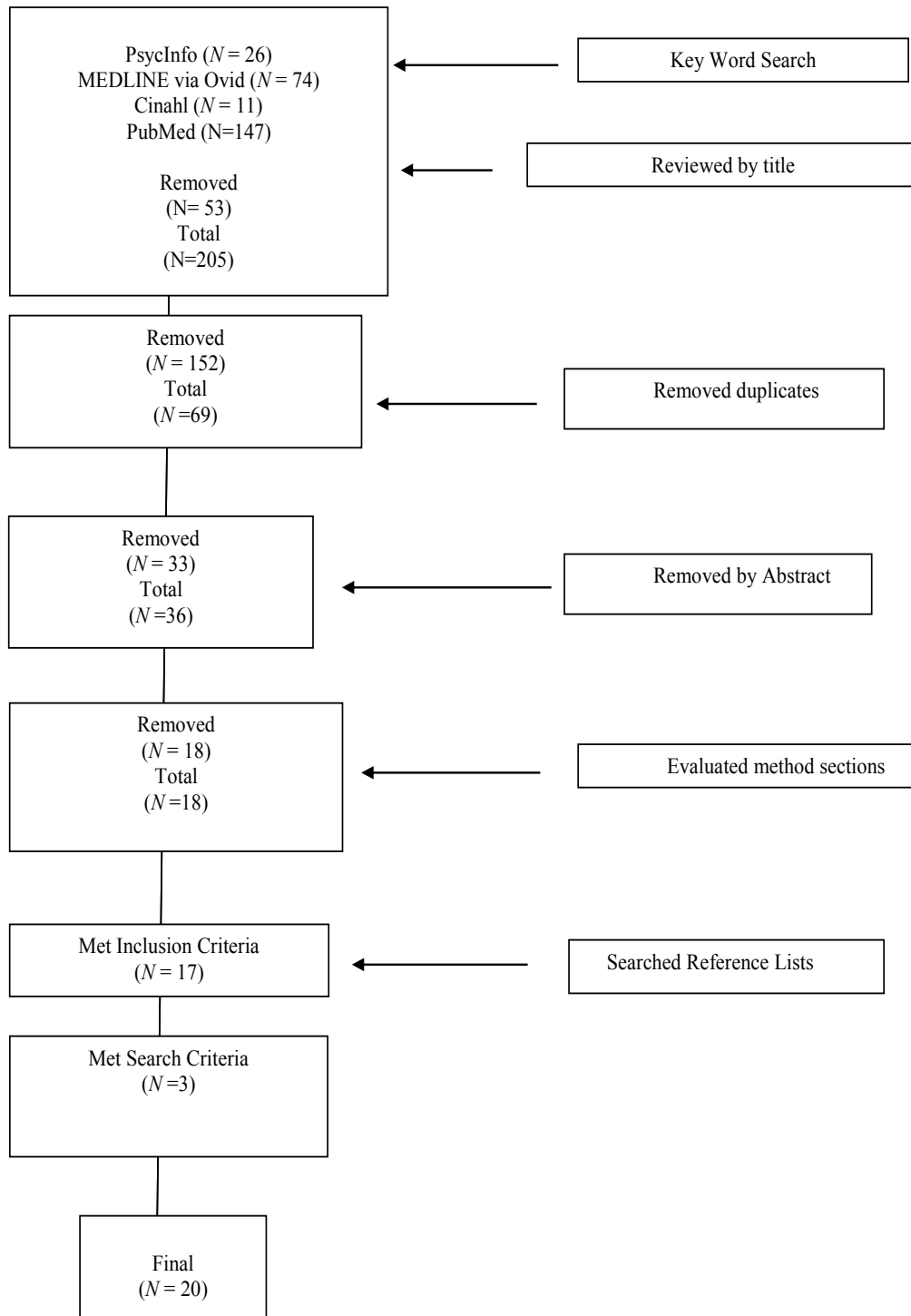
Figure 1. Systematic Review Steps

Table 1

Systematic Review Process and Results

Databases			
Total Articles: 258			
Medline via OVID	PubMed	PsycInfo	CINAHL
Step One: Titles			
Rural population & Diabetes Mellitus Type II & Distress Yield:10 Included:9	Rural & Diabetes Mellitus Type II & (Distress or Anxiety or Depression) Yield:51 Included:34	Diabetes distress & type 2 diabetes & rural Yield:9 Included:8	Rural & Diabetes Distress Yield:4 Included:4
Rural Population & Diabetes Mellitus Type II & distress & self care Yield:6 Included:5	Rural & Diabetes Mellitus Type II & Distress Yield:17 Included:14	distress & type 2 diabetes & rural & self-efficacy Yield:3 Included:3	(rural & diabetes Mellitus, Type 2) & (anxiety or depression or diabetes distress or psychological stress) & (adaption, psychological or disease management or psychosocial support or self-efficacy) Yield:7 Included:6
Rural Population & Diabetes Mellitus & Type II & distress & social support Yield:2 Included:2	Rural & Diabetes Mellitus Type II & (Distress or Anxiety or Depression) & (coping OR self care OR social support) Yield:28 Included:18	Type 2 diabetes mellitus & rural & self-efficacy Yield:9 Included:7	
Rural Population & Diabetes Mellitus, Type II & depression & self care Yield: 3 Included:3	Rural & Diabetes Mellitus Type II & Psychological Stress Yield:6 Included:6	type 2 diabetes & social support & rural environment & self-management Yield:4 Included:3	
Rural Population &, Diabetes Mellitus, Type II & Depression & social support Yield: 2 Included:2	(Diabetes Mellitus Type 2/psychology OR Diabetes Mellitus Type II) AND (rural) AND (Stress, Psychological/etiology OR Stress Psychological/psychology OR anxiety OR depression) AND (self care OR social support OR adaptation, psychological or coping) Yield:23 Included:15	type 2 diabetes & stress & rural environment Yield:1 Included:1	

Rural Population &, Diabetes Mellitus, Type II & anxiety & social support Yield: 0 Included: 0	(diabetes mellitus type 2/psychology OR diabetes mellitus type ii) AND (rural) AND (stress, psychological/etiology OR stress psychological/psychology Yield:10 Included:10 OR anxiety OR depression OR diabetes distress) AND (self care OR social support OR adaptation, psychological OR coping) Yield: 22 Included: 19	type 2 diabetes & depression & rural environment Yield:3 Included:3
Rural Population &, Diabetes Mellitus, Type II & anxiety & self care Yield: 0 Included: 0		type 2 diabetes & anxiety & rural environment Yield:0 Included:0
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress) Yield: 17 Included: 12		type 2 diabetes & social support & rural environment Yield:6 Included:6
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress) & (Self-care or Social support) Yield: 7 Included: 7		
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress or stress, psychological) & (Self care or Social support or adaptation, psychological) Yield: 7 Included: 7		
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress or stress, psychological) & (coping or Self care or Social support or adaptation, psychological) Yield: 8 Included:8		
(Rural Population or Rural or Rural Health) & (Diabetes Mellitus, Type II or Type 2 diabetesor Diabetes, Mellitus, psychology) & (diabetes distress or anxiety or depression or stress,		

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psychological) & (social support or coping or psychological adaptation or disease management or self care) Yield: 12 Included: 11			
After removal of Titles Total: 205 Step Two: Duplicate Studies Removed: 152			
Step Three: Abstract			
Rural population & Diabetes Mellitus Type II & Distress Included:5	Rural & Diabetes Mellitus Type II & (Distress or Anxiety or Depression) Included:9	Diabetes distress & type 2 diabetes & rural Included:1	Rural & Diabetes Distress Included:3
Rural Population & Diabetes Mellitus Type II & distress & self care Included:0	Rural & Diabetes Mellitus Type II & Distress Included:4	distress & type 2 diabetes & rural & self-efficacy Included:0	(rural & diabetes Mellitus, Type 2) & (anxiety or depression or diabetes distress or psychological stress) & (adaption, psychological or disease management or psychosocial support or self-efficacy) Included:1
Rural Population & Diabetes Mellitus & Type II & distress & social support Included:0	Rural & Diabetes Mellitus Type II & (Distress or Anxiety or Depression) & (coping OR self care OR social support) Included:0	Type 2 diabetes mellitus & rural & self-efficacy Included:4	
Rural Population & Diabetes Mellitus, Type II & depression & self care Included:0	Rural & Diabetes Mellitus Type II & Psychological Stress Included:1	type 2 diabetes & social support & rural environment & self-management Included:1	
Rural Population &, Diabetes Mellitus, Type II & Depression & social support Included:0	(Diabetes Mellitus Type 2/psychology OR Diabetes Mellitus Type II) AND (rural) AND (Stress, Psychological/etiology OR Stress Psychological/psychology OR anxiety OR depression) AND (self care OR social support OR adaptation, psychological or coping) Included: 2	type 2 diabetes & stress & rural environment Included:0	
Rural Population &, Diabetes Mellitus, Type II & anxiety & social support Included: 0	diabetes mellitus type 2/psychology OR diabetes mellitus type ii) AND (rural) AND (stress, psychological/etiology OR stress psychological/psychology Yield:10 Included:10	type 2 diabetes & depression & rural environment Included:1	

	OR anxiety OR depression OR diabetes distress) AND (self care OR social support OR adaptation, psychological OR coping) Included: 0		
Rural Population &, Diabetes Mellitus, Type II & anxiety & self care Included: 0		type 2 diabetes & anxiety & rural environment Included:0	
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress) Included: 2		type 2 diabetes & social support & rural environment Included:2	
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress) & (Self-care or Social support) Included: 0			
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress or stress, psychological) & (Self care or Social support or adaptation, psychological) Included: 0			
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress or stress, psychological) & (coping or Self care or Social support or adaptation, psychological) Included:0			
(Rural Population or Rural or Rural Health) & (Diabetes Mellitus, Type II or Type 2 diabetesor Diabetes, Mellitus, psychology) & (diabetes distress or anxiety or depression or stress, psychological) & (social support or coping or psychological adaptation or disease management or self care) Included: 0			

After removal of Abstracts Total: 39

Step Four: Method			
Rural population & Diabetes Mellitus Type II & Distress Included:4	Rural & Diabetes Mellitus Type II & (Distress or Anxiety or Depression)	Diabetes distress & type 2 diabetes & rural	Rural & Diabetes Distress Included:2

Rural Population & Diabetes Mellitus Type II & distress & self care Included:0	Included:3 Rural & Diabetes Mellitus Type II & Distress Included:2	Included:0 distress & type 2 diabetes & rural & self-efficacy Included:0	(rural & diabetes Mellitus, Type 2) & (anxiety or depression or diabetes distress or psychological stress) & (adaption, psychological or disease management or psychosocial support or self-efficacy) Included:1
Rural Population & Diabetes Mellitus & Type II & distress & social support Included:0	Rural & Diabetes Mellitus Type II & (Distress or Anxiety or Depression) & (coping OR self care OR social support) Included:0	Type 2 diabetes mellitus & rural & self-efficacy Included:1	
Rural Population & Diabetes Mellitus, Type II & depression & self care Included:0	Rural & Diabetes Mellitus Type II & Psychological Stress Included:1	type 2 diabetes & social support & rural environment & self-management Included:1	
Rural Population &, Diabetes Mellitus, Type II & Depression & social support Included:0	(Diabetes Mellitus Type 2/psychology OR Diabetes Mellitus Type II) AND (rural) AND (Stress, Psychological/etiology OR Stress Psychological/psychology OR anxiety OR depression) AND (self care OR social support OR adaptation, psychological or coping) Included: 0	type 2 diabetes & stress & rural environment Included:0	
Rural Population &, Diabetes Mellitus, Type II & anxiety & social support Included: 0	(diabetes mellitus type 2/psychology OR diabetes mellitus type ii) AND (rural) AND (stress, psychological/etiology OR stress psychological/psychology Yield:10 Included:10 OR anxiety OR depression OR diabetes distress) AND (self care OR social support OR adaptation, psychological OR coping) Included: 0	Type 2 diabetes & depression & rural environment Included:0	
Rural Population &, Diabetes Mellitus, Type II & anxiety & self care Included: 0		type 2 diabetes & anxiety & rural environment Included:0	
(Rural Population & Diabetes Mellitus, Type II) & (anxiety or depression or distress) Included: 1		type 2 diabetes & social support & rural environment Included:2	

(Rural Population & Diabetes
Mellitus, Type II) & (anxiety
or depression or distress) &
(Self-care or Social support)
Included: 0

(Rural Population & Diabetes
Mellitus, Type II) & (anxiety
or depression or distress or
stress, psychological) & (Self
care or Social support or
adaptation, psychological)
Included: 0

(Rural Population & Diabetes
Mellitus, Type II) & (anxiety
or depression or distress or
stress, psychological) &
(coping or Self care or Social
support or adaptation,
psychological)
Included:0

(Rural Population or Rural or
Rural Health) & (Diabetes
Mellitus, Type II or Type 2
diabetesor Diabetes, Mellitus,
psychology) & (diabetes
distress or anxiety or
depression or stress,
psychological) & (social
support or coping or
psychological adaptation or
disease management or self
care)
Included: 0

Step Five: Reference Analysis
Added: 3
Final Total = 20 Studies

Table 2

Key Code for Study Characteristics

Study design		
2GE- 2 Group Experimental	O: Observation	RCI: Randomized Control Trial
CS- Cross-Sectional	PPD- Pre-post-test design	RFA: Recursive Frame Analysis
I: Intervention	QE- Quasi-experimental	RM- Repeated Measures intervention
Setting		
IH: In home	RCHC: Rural Community Health Center	UC: Urban and Rural
ODEC: Outpatient Diabetes Education Center	RPC: Rural primary care center	
RC: Rural Community	RT: Rural Telehealth	
Measures of emotional distress (ED)		
CES-D: Center for Epidemiological Studies Depression Scale	CES-D: Center for Epidemiological Studies Depression Scale	PAID: Problem Areas in Diabetes Scale
DDS: Diabetes Distress Scale	PHQ-8/PHQ-9: Patient Health Questionnaire 8 or 9	SCID: Structured Clinical Interview for the DSM-IV
Measures of self-efficacy (SE)		
DDS: Diabetes Distress Scale	DSMART: Diabetes Self-Management Assessment Report	PAM: Patient Activation Measure
DES-SF: Diabetes Empowerment Scale-Short Form	LC: Locus of Control	SN: Subjective Norms
DMSES: Diabetes Management Self-Efficacy Scale	OE: Open-ended	TDQ: The Diabetes Questionnaire
DSE: Diabetes Self-Efficacy scale	PAID: Problem Areas in Diabetes	
Measures of social support (SS)		
CIRS: Chronic Illness Resource Survey	DES-SF: Diabetes Empowerment Scale-Short Form	MOS: Medical Outcomes Study Social Support Survey
CRP: Community Resources and Problems Measure	ED: Economic Distress	PRA: Patient Reactions Assessment
CPS: Communication with Provider Scale	FIQ: Family Intrusiveness Questionnaire	POST: Patient satisfaction
DCP: Diabetes Care Profile	FRS: Family Resource Scale	QLD: Quality of life in Diabetes instrument
Diabetes Distress Scale (DDS)	MFSS: Modified Dunst Social Support Scale	SPS: Social Provisions Scale
Types of social support (SST)		
CH: Church/Spirituality	FIN: Economic Resources	PTS: Participants
CO: Community	Media: Media	UN: Unspecific
FA: Family	PRO: Provider	WO: Work
FR: Friend	PSP: Primary Support Person	
Outcomes (O)		
BMI: Body Mass Index	DK: Diabetes Knowledge	MA: Medication adherence
BP: blood pressure	DSCA: Diabetes Self-care activities	MO: Medical Outcomes
CH: Cholesterol	DT: Diet/Nutrition	PA: Physical Activity
DCP: Diabetes Care Profile	HbA1c: Blood Glucose	QL: Quality of Life

Notes. Abbreviations made based on existing abbreviations or from the simplest perceived abbreviation by the author

Table 3

Qualitative Systematic Review Findings

Year 1st Author	N	% Female % Minority Age range Setting	Measures					Qualitative themes and findings
			ED	SE	SS	SST	O	
2000 Samuel-Hodge	70	100% 100% 35 – 65 RCHC UC	OE	OE	OE	FA FR CH FIN	DT PA MO	Life stress ⇓ management Family stress ⇓ management T2D = emotional/physical tiredness T2D= dietary deprivation T2D= fears about complications
2006 Nagelkerk	24	50% 0% 26-78 RCHC	OE	OE	OE	PRO PSP FIN	MA DK DT	Treatment confusion ⇓management Pessimism ⇓ management Disease progression ⇓management Collab w/PRO⇑ management PSP ⇑ management
2006 Utz	73	57% 100% <21 RC	OE	OE	OE	PRO CO FA CH FIN	MA DT PA DK	Cultural differences impede help Financial burden unawareness PRO, FR, FA, CH support ⇑ T2D management Females receptive to support Males emphasize PA limitations Narrative of body betrayal Use of CH to cope Need for DK
2007 Denham	13 PTS 13 PSP	76% 0% 23-78 IH	NA	OE	OE	PSP FA	DT	PSP need education about DT Family traditions impact DT Culture of origin impacts DT FA support varies by PT gender
2007 Mier	39	84% 100% 30-55 RC	OE	NA	OE	FA PRO CO	PA	FA motivates PA FA obligations prevent PA Depression prevents PA CO impacts PA
2008 Jones	21 PTS 6 PSP	NA 100% 27-85 RC	NA	OE	OE	FA FR CH	DT MA PA DK BP	FR and FA impacts management PSP and PTS need DT information
2012 Bhattacharya	31	50% 100% 45-64 RC	OE	OE	OE	FA PSP FR CH	PA DT MA MO	Fear of inability to make changes Fear about PA Fear about DT Fear about MA and MO Limited support by FR and FA Feeling of alienation by FR and FA Treatment pessimism
2015 Aamar	294	73% 68% NA RCHC	OE	OE	FA FIN WO	FA FIN WO	HbA1c BP BMI DK	Most common concerns: HbA1c Depression Family and financial stress Most common strengths reported: Social support Willingness to change Diabetes knowledge

Table 4

Quantitative systematic review findings

Year 1st Author	Study Design (N=)	% Female % Minority Age Range Setting	Measures					Author findings/Conclusions
			ED	SE	SS	SST	O	
2005 Skelly	2GE 41	100% 100% 50-85 IH	BDI-II DSDS	NA	QLD	UN	DK HbAlc DSCA IS	Intervention group findings: ⇑ Patient satisfaction ⇑ Self-care practice & Quality of life ⇓ Diabetes distress Both groups reported: ⇑ Hb1AC control
2005 Whittemore	CS 53	11% 100% 30-70	PAID	DSMART TDQ	DSMART	FR FA PRO	BMI HbA1c PA DSCA DT	SS predicted DSCA, distress, DT SE predicted DSCA, distress, DT Females met PA goals Females did not meet exercise goals
2007 Kogan	CS O 200	70% 100% 40-65 IH	CES-D	NA	FRS CRP SPS FIQ PRA	FIN CO PRO	DCP MO	30% report ⇑ depression 57% of variance predicted by model
2009 Melkus	CS 97	100% 50% 25-77 ODEC	PAID	NA	DCP	UN	BMI HbA1c DSCA	Rural white women report: ⇑ HbA1c control ⇑ social support ⇓ emotional distress
2009 Kogan	CS 192	70% 100% ~53 IH	CES-D	NA	SPS ED	CO FIN	HbA1c	FIN stress ⇓ HbA1c control No direct CO affect, but CO disadvantage ⇑ depression Depression ⇓ HbA1c control Lower education ⇓ HbA1c control
2012 De Groot	RM 40	68% 0% ~57 RC	SCID BDI	NA	CIRS	PRO FA FR CO WO MEDIA	HbA1c PA Ch BP BMI	⇑ Quality of life ⇑ HbA1c control ⇑ Neighborhood support ⇓ Depression ⇓ PA ⇓ Blood pressure
2012 Hunt	CS 152	65.8% 58.6% 19-81 RCHC	NA	DMSES	MOS	UN	DCSCA	SE predicts T2D management for men and women SS strongly associated w/T2D management for men
2012 Parada	RCT 302	60% 100% ~57 RCHC	PHQ-8	CIRS	CPS	PRO	MA	60% of sample nonadherent Men 1.85x more likely to have poor MA Pts w/depression 3.91x more likely to have poor MA Less regular diabetes control ⇓ MA SS from PRO not predictive of MA
2013 Cummings	CS 200	100% 100% 19-75 RC	DDS CES-D	DES-F DSE SN LC	MFSS	FA FR	BMI PA DT Hb1AC BP MA DSCA	At baseline: ⇓ Hb1Ac control ⇓ Dietary and medication adherence

			Measures					
Year 1st Author	Study Design (N=)	% Female % Minority Age Range Setting	ED	SE	SS	SST	O	Author findings/Conclusions
2014 Siminerio	RCI 35	54% 3% 38-80 RT	PAID	DES-F	NA	NA	DSCA HbA1C PS	⇑ Sense of empowerment ⇓ Diabetes distress ⇑ PS
2015 Littlewood	RCT 200	100% 100% 19-75 RCHC	DDS CES-D	DES-F DSE SN LC	MFSS	FA PRO FR CH	BMI PA DT Hb1AC BP MA DSCA	PRO most adequate support FA, FA with T2D & FR support helpful SS associated with ⇑ SE SS associated with ⇓ emotional distress
2015 Safford	RCI 360	75% 87.4% ~60.2 RCP RT	DDS	PAM	NA	NA	Hb1Ac BP Ch BMI	Intervention effect: ⇑ QL & Patient activation ⇓ Diabetes distress & BP No effect: Hb1Ac or CH

Table 5

Study Quality Criteria

Year First Author	Representative sample[1]	Defined sample[2]	Blinded outcome assessment[3]	> 85% follow-up rate[4]	Appropriate outcome measures[5]	Outcome data reported at follow-up[6]	Multivariate analysis, w/ adj. for confounds[7]	Total
2000 Samuel-Hodge	0	1	0	0	0	0	0	1
2005 Skelly	0	1	0	0	1	0	1	3
2005 Whittemore	0	1	0	0	1	0	1	3
2006 Nagelkerk	1	1	0	0	0	0	0	2
2006 Utz	0	1	0	0	0	0	0	1
2007 Denham	0	1	0	0	0	0	0	1
2007 Kogan	1	1	0	0	1	0	1	4
2007 Mier	0	1	0	0	0	0	0	1
2008 Jones	0	1	0	0	0	0	0	1
2009 Kogan	1	1	0	0	1	0	1	4
2009 Melkus	0	1	0	0	1	0	1	3
2012 Bhattacharya	0	1	0	0	0	0	0	1
2012 de Groot	0	1	0	1	1	1	1	5
2012 Hunt	0	1	0	0	1	0	0	2
2012 Parada	0	1	0	0	1	0	1	3
2013 Cummings	0	1	0	0	1	0	1	3
2014 Siminerio	0	1	0	0	1	0	1	3
2015 Aamar	0	1	0	0	0	0	0	1
2015 Littlewood	0	1	0	0	1	0	0	2
2015 Safford	0	1	0	0	1	0	1	3

Note: '1' signifies that the author met the stated criteria, whereas '0' indicates the criteria have not been met.

[1]"Participants selected as consecutive or random cases" (Hall, Ferreira, Maher, Latimer, & Ferreira, 2010, p. 1103).

[2] "Description of participant source and inclusion and exclusion criteria" (p. 1103).

[3] "Assessor was unaware of prognostic factors at the time of outcome assessment" (p. 1103).

[4] "Outcome data were available for at least 85% of participants at one follow-up point" (p. 1103).

[5] "Appropriate choice of outcome measures" (p. 1103).

[6] "Reporting of outcome data at follow up" (p. 1103).

[7] "Multivariate analysis conducted, with adjustment for potentially confounding variables" (p.110)

Table 6

Demographic Statistics

Demographic Item	# articles (# out of 20)	% of articles
Sample Race/Ethnicity		
African American	13	65%
Hispanic non-White	4	15%
Native American	2	10%
White non-Hispanic	9	45%
Other/Multi-Ethnic (Not identified)	2	10%
Sample Gender		
Women	20	100%
Men	14	70%
Age		
Between 18 -24	4	20%
Between 25-44	11	55%
Between 45-65	18	90%
Over 65	10	50%
Unknown	1	5%
Setting		
Rural Community Health Center (RCHC)	6	30%
Rural Community (RC)	6	30%
IH(In home)	4	20%
Rural Telemedicine(RT)	1	5%
Rural Primary Healthcare(RPC)	1	5%
Urban and Rural (UC)	1	5%
Outpatient Diabetes Education Center (ODEC)	2	10%

Table 7.

Psychosocial Measure Statistics	#
Emotional Distress	
Diabetes Distress	6
Problem Areas in Diabetes Scale[79]	3
Diabetes Distress Scale[28]	3
Diabetes Symptoms Distress Scale[80]	1
Depression	8
Center for Epidemiological Studies Depression Scale[74]	4
Beck Depression Inventory[75-76]	2
Patient Health Questionnaire-9[77]	1
Structured Clinical Interview for the DSM-IV[78]	1
Anxiety	0
Unspecified	
Open-ended items	6
Self-Efficacy	
Open-ended	7
Diabetes Empowerment Scale-Short Form[84]	3
Diabetes Self-Efficacy Scale[44]	2
Subjective Norms[85]	2
Health Locus of Control[86]	2
Social Support	
Open-ended	8
Modified Dunst Social Support Scale[88]	2
Social Provision Scale (SPS)[89]	2
CIRS: Chronic Illness Resource Survey	1
CRP: Community Resources and Problems Measure	1
CPS: Communication with Provider Scale	1
DCP: Diabetes Care Profile	1
DES-SF: Diabetes Empowerment Scale-Short Form	1
ED: Economic Distress	1
FIQ: Family Intrusiveness Questionnaire	1
FRS: Family Resource Scale	1
Diabetes Distress Scale (DDS)	1
MOS: Medical Outcomes Study Social Support Survey	1
PRA: Patient Reactions Assessment	1
POST: Patient satisfaction	1
QLD: Quality of life in Diabetes instrument	1
Social Support Type	
Medical Providers	8
Families	11
Friends	7
Community	6
Finances	4
Unspecified primary support person	6
Work	3
Church	3
Media	3

CHAPTER 3: REVIEW OF LITERATURE

One of the most common non-communicable diseases (CDC, 2014) and expensive health conditions in the United States (Huang et al., 2009), type 2 diabetes mellitus (type 2 diabetes or "T2D") is a pervasive health concern. Researchers and providers have identified diabetes self-management as one of the primary keys to reducing the long-term costs associated with the condition (CDC, 2014). To this end, practitioners and researchers have placed a tremendous emphasis on developing T2D self-management strategies in an effort to ameliorate related barriers (CDC, 2014; Stolar, 2010).

Chronic conditions like type 2 diabetes are complex and treatment often requires the intersection of biological, psychological, and social health (Dreyfus, 2014). Thus, psychosocial factors are of considerable interest in promoting daily management adherence (Glasgow, Toolbert, & Gillette, 2001; Young-Hyman et al., 2016). Specifically, psychological factors like depression, diabetes distress, and self-efficacy and social factors like social support, insurance status, and place of residence can impede or promote patient management efforts (Aghili et al., 2016; Glasgow et al., 2001; Nicolucci et al., 2013; Walker et al., 2015).

This interest in addressing complex biopsychosocial needs associated with chronic conditions has coincided with the transition away from the traditional biomedical model and towards an integrated care model (Engel, 1979; Blount, 2003). In the current literature framework, the term "integrated care" has served as a catch-all phrase for a variety of service delivery models incorporating a continuum of medical and psychological services (Peek and National Integration Academy Council, 2013). The model that is the focus of this review and dissertation is the integrated behavioral healthcare (IBHC) model. In this model, medical and behavioral health services are combined to provide for patient concerns within primary care

settings (Peek and National Integration Academy Council, 2013). The purpose of this literature review is to highlight the associations between type 2 diabetes, psychosocial factors, and integrated behavioral healthcare.

Type 2 Diabetes

Type 2 diabetes (T2D) is a chronic condition, where glucose management is no longer homeostatic (Porte et al., 2003; Parchman & Franz, 2014). Glucose, derived from nutritional intake, travels in the bloodstream. As blood glucose levels rise beyond the normal range of 7%, the pancreas produces insulin to transport the glucose to the muscles for energy or to other cell groups for storage (Porte et al., 2003). Over time, the human body can become resistant to insulin (Parchman & Franz, 2014). The pancreas produces increasing amounts of insulin to meet the body's energy and storage demands, but eventually falls short and insulin resistance is associated with insulin deficiency (Parchman & Franz, 2014). At the stage of insulin deficiency, glucose is not extracted from the blood depriving the body's cell groups of needed energy and damaging vital organs including the kidneys and heart (ADA, 2015). The resistance and eventual deficiency of insulin usually associated with obesity, but not caused by antibodies against insulin-producing cells, is diagnosed as type 2 diabetes. Type 2 diabetes medications have various mechanisms including helping reduce insulin resistance, improving insulin secretion, limiting glycogen breakdown, and preserving beta cell function (Parchman & Franz, 2014).

In 2012, 8.9% or 27.85 million of the adult American population met the diagnostic criteria for T2D (ADA, 2016). In 2010, only six other chronic conditions were more common in the United States, (high blood pressure, dementias, depression, arthritis, and osteoporosis) than diabetes (CDC, 2014). Not only prevalent, T2D has proven to be costly. In 2012, patients with diabetes cost an estimated 20% of the national healthcare spending (CDC, 2016). Thus, despite

affecting less than 10% of the population, those with T2D make up over a fifth of healthcare spending. Beyond fiscal cost, numerous health risks are also associated with T2D. In 2013, diabetes was the seventh leading cause of death in the United States (CDC, 2016). Unmanaged T2D complications/health risks for adults include blindness, kidney failure, heart disease, stroke, amputations, and a 50% increased likelihood of premature death (CDC, 2014; Parchman & Franz, 2014).

These high fiscal and health costs are not fixed, but susceptible to change through T2D disease management. The T2D disease management regimen recommended by the Center for Disease Control (CDC) (2014) and the American Diabetes Association (ADA)(2015) consists of increased physical activity, better diet/nutrition (meal planning), and medication (pills and/or injectible medication). Ideally adherence to this management plan will diminish the financial costs and health risks that can accompany T2D (ADA, 2015; CDC, 2014). Specifically, positive outcomes that are hopefully achieved through this regimen include improved glycemic control (e.g., blood glucose in the target range).

One measure of successful glycemic control is the Hemoglobin A1c (HbA1c; ADA, 2014). It provides a measure of the average glucose percentage present in the blood stream across the most recent 2-3 months (ADA, 2014). Generally healthy HbA1c levels are below 7%, and patients with unmanaged T2D are significantly above this amount (ADA, 2014). As patient HbA1c percentages drop to within a range of between 8% and 10%, the number of hospital visits drop in half compared to patients with an HbA1c percentage that persists over 10% (Menzin, Langley-Hawthorne, Friedman, Boulanger, & Cavanaugh, 2001). Hospital stays are one of the largest contributors to high patient medical costs suggesting that greater glycemic control indicates potentially lower patient costs (Menzin et al., 2001). Some of the greatest obstacles to

proper self-management and glycemic control are psychosocial in nature including diabetes

distress, diabetes self-efficacy, social support, rurality, and insurance type (Delameter, 2006;

Glasgow et al., 2001; Walker et al., 2014). Thus, to encourage successful T2D management, the

psychosocial concerns.

Biopsychosocial Model

Historically, health was understood through a biomedical lens (Engel, 1977). In so doing,

other significant impact were influences were ignored. This resulted in a skewed and incomplete

understanding of health. Engel (1977, 1981) proposed that greater gains were possible if health

was understood via the biopsychosocial model (BPS). Model creators suggest that the BPS

approach embraces the "biological, psychological, social, and structural processes operate in a

matrix of nested and inextricably connected subsystems that influence all aspects of mental and

physical health" (Suls, Krantz, & Williams, 2013, p. 507).

To varying degrees, several authors have conceptualized T2D using the BPS model. For

example, Segal and colleagues (2013) developed a diabetes treatment approach driven by the

BPS model. Other studies have organized their qualitative findings regarding diabetes via the

BPS model (Dreyfus, 2014) or with an expanded model, the biopsychosocial-spiritual framework

(Aamar, Lamson, & Smith, 2015). Peyrot, McMurry, and Kruger (1999), proposed a model of

glycemic control for diabetes patients that incorporated a BPS framework for the prevention and

management of T2D. While the BPS model continues to be an effective guide towards whole-

patient clinical practice, none of these variations of the BPS model have consistently served as

frameworks for the T2D self-management literature.

Integrated Behavioral Healthcare

At the turn of the 21st century, the Institute of Medicine caught the Engel's vision. A chasm in the quality of provided medical care was recognized (IOM, 2001). Policy efforts began to target poor health outcomes and expanding care by emphasizing patient satisfaction, population health, and cost reduction (Berwick, Nolan, & Whittington, 2008). Integrating behavioral health professionals (BHPs) into primary care medical settings was one way to address these concerns in hopes that integrated behavioral healthcare (IBHC) would yield positive health outcomes (Blount, 2003). For example, by serving as "one-stop shop" for a variety of health needs, IBHC settings could potentially reduce more expensive patient service utilizations (i.e., emergency department visits and unneeded hospitalizations) (Blount, 2003; Peek & National Integration Academy Council, 2013). Thus far, these efforts have yielded support of this assumption including reduced use of more costly services (Lanoye et al., 2016) and reduce total healthcare costs by 5 to 10% over a period of 2 to 5 years (Melek, Norris, & Paulus, 2014).

At IBHC sites, physicians and nursing staff collaborate at either a coordinated, co-located or collaborative level of integration (Doherty, McDaniel, & Baird, 1996) with on-site or off-site behavioral health specialists including counselors, health coaches, social workers, medical family therapists, psychologists, care coordinators, and psychiatry (Boon, Mior, Barnesly, Ashbury, & Haig, 2009; Marlowe, Hodgson, Lamson, White & Irons, 2013). The collaborative efforts of medical and behavioral health providers encourage communication and concerted action to treat patients' biomedical and psychosocial needs (Peek & National Integration Academy Council, 2013). These integrated care sites provide an opportune setting for treating complicated biopsychosocial conditions like T2D (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Busetto et al., 2016) and have demonstrated efficacy to this end (Busetto et al., 2016;

Katon et al., 2010; Sieber, Newsome, & Lillie, 2012). Throughout this review, evidence of the impact of integrated care services on T2D will be examined in regards to the different significant biopsychosocial factors considered. The integrated care sites included in this review were limited to the literature that specifically identified themselves as either an IBHC site or as a multidisciplinary collaborative care sites.

<div align="center">**Transactional Model of Stress and Coping**</div>

While an appropriate guide for integrated care, the BPS model is insufficient to guide quantitative studies or predict relationships (Epstein & & Borrell-Carrio, 2005). Fortunately, other models exist that capture these biopsychosocial factors albeit with different labels and in similar constructs. The model that captures these elements and will guide the organization of this review is the Transactional Model of Stress and Coping (TMSC) (Lazarus & Folkman, 1987).

The work of Lazarus and Folkman (1987) regarding appraisal and coping lends itself to an understanding of the relationship between psychosocial factors, disease management, and T2D biomarker outcomes (HbA1c). The authors proposed, via the Transactional Model of Stress and Coping, that appraisal of a threat to self can influence one's coping efforts, which in turn influence outcomes (Lazarus & Folkman, 1987). Whether a new diagnosis or an ongoing management concern, T2D poses a significant threat to self. Due to insulin resistance and deficiency, high levels of blood glucose remain in the blood stream increasing the risk of cardiovascular conditions, kidney dysfunctions and even death (Baek et al., 2014). Treatment can be costly (Huang et al., 2009) and the management regimen is multidimensional including diet, activity changes, and medication (Delamater, 2006). After identifying the stressor, five major interactive components follow: primary appraisal, secondary appraisal, coping efforts, social support and outcomes (Lazarus & Folkman, 1987).

After the stress is presented, one engages in the primary appraisal (evaluation of potential harm) and then the secondary appraisal (evaluation of potential mastery) (Lazarus & Folkman, 1987). Social support is appraised after this to identify if it is available or warranted (Lazarus & Folkman, 1987). After these appraisals, coping behaviors are utilized to address either the problem itself or the emotional reaction (Lazarus & Folkman, 1987). These coping behaviors then influence the health outcomes associated with the stressor (Glanz & Schwartz, 2008). In this dissertation, primary appraisal was the emotional distress to T2D, secondary appraisal was self-efficacy regarding T2D management, social support included perceived in-person and online support, coping behaviors were disease management behaviors and the measured outcome was HbA1c percentage. Each of the five major model constructs were expected to interact with the other, but for the sake of conceptualization, each construct in this review was explored as an independent factor.

Primary Appraisal: Emotional Distress

The primary appraisal accounts for: harm already experienced by the stressor (i.e., symptoms, poor outcomes, missed work; CDC, 2014), anticipated future harm from the stressor (i.e., premature death, amputations [ADA, 2015; CDC, 2014]), and the perceived potential for mastery of the stressor (i.e., effective disease management) (Lazarus & Folkman, 1987). The primary appraisal includes a cognitive and emotional function in its evaluation (Lazarus & Folkman, 1987). The emotional reaction during the primary appraisal is interpreted as an indicator of the perceived severity of the threat per the cognitive appraisal (Lazarus & Folkman, 1987). In this dissertation, the emotional reaction was used to assess the primary appraisal, and was measured via diabetes distress and depression.

Diabetes distress captures the emotional reaction to the demands of T2D (Hessler et al., 2014). Diabetes distress by name alone would seemingly indicate that it is similar to depression, but it is independent of depression (Fisher, Glasgow, & Strycker, 2010). Diabetes distress can be very prevalent in adults with T2D. One study found that at least 70% of a two-wave sample experienced moderate diabetes distress over an 18-month study (Fisher et al., 2012). Diabetes distress is made up of multiple constructs including distress related to disease self-management, distress related to provider interactions, general emotional distress, and distress related to family and friends (Polonsky et al., 2005). Of these, regimen-distress, in particular, has been highly associated with glycemic control (Hessler et al., 2014). These four factors are susceptible to both individual characteristics (Wagner, Tennen, Feinn, & Osborn, 2015) and community characteristics (Gariepy et al., 2013).

Depression is relatively common per self-report in adult patients with T2D (20-31%) and can enhance the costs and consequences of T2D (Semenkovich, Brown, Dragan, & Lustman, 2015). One way to conceptualize the relationship between diabetes distress and depression is that depression gauges the severity of the emotional distress (Fisher et al., 2014). For example, one study found that while T2D did not impact prevalence of depression, African American men with T2D and depression were three times more likely to visit the emergency room and three times more likely to have longer inpatient stays (Husaini et al., 2004). Thus, depression may indirectly impact outcomes through its relationship with diabetes distress (Burns, Deschênes, & Schmitz, 2015; Ehrmann, Kulzer, Haak, & Hermanns, 2015; Fisher, 2014). As depression is distinct from distress, and may have an impact on outcomes, it was important to include in the review and in this dissertation.

One of the primary goals of the introduction of integrated care was to effectively address the somatic and psychological factors that were present during primary care visits (Blount, 2003). There is substantial evidence regarding the effect of integrated care efforts on depression in patients with T2D. One of the first benefits of the integrated care model was an increase in depression screening (Hudson et al., 2013; Palmer, Vorderstrasse, Colford, & Dolan-Soto, 2015). A variety of models were utilized with each finding some degree of success in impacting both depression and glycemic control (Ciechanowski et al., 2006; Cully et al., 2014; Katon et al., 2010; Siminerio, Ruppert, & Gabbay, 2013). The personnel utilized within these settings varied from nurse case managers (Ciechanowski et al., 2006; Katon et al., 2010) to behavioral health coaches (Cully et al., 2014), peer coaches (Rogers et al., 2014), and diabetes educators (Siminerio et al., 2013). The majority of these models utilized antidepressant management, diabetes education, and in-person/telephone check-ins by care management staff (Ciechanowski et al., 2006; Katon et al., 2010). Only one study (Gabbay et al., 2006) measured diabetes distress as an outcome variable and found that diabetes education via a nurse case manager reduced distress, but did not impact Hba1c percentages (Gabbay et al., 2006).

Thus far, the evidence supports the finding that integrated care delivery models can positively impact depression that is co-morbid with T2D and the importance of education and reaching out to patients with T2D. However, this review found that significant gaps remain regarding IBHC settings and specifically, the role of behavioral health providers (social workers, medical family therapists, counselors, health coaches), and most importantly the impact of these efforts on diabetes distress. Potentially, IBHC services would positively impact depression, diabetes distress, and HbA1c percentages.

Secondary Appraisal: Self-efficacy

While labeled the secondary appraisal, this is misleading. This appraisal process can occur before or simultaneously with the primary appraisal, and supplements the primary appraisal. It reflects one's beliefs and confidence regarding their ability to manage and control the identified stressor (i.e., self-efficacy) (Lazarus & Folkman, 1987). In the context of T2D, the secondary appraisal is conceptualized through the individual's confidence regarding ability to successfully self-manage and follow the regimen needed for diabetes disease management. Diabetes self-efficacy is a measurable construct of this confidence (Anderson et al., 2000; Bandura, 1979). These beliefs about ability and control influence resiliency, effort investment, and achievable health goals (Maibach & Murphy, 1995; Van Der Ven et al., 2003). Higher reported self-efficacy is associated with decreased HbA1c percentages (Aalto, Uutela, & Aro, 1997). Regarding this association, it is important to note that self-efficacy can be impacted by health education and interventions and can thus, potentially augment T2D management confidence (Van Der Ven et al., 2003).

Integrated care models can emphasize self-management support through a wide variety of efforts including information, patient education, and motivational support (Busetto et al., 2016). The impact of these efforts on patient reported self-efficacy and HbA1c percentages has been mixed. For example, a telehealth model providing health education via an online course and a telehealth nurse increased patient diabetes knowledge and improved glycemic control (Carter, Nunlee-Bland, Callender, 2011). Another telehealth model provided health education solely through computer-based interactions did not improve self-efficacy (Gerber et al., 2005). In general, efforts provided by peer coaches (Rogers et al., 2014), nurses reaching out to patient via telephone/telehealth (Carter et al., 2011; Piett, Weinberger, & McPhee, 2000), and primary care providers (Greene & Yedida, 2005) improved self-efficacy through the provision of T2D

education. However, these studies did not account for multiple providers of education support that can be available in an IBHC setting. Thus, it is possible in an IBHC setting, that involvement with these services would be associated with increased patient self-efficacy, and reduced HbA1c percentages.

Social Support Appraisal

Social support is traditionally defined as an individual's perception of the available emotional support and resources accessible through others (Karlsen et al., 2011). This has predominantly emphasized in-person support. However, online or internet mediated relationships are sources of significant support for many people in the world (Baym, 2015). These on-line social networks may also be sources of emotional and educational support for patients with T2D. To this end, this review of the social support literature includes both perceived in-person and online social support.

The impacts of specific providers extending in-person support on T2D are inconsistent; thereby, reflecting the complex dynamics and interactions between the patient with T2D and the support provider (Karlsen et al., 2012). For example, relationship partners can be a source of support, stress, or both (Johnson et al., 2015; Lida, Stephens, Franks, & Roots, 2012). Extended family can provide support through encouragement and collaboration regarding T2D disease management (Aamar et al., 2015; Mayberry, Harper, & Osborn, 2016) or can obstruct behavioral change through criticism or sabotaging management efforts (Mayberry et al., 2016; Mier et al., 2007). Primary care providers are a significant support provider for rural African American women (Littlewood et al., 2015), but have little impact on T2D disease management efforts of Hispanic non-White men (Parada et al., 2012). Community support providers can enhance T2D management by promoting physical activity or encouraging healthy lifestyles (de Groot et al.,

2012). From these findings, it is apparent that there is a need to account for multiple in-person supports as several types may be associated with positive and negative outcomes.

Not all patients with T2D find sufficient and available social support and report feeling isolated (Bolin et al., 2015; Rock, 2003; Shaw, Gallant, Riley-Jacome, & Spokane, 2006). Potentially these patients may be turning to online support. No longer are social circles limited to physical locations (Baym, 2015). People can form new connections regardless of location and meet those with similar illnesses via online chatrooms, blogs, and social networks (Baym, 2015). These online relationships can be sources of significant support and meaning (Quakenbush, Allen, & Fowler, 2016).

Thus far, the literature regarding the effect of online social support on T2D disease management suggests that online support has no effect. Beatty and Lambert (2013) found that online support did not reduce T2D distress or increase disease management behaviors. Another study requiring participants to use a specific website designed to promote T2D wellness with educational videos, chat groups, and blogging opportunities produced no change in self-efficacy, distress, or perceived support (Yu et al., 2014). However, these studies did not measure self-guided support efforts and self-created online social networks that appear to becoming more and more prevalent, and may produce positive results (Fox & Duggan, 2013).

In many of the integrated models, the addition of support for patients struggling with chronic conditions is a secondary outcome. However, this review found this to be an understudied factor within the integrated care literature. Studies that did include an outcome associated with perceived support emphasized the primary care provider's beliefs about their own ability to provide support (Lemay et al., 2006; Nuovo et al., 2004; Strickland et al., 2010; Yu & Bereford, 2010). The inclusion of community health workers demonstrated some

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qualitative evidence of increased perceived support by patients (Collinsworth, Vulimiri, Schmidt, & Snead, 2013; McCloskey, Tollestrup, & Sanders, 2011). Online support through an online education portal demonstrated no improvement in perceived support (Glasgow et al., 2012). Overall, this review found the need for a greater examination of perceived social support from patients with T2D within integrated care settings. Specific gaps noted are the degree of in-person support the patients perceive in an integrated setting, and the patient's self-sought online support efforts.

Disease Management

In the TMSC, coping behaviors are utilized in response to the primary and secondary appraisal to either address the problem (problem-focused) or reduce the emotional reaction (emotion focused) (Lazarus & Folkman, 1987). Problem-focused coping addresses the stressor through behavioral management and intervention (i.e., disease management) (Lazarus & Folkman, 1987). In the context of this dissertation, this would be medication adherence, physical activity, and diet/nutrition (CDC, 2014). Emotion-focused coping addresses the emotional reactions caused by the stressor and seeks to regulate them (i.e., seeking someone to vent to about T2D) (Lazarus & Folkman, 1987). Emotion-focused coping tends to be associated with lower perceived manageability while problem-focused coping is associated with greater perceived problem manageability (Taylor et al., 1992). To this end, this dissertation emphasizes problem focused-coping measured via medication adherence, physical activity, and diet.

Measurement of integrated care effectiveness in studies with type 2 diabetes normally assessed either specific diabetes management behaviors or used the most recent HbA1c percentage (Busetto et al., 2016). A recent systematic review cited over 21 studies that included either a measure of disease management or HbA1c (Busetto et al., 2016). Of these studies only

five did not report any improvement in HbA1c scores or disease management. In these studies, interventions such as shared medical appointments (Sanchez, 2011), a physician-directed health information technology system (Hunt et al., 2009), computer multimedia application (Gerber et al., 2005), a web-based intervention (Estrada et al., 2011), and a nurse case management system (Gabbay et al., 2006) improved either management or HbA1c percentages depending on which was included in the study. With the exception of the nurse case management, these interventions relied on multimedia tools, and did not report including behavioral health providers or strategies to address the psychosocial concerns. Future research at IBHC sites specifically would be beneficial to determining any associations between involvement with BHPs, disease management and HbA1c outcomes.

Control Factors

Additionally, this model acknowledges factors of considerable impact that may not specifically be associated with appraisal, social support, or disease management (Lazarus & Folkman, 1987). These factors can indirectly influence outcomes, and must be controlled for in the model to understand the true effects of the independent variables. For T2D, two such factors are place of residence urbanization and insurance type. Place of residence and insurance type are associated with emotional distress, self-efficacy, social support, disease management, and HbA1c percentages.

Place of Residence

Place of residence offers context surrounding community-based influences that shape the narrative regarding T2D management and outcomes (Eberhadt & Pamuk, 2004; Gariepy, Smith & Schmitz, 2013; Strom et al., 2011). The United States Department of Agriculture Economic Research Service (ERS) use a nine level coding system to indicate the degree of urbanization in

an area (ERS, 2013). Communities not associated with an urbanized area of at least 50,000 are classified as rural (USDA ERS, 2016). Compared to urban areas, patients with T2D living in rural communities face worse diabetes outcomes and higher T2D prevalence (Bellamy, Bolin, & Gamm, 2011; Douthit, Kiv, Dwolatzky & Biswas, 2015). This occurs despite no reported differences in the quality of healthcare received (Strom et al., 2011). This may reflect the an interaction with psychosocial concerns unique to rural areas.

The prevalence of negative psychosocial factors is considerably higher in places of residence with lower urbanization. Emotional distress of varying severity is more common in rural areas (Breslau, Marshall, Pincus, & Brown, 2014). Patients from rural communities also reported less confidence in their understanding of their treatment plan and their ability to self-manage T2D (Nagelkerk et al., 2006). Patients with T2D in rural areas reported insufficient social support in rural communities (Bolin et al.,2015; Shaw et al., 2006) and feeling isolated (Rock, 2003). Thus, patients within rural communities may be at greater risk for poorer outcomes per the TMSC model, and a significant need for integrated care services (Lambert & Gale, 2014)

Current indications suggest that integrated care services can improve the quality and range of services of rural primary care sites (Lambert & Gale, 2014). Additionally, at rural integrated care sites more patients are screened and received treatment for psychosocial concerns including depression than at sites without integrated care (Bur, 2016). Thus, it appears that integrated care services within rural areas could greatly impact the biopsychosocial factors associated with T2D. As this study will include patients with T2D from both urban and rural areas, it will be important to account for urbanization in place of residence and the associated integrated care services offered.

Insurance type

Access to and type of insurance is one of the most important determinants of medical care for patients with T2D (Richard, Alexandre, Lara, & Akamigbo, 2011; Hu et al., 2014). In 2015, 67.2% of patients in the United States had private coverage, 19.6% had Medicaid coverage, and 16.3% had Medicare coverage (Barnett & Vornovitsky, 2016). Despite the passing of the Affordable Care Act (ACA), around 9% of Americans still report having no insurance (Kaiser Health Facts, 2015). Among various insurance types (private, Medicare, and Medicaid), patients covered by Medicaid have worse overall T2D outcomes and take a heavier financial toll on the healthcare system than the other insurance types (Garfield et al., 2015; NCQA, 2013). These outcomes may reflect the complicated socioeconomic picture of patients with Medicaid. Medicaid provides coverage for those with low income, pregnant women, children, the elderly, and those with disabilities (NCQA, 2013).

Integrated care can provide the needed framework to ensure the screening and assessment, care planning, and coordinated service delivery that patients with Medicaid needed to promote positive outcomes (NCQA, 2013). Researchers found patients with Medicaid and Medicare to report improved T2D outcomes within integrated care models (Noll, Rothbard, Hadley, & Hurford, 2016; Tice et al., 2015). Thus, acknowledging the role that insurance type and access can play on T2D and the role integrated care can provide in reducing these outcomes, it is important to account for the type of insurance.

<div align="center">

Interactions

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The Transactional Model of Stress and Coping assumes that these different variables are not only acting in a unilateral direction, but are influencing all of the other variables considered in this framework. In this sense, it is a truly systemic model (Lazarus & Folkman, 1987).

However, a recent review found that very few research teams studying T2D analyzed these interactions simultaneously (Blocker et al., 2016). Another review reported only five articles assessing the effectiveness of integrated care included both biomedical and psychosocial variables in their studies (Busetto et al., 2016). Of these five, none examined the interactions between these systemic variables within a complex statistical model.

Conclusion

Type 2 diabetes is a complex biopsychosocial chronic condition. Models of integrated primary behavioral healthcare were created to manage such complex whole patient conditions (Blount, 2003). Many gaps exist in our understanding of how these integrated care efforts influence or effect not just glycemic control, but depression, distress, self-efficacy, and social support. In addition, these questions must be asked in the context of the insurance status and place of residence of the patient. Using the Transactional Model of Stress and Coping (Lazarus & Folkman, 1987), this dissertation intends to examine these factors in a complex structural equation model that allows for the identification of the unique effect of each of these factors on outcomes within an integrated primary behavioral healthcare setting.

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CHAPTER 4: METHODOLOGY

When properly managed, many of the negative consequences of type 2 diabetes (T2D) are reduced (ADA, 2015). Impediments and enhancements to successful diabetes self-management have consistently been found to be psychosocial in nature (Chlebowy, Hood, & LaJoie, 2010; Glasgow et al., 2001). The psychosocial variables of interest in this dissertation project were emotional distress measured by depression symptoms and diabetes distress (Fisher et al., 2008; Fisher, 2014), diabetes self-efficacy (Anderson, Funnell, Fitzgerald, & Marrero., 2000; Van der Ven et al., 2003), perceived online/in-person social support (Littlewood et al., 2015), place of residence (Gariepy, Smith, & Schmitz, 2013; Walker et al., 2014), and insurance status (Richard, Alexandre, Lara, & Akamigbo, 2011; Hu et al., 2014). The newest guidelines in T2D treatment suggest that it is critical that both biological and psychosocial factors are addressed (Young-Hyman et al., 2016). The provision of biomedical and psychosocial treatment in a single setting is one of the primary goals of integrated behavioral healthcare (IBHC) settings (Blount, 2003; Dreyfus et al., 2014; Engel 1977).

While IBHC efforts do appear to positively influence T2D biomarkers and disease management (Katon et al., 2010; Sieber, Newsome, & Lillie, 2012), the associations between psychosocial factors and IBHC efforts has been understudied (Blocker et al., 2016; Busetto, Luijkx, Mathilda, Elissen, & Vrijhoef, 2016). In this dissertation project, it was critical to account for several psychosocial factors within an IBHC setting. By controlling for multiple factors, the confounding effects of other variables can to some extent be controlled and the unique associations between each psychosocial factor on T2D management and hemoglobin A1c (HbA1c) percentages can be considered (Walker et al., 2015). This has yet to be accounted for within an IBHC setting. The primary goal of this dissertation project was to better understand the

associations between selected psychosocial factors, disease management, and HbA1c

percentages within an integrated care setting through a quantitative cross-sectional study.

Institutional review board approval was granted prior to data collection by the following

institutions: (a) East Carolina University and Medical Center Institutional Review Board

(UMCIRB; See Appendix G), (b) St. Mary's Family Medicine review board (see Appendix H),

and (c) the Western Institution Review Board (WIRB; see Appendix I). Institutional oversight

co-provided by UMCIRB and WIRB was adhered to throughout this project to protect research

participants.

Research Hypotheses

H1: Recipients of IBHC reported significant reductions in their depression (Bogner,

Morales, de Vries, & Cappola, 2012) as well as reductions in overall health distress (Lorig,

Ritter, Villa, Piette, 2008). While controlling for self-efficacy and in-person/online sources of

social support, it was hypothesized that that a negative association between participation with

behavioral health services in an IBHC setting and depression and diabetes distress existed.

H2: A handful of studies have found that integrated care services improves self-efficacy

in patients with T2D (Schillinger, Handley, Wang & Hammer, 2009; Swavely, Vorderstrasse,

Maldonado, Eid & Etchason, 2013). Based on this and while controlling for depression, diabetes

distress, and in-person/online sources of social support, it was hypothesized that a positive

association existed between participation with behavioral health services in an IBHC setting and

reported self-efficacy.

H3: There have been no studies found via literature review that examine the effect of

integrated care on perceived support and diabetes (Busetto et al., 2016; Blocker, 2016).

However, the BPS framework (Engel, 1977) that guides integrated behavioral healthcare posits

that the provision of these services should increase perceived social support among patients. Studies outside of integrated care have found that higher reports of social support are associated with reports of higher disease self-management (Hunt et al., 2012; Littlewood et al., 2015). While controlling for online sources of social support, self-efficacy, depression and diabetes distress, it was hypothesized that participation with behavioral health services in an IBHC setting was positively associated with perceived in-person support.

H4: The literature regarding the impact of online social support thus far shown to be inconclusive (Beatty & Lambert, 2013; Oh et al., 2013). While controlling for in-person sources of social support, self-efficacy, depression and diabetes distress, it was hypothesized that a positive association existed between online social support and participation with behavioral health services in an IBHC setting.

H5: Previous studies have found that significant associations exist between emotional distress, self-efficacy and social support (Littlewood et al., 2015; Whittemore, Melkus, & Grey, 2005; Walker et al., 2015). However, to date there have been no studies examining these associations within the context of an integrated care setting. The following were hypothesized that a) a negative relationships between emotional distress (diabetes distress and depression) and self-efficacy b) negative relationships between emotional distress (diabetes distress and depression) and in-person/online social support and c) a positive relationship between self-efficacy and in-person/online sources of social support.

H6: While controlling for the effect of the other included variables, it was hypothesized that unique associations with T2D management behaviors (daily diet adherence, medication adherence, and daily physical activity) would include:

a) a negative association with emotional distress

b) a positive association with self-efficacy

c) a positive association with in-person social support

d) a positive association with online social support

e) a positive association with participation with behavioral health services

H7: While controlling for the effect of the other included variables, it was hypothesized that unique associations with HbA1c percentages would include:

a) a positive association with emotional distress

b) a negative association with self-efficacy

c) a negative association with in-person social support

d) a negative association with online social support

e) a negative association with diabetes management behaviors

f) a negative association with participation with behavioral health services

Study Design

To examine these hypotheses, a quantitative cross-sectional survey was used. Advantages of a quantitative survey method include: 1) identification and inferences about the sample population from a small sample size; 2) convenient and economical; and 3) enabled researchers to collect more data in a shorter time-period (Creswell, 2013).

Setting

Participants were recruited from an integrated family medicine practice that provides primary medical and behavioral healthcare for multiple populations including rural and urban populations in the mountain west region of the United States. This site was chosen as the recruitment site because: a) it is an IBHC setting, where biomedical providers (MDs, NPs, RNs,

etc.) and behavioral health providers (Medical Family Therapists and counselors) collaborate to provide acute and primary care for patients and families b) it was the most accessible to the researcher and c) there was support from clinical management

Participants

The project inclusion criteria required that participants were: (a) adults over 18 (b) diagnosed per their electronic medical record with type 2 diabetes mellitus, and (c) fluent in written and spoken English. Project exclusion criteria omitted patients that were: (a) diagnosed per their electronic medical records with advanced severe diabetes outcomes including end stage renal disease, advanced heart failure, blindness, amputations, or metastatic cancer), and/or (b) diagnosed per their electronic medical record with psychosis/dementia/cognitive impairment. The target sample size was 150 adults.

Recruitment

Participants were recruited utilizing a purposive sample method. Recruitment occurred primarily through daily examinations of the schedule for the clinic. All patients with medical appointment scheduled in the clinic were screened by the primary investigator for inclusion and exclusion criteria. After meeting inclusion criteria, an appointment note was digitally added to the patient's visit via the electronic medical record (EMR) indicating the primary investigator to invite the patient to participate in the study. Upon arrival for their medical visit, consent was obtained either by the lead researcher or a member of the behavioral team by verbally explaining the study and providing hard copy of the informed consent documents.

<div align="center">

Data Collection and Procedures

</div>

After consenting to participate, the patient was assigned a unique identification number that corresponded with the patient's medical record number and name. Only the primary

investigator accessed the coding sheet that connected the unique identifier with the patients'

medical record number. This coding sheet was stored on a password protected folder on an on-

site server accessible only to the primary investigator. The participant was then provided with a

hard copy survey with their unique identification number at the top. The survey consisted of

several validated measured as well as some measures designed specifically for this project. (See

Appendices B). The survey took less than 15 minutes to complete and was done either in the

waiting room or in the medical exam room. The participant was instructed upon termination of

their medical appointment to return the survey to the front desk, where the surveys were stored in

a closed file cabinet until the end of the day. The principal investigator entered the survey

information and demographic information ascertained from the patient's medical record

including insurance type, zipcode, age, race, and gender, and the patient's most recent HbA1c

into Qualtrics. To ensure data security, electronic medical information was accessed from a

secure server provided on-site. After entering the data, hard copy surveys and signed informed

consents were kept in a lockbox on-site.

Study Variables

Demographic Information

Basic participant demographic information was gathered from the patient's electronic

medical record. This information included age, ethnicity/race, gender, zipcode, and insurance

type. The participant reported their best estimate on how many years it had been since they were

diagnosed with type 2 diabetes. Insurance type was recoded to be either 1 indicating positive

Medicaid status or 0 for indicating another type of insurance. Zipcodes were recoded using the

USDA EMR (2013) classification codes as either 1 (urban) or 0 (rural).

The World Health Organization-5 Well-Being Index (WHO-5)

The WHO-5 is one of the most widely used measures of subjective psychological well-being in the world (Topp, Ostergaard, Sondergaard, Bech, 2015). As a screening tool for depression, it was found to be sensitive (>.93), valid, and reliable (α=.87) (de Wit et al., 2007; Topp et al., 2015). In a multi-national study on diabetes, the WHO-5 was used to screen for depression symptoms and was found to be a valid and appropriate screening tool comparable to other depression screens (Nicolucci et al., 2013; Topp et al., 2015). Items are scored based on the frequency of feeling the stem statement over the last two weeks on a likert scale of 5(all of the time) to 0 (at no time). A sample item is "I have felt cheerful and in good spirits". Total scores are multiplied times 4, and a cutoff score of 50 is used when screening for depression (Topp et al., 2015). Scores lower than 50 indicate depression and scores less than 28 indicates moderate to severe depression (de Wit et al., 2007).

Diabetes Distress Scale (DDS-17)

The Diabetes Distress Scale-17 (DDS-17) is a measure of diabetes-related emotional distress across four subscales: regimen distress, emotional burden, physician-related distress, and diabetes-related interpersonal distress (Polonsky et al., 2005). Reliability for the whole scale and four subscales was adequate (α>.87) and was associated with measures of diabetes disease management and depression (Polonksy et al., 2005). Furthermore, research has shown that diabetes distress is a distinct concept from depression and anxiety (Fisher et al., 2008). Patients reported on the severity the stem statement presented over the last month. A sample item from the survey is "Feeling that my doctor doesn't know enough about diabetes and diabetes care". Items are scored on a likert scale from 1 ("Not a Problem") to 6 ("A Very Serious Problem"). Mean scores of 3 or higher are considered significant for the total score and subscales (Fisher et

al., 2012). Of particular interest was the regimen distress subscale due to its' high correlation

with overall distress and outcomes (Hessler et al., 2015)

Diabetes Empowerment Scale-Short Form (DES-SF)

The Diabetes Empowerment Scale-Short Form (DES-SF) is a shortened version of the

original 38 item Diabetes Empowerment Scale (DES) and measures self-efficacy specific to

diabetes self-management (Anderson et al., 2000; Anderson, Fitzgerald, Gruppen, Funnell, &

Oh, 2003). Measure reliability was found to be adequate ($\alpha>.83$) (Anderson et al., 2003). This 8-

item measure is scored on a likert scale of 1("Strongly Disagree) to 5 ("Strongly Agree"), where

higher average scores of the items completed indicate higher reports of self-efficacy (Anderson

et al., 2003). Measure reliability is adequate ($\alpha=.84$) (Anderson et al., 2003). A sample item was

"am able to turn my diabetes goals into a workable plan."

Modified Family Support Scale (FSS-AA T2DM)

The Dunst Family Support Scale (FSS) was a valid and reliable measure of the perceived

helpfulness of various support groups (Dunst, Trivette, & Deal, 1994). This measure was adapted

for rural African American populations by Littlewood and colleagues (2015) to specifically

address T2D in a culturally appropriate way. The measure consists of three factors made up of a

total of 16 items scaled from 0 ("not available") to 5 ("extremely helpful") (Littlewood,

Cummings, Lutes, & Solar, 2015). Reliability was adequate ($\alpha>.83$). While only currently valid

with the rural African American population, the authors proposed that with its current validity

and reliability, it was worth testing with other populations, and is thus, included in this study

(Littlewood et al., 2015). Some of the support groups included are parents, children, spouse,

primary care provider.

Online Support

Inspired from the 12-item Online Social Support for Smokers Scale (OS4; Graham et al., 2011) and the 2013 Pew Health Online report (Fox & Duggan, 2013), 6 items were included that measured frequency of online information gathering and support, and perceived helpfulness. Sample items include: "I talk to others online about my diabetes" and "I feel supported and encouraged by others online" scored from 1 (Never) to 5 (Very Frequently). These items were developed for this survey and did not have any statistical validity or reliability at the time the study was conducted.

The Revised Summary of Diabetes Self-Care Activities Measure (SDSCA)

The Revised Summary of Diabetes Self-Care Activities Measure (SDSCA) is a self-report measure of diabetes self-management in adults (Toobert, Hampson, & Glasgow, 2000). The revised version includes a simplified scoring technique, reduced number of items, and is recommended as a research tool (Toobert et al., 2000). It includes subscales capturing diet, activity, foot care, and smoking, where items are scored by the number of days, the item was completed in a week on a scale of 0 to 7. As the focus of this dissertation was T2D management per the ADA, the items capturing diet, physical activity, and medication adherence behaviors were used. Internal consistency was found to be acceptable for items on general diet, physical activity, and medication (Toobert et al., 2000). Sample items include "On how many of the last seven days did you take your recommended diabetes medication."

Integrated Care

The goal of this project-specific measure was to capture the variety of integrated care experiences patients experience at an IBHC setting. At this site, typical visits can include one or more of the following: meeting with only the primary care provider (PCP), meeting in a co-visit with the PCP and a behavioral health provider (BHP), meeting only with the BHP, attending

diabetes medical group or wellness group visits, receiving traditional behavioral therapy, receiving education or assistance from care team members by phone, nutrition information from clinic staff, attended a cooking class, and care coordination from social workers. Participants were asked to mark how many of these experiences they recalled having over the last three months. This was recoded to a 1 indicating that the patient recalled receiving some level of care for a BHP or 0 indicating the patient recalled only visiting with a medical provider in the last three months.

HbA1c

Nicknamed the "bloodcheck with a memory", the A1c or estimated average glucose is a measure of the average glucose over the past 2-3 (ADA, 2014). It indicates a patient's overall average success in diabetes self-management (ADA, 2014). Generally healthy HbA1c percentages are below 7% (ADA, 2014). The lead researcher ensured that the HbA1c percentage used in this study were obtained within a three month range of survey administration.

<div align="center">**Data Analysis**</div>

The present study used structural equation modeling (SEM) as the primary method of data analysis. Sample size in SEM can depend on the size and complexity of the model varying from 50-100 (Lacobucci, 2010; Sideris, Simos, Papanicolaou, & Fletcher, 2014) to 200 subjects (Kline, 2011) to near 450 (Wolf, Harrington, Clark, & Miller, 2013). An online sample size calculator (Soper, 2016) determined the desired sample size for the present study to have adequate power was 92 subjects. Based on these different guidelines, it was determined to collect a sample size of 150 subjects.

After examining correlations among variables, addressing outliers, checking for normality, heteroskedasticity, and multicollinearity, the data was put to a structural equation

model. With an adequate number of participants and several latent constructs, structural equation modeling (SEM) was utilized to examine the relationship between predictor and criterion variables. Tabachnick and Fidell (2007) suggest structural equation modeling (SEM) is an appropriate analytical strategy to evaluate relationships that involve multiple variables and varied layers of relationships, as the current study has. Additionally, confirmatory factor analysis (CFA) was used to ensure sufficient factor loadings, especially for the support variables. Missing data was minimal (less than 5%). The lavaan program (Rosseel, 2012) in R was used to test the relationships (R Core Team, 2016). When examining relationships using SEM it is common for researchers to test the goodness of fit of the model (Tabachnick & Fidell, 2007). The following indices were used to test the model fit: (a) root mean square error of approximation (RMSEA; values lower than .10 indicate good fit with a confidence interval less than .05 and less than .10; Kenny, 2015); and (b) Standardized Root Mean Square Residuals (SRMR; a value below .08 indicates good fit; Hu & Bentler, 1999).

This dissertation examined the potential associations between emotional distress, social support, self-efficacy, diabetes disease management and HbA1c percentages when controlling for behavioral health involvement in an IBHC setting, insurance status, and place of residence. To assess these hypotheses, all items were placed into a structural equation model to assess for associations while controlling for the other variables.

Summary

While some research exists regarding the associations between psychosocial variables and diabetes management and outcomes, more research is needed to understand how these variables interact within an IBHC setting. The goal of this dissertation project was to assess and examine the unique associations that exist between psychosocial variables on diabetes disease

self-management and HbA1c while controlling for behavioral health participation in an IBHC

setting, place of residence, and insurance status. The findings are intended to add clarity to

existing knowledge and to guide future research.

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CHAPTER 5: THE ASSOCIATIONS BETWEEN EMOTIONAL DISTRESS, SELF-EFFICACY, AND SOCIAL SUPPORT ON DIABTES MANAGEMENT AND DIABETES OUTCOMES IN A INTEGRATED BEHAVIORAL HEALTH CARE SETTING

Type 2 diabetes (T2D) is both prevalent in the United States (over 9% of all adults) and expensive (over $245 billion spent in 2012) (Centers for Disease Control and Prevention, 2014). Unmanaged T2D can result in significant financial burdens and increased risk for severe and fatal health outcomes (e.g., kidney failure, stroke, amputations, etc.) (CDC, 2014). Reduction of the severity of these outcomes can depend on adherence to a diabetes self-management regimen consisting of physical activity, dietary adherence, and medication (ADA, 2015; 2016; CDC, 2014).

Successful promotion of diabetes self-management, recommended within primary care medical settings (ADA, 2017), requires addressing the complex psychosocial factors that impede and enhance regimen behaviors (Young-Hyman et al., 2016). Specific factors that warrant consideration include diabetes distress, depression, self-efficacy, and social support (Young-Hyman et al., 2016). To achieve this, medical providers collaborating with behavioral health providers (BHPs) "yields the most promise" (Young-Hyman et al., 2016, p. 2137). An ideal setting for this collaboration is an integrated behavioral healthcare setting (IBHC) (Blount, 2003; Peek & National Integration Academy Council, 2013)

Integrated behavioral healthcare (IBHC) settings combine medical and behavioral health services to address the biopsychosocial needs of patients (Blount, 2003; Peek & National Integration Academy Council, 2013). A growing body of evidence supports the effect of IBHC services on both psychosocial factors and diabetes management (Coventry et al., 2014; Katon et

al., 2010; Sieber, Newsome, & Lillie, 2012). However, gaps remain regarding IBHC, the aforementioned psychosocial factors (e.g., diabetes distress, etc.), diabetes management, and outcomes.

This study seeks to add to the literature by addressing the associations between select psychosocial factors, IBHC services, diabetes management, and Hemoglobin A1c (HbA1c) percentages informed by the Transactional Model of Stress and Coping (TMSC; Lazarus & Folkman, 1987). When the variables are contained within the same model, the confounding effects of each variable can be somewhat controlled, highlighting the existing unique associations (Kline, 2011). While other studies have done this with place of residence and insurance status (Walker et al., 2014), it has not been done in a sample of patients diagnosed with T2D in an IBHC setting.

Transactional Model of Stress and Coping

The Transactional Model of Stress and Coping (TMSC) was the primary framework used to examine variables and organize the findings for this study (Lazarus & Folkman, 1987). Essentially, the TMSC is a series of appraisals used to assess and respond to a perceived stressor like T2D (Lazarus & Folkman, 1987). The primary appraisal evaluates the stressor for potential harm (Lazarus & Folkman, 1987). Occurring simultaneously or following the primary appraisal, a secondary appraisal evaluates patient ability to reduce the stressor threat. The final appraisal evaluates the availability and potential helpfulness of various social supports (Lazarus & Folkman, 1987). Each of these appraisals influence the behaviors used to respond to the stressor and the desired outcome (Glanz & Schwartz, 2008; Lazarus & Folkman, 1987). Additionally, the TMSC accounts for contextual factors such as setting, race or socio-economic status as each may impact the appraisal process (Saldana, 1993).

In this study, primary appraisal was measured by diabetes distress and depression, secondary appraisal by diabetes self-efficacy, social support appraisal by in-person/online support, coping efforts by adherence to medication, dietary intake, and physical activity requirements, and the outcome was Hemoglobin A1c (HbA1c) percentage. The appeals of this model were the expected associations between the appraisals, coping behaviors and outcome (Lazarus & Folkman, 1987) and its prior use with T2D in other studies (Duangdo & Roesch, 2008; Hocking & Lochman, 2005; Hunt et al., 2012). While this model predicts that these variables are interdependent, each part of the process is reviewed independently for ease of understanding beginning with the primary appraisal.

Primary Appraisal: Emotional Distress

During the primary appraisal, both cognitive and emotional evaluations occur (Lazarus & Folkman, 1987). It is common practice to utilize measures of the emotional reaction to a stressor to capture the cognitive appraisal (Lazarus & Folkman, 1987). This study followed this precedent using measures of diabetes distress and depression. Diabetes distress measures the context surrounding the emotional reaction, while depression indicates the severity of the emotional reaction (Fisher, 2014). Both are relatively prevalent in type 2 diabetes patient populations.

One in four adult patients diagnosed with T2D endorse symptoms of major depression (Anderson et al., 2001) and 18-45% of patients endorse diabetes distress (Aikens, 2012). Both can significantly impact T2D management and outcomes (Semenkovich, Brown, Dragan, & Lustman, 2015). Regimen-distress sub-construct of diabetes distress in particular is associated with higher HbA1c scores, poor medication adherence, dietary choices, and physical activity (Aikens, 2012; Ciechanowski, Katon, & Russo, 2000; Cummings et al 2014; Fisher et al., 2008;

Fisher et al., 2010; Fisher et al., 2012; Hessler et al., 2014). Together, diabetes distress and depression capture the emotional reactivity that is attributed to the primary appraisal, and influences among other processes, the secondary appraisal.

Secondary Appraisal: Self-efficacy

Diabetes self-efficacy reflects the secondary appraisal process or appraisal of patient confidence to manage the stressor (Anderson et al., 2000; Bandura, 1979; Lazarus & Folkman, 1987). Historically, positive patient perception of their ability to influence the course of their illness promotes positive diabetes outcomes (Maibach & Murphy, 1995; Van Der Ven et al., 2003). For example, higher reports of patient self-efficacy have been associated with improved self-management, which in turn reduced HbA1c percentages (Aalto, Uutela, & Aro, 1997). Both the primary secondary and secondary appraisal influence and inform the final appraisal process, the appraisal of social support.

Social Support Appraisal

The appraisal of social support accounts for the availability and quality of the support provided by family, friends, medical providers, and even the community (Lazarus & Folkman, 1987; Littlewood, Cummings, Lutes, & Solar, 2015). For some patients with T2D, it is difficult to find sufficient inperson social support (Shaw, Gallant, Riley-Jacome, & Spokane, 2006) and even when support is available; it does not always promote positive outcomes (Karlsen et al., 2012). For example, significant others (partners/spouses), adult children, and primary care providers (PCP), have been found to promote or demote diabetes management influence HbA1c percentages (Aamar et al., 2015; Johnson et al., 2015; Lida, Stephens, Franks, & Roots, 2012; Littlewood et al., 2015; Mayberry, Harper, & Osborn, 2016; Mier et al., 2007; Parada et al.,

2012). In the 21st, century, the appraisal of social support should also capture online sources (Baym, 2015).

No longer restricted to physical proximity, social support is possible through online chatrooms, blogs, and social networks (Baym, 2015). Significant support and meaning can be found in these online relationships (Quakenbush, Allen, & Fowler, 2016). Thus far, studies measuring the association between online social support and diabetes management and diabetes outcomes have not yet yielded significant results (Beatty & Lambert, 2013; Yu et al., 2014). These existing studies measured provided online resources, and did not assess patient-driven online support (Beatty & Lambert, 2013; Yu et al., 2014). It is possible that patients are engaging in their own self-guided online support efforts (Fox & Duggan, 2013). Thus, it is important to include self-guided online support efforts in concordance with in-person support. Thus, in this study, measures of social support provided by primary care providers, their partners/spouse, their children, and online resources are included. Each step of the appraisal process including social support influence coping behaviors, or as identified in this dissertation, disease management behaviors (Lazarus & Folkman, 1987).

Disease Management

Coping behaviors are utilized in response to the primary and secondary appraisal to either remove the emotional reactivity or address the threat (Lazarus & Folkman, 1987). The most effective coping behaviors for patients' self-management of T2D are medication adherence, physical activity, and diet/nutrition (CDC, 2014). These types of behaviors are associated with reduced HbA1c percentages (ADA, 2017) and are promoted by the American Diabetes Association (Haas et al., 2012). As demonstrated thus, the psychosocial barriers and facilitators captured in the appraisal process influence these management behaviors (Fisher, 2014;

Littlewood et al., 2015; Van Der Ven et al., 2003). To address this interaction, it is ideal to operate in a setting, where medical providers collaborate to some degree with behavioral health providers, such as those in an IHBC setting (Young-Hyman, et al., 2016).

Integrated Behavioral Healthcare

The integrated behavioral healthcare (IBHC) model acknowledges factors of considerable impact specifically associated with appraisal, social support, or disease management (Lazarus & Folkman, 1987). Integrated behavioral healthcare is one type of integrated care services, where patients have access to not only traditional medical care, but behavioral health in a primary care setting (Marlowe, Hodgson, Lamson, White & Irons, 2013; Peek & National Integration Academy Council, 2013). Integrated care providers strive to be patient-centered and settings can extend coordinated, co-located, and collaborative care depending on patient need and setting capacity (Doherty, McDaniel, & Baird, 1996; WHO, 2013). In an IBHC setting, services may include traditional behavioral health therapy visits, co-visits with primary care and behavioral health providers, psycho-education group visits, illness management education, care management calls, and peer support among many others (Peek & National Integration Academy Council, 2013). Previous research examining non-IBHC specific integrated care has found significant associations between this model of care and changes in reported emotional distress, self-efficacy, and social support (Busetto et al., 2015).

Emotional Distress

One of the primary goals of an integrated model like IBHC is to address psychological concerns that are manifest during primary care visits (Blount, 2003). Substantial evidence supports the effect of integrated care efforts on depression in patients with T2D. In an IBHC setting, there is an increase in depression screening for diabetes as recommended by the ADA

(Hudson et al., 2013; Palmer, Vorderstrasse, Colford, & Dolan-Soto, 2015; Young-Hyman et al., 2016). Additionally, within non-IBHC integrated settings researchers found utilizing a variety of personnel including nurse case managers, diabetes educators, and peer coaches resulted in successfully reducing depression and improving glycemic management (Ciechanowski et al., 2006; Cully et al., 2014; Katon et al., 2010; Siminerio, Ruppert, & Gabbay, 2013). These changes were accomplished through antidepressant management, diabetes education, and in-person/telephone check-ins by care management staff (Ciechanowski et al., 2006; Katon et al., 2010).

Despite prevalence and impact on T2D outcomes, there is limited examination of the associations between IBHC and diabetes distress. Only one study measured diabetes distress as a factor finding that diabetes education via a nurse case manager reduced distress, but did not impact glycemic management (Gabbay et al., 2006). This study will examine and address both the associations of between depression and diabetes distress within an IBHC setting.

Self-efficacy

Ideally, IBHC settings promote confidence in self-management through education, and encouragement (Busetto et al., 2016). However, support for these efforts is mixed. In general, education provided in-person or through telehealth improved self-efficacy and outcomes (Carter, Nunlee-Bland, Callender, 201; Greene & Yedida, 2005; Piett, Weinberger, & McPhee, 2000; Rogers et al., 2014). Models of education that were purely online with no personal interaction did not improve self-efficacy (Gerber et al., 2005). These studies did not account for multiple types of providers available to promote diabetes self-efficacy in an IBHC setting (i.e., groups, behavioral health providers, diabetes educator, dieticians). Thus, it is possible that patients more

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involved with these services will be associated with higher reports of self-efficacy and greater glycemic management.

Social Support

Perceptions of social support in IBHC settings have yielded some significant findings. For example, providers in an IBHC setting feel more capacity to provide support to patients (Lemay et al., 2006; Nuovo et al., 2004; Strickland et al., 2010; Yu & Bereford, 2010). Patients in an IBHC setting with community health workers reported an increased sense of support (Collinsworth, Vulimiri, Schmidt, & Snead, 2013; McCloskey, Tollestrup, & Sanders, 2011). Online support through an online education portal demonstrated no improvement in perceived support (Glasgow et al., 2012). Overall, a greater examination of perceived social support from patients with T2D within integrated care settings is needed. Specific gaps noted are the degree of in-person support the patients perceive in an IBHC setting, and the patient's self-sought online support efforts.

Disease Management

The effectiveness of IBHC efforts on disease management is measured either directly through the desired management behaviors or indirectly via HbA1c levels (Busetto et al., 2016). Interventions such as shared medical appointments (Sanchez, 2011), a physician-directed health information technology system (Hunt et al., 2009), computer multimedia application (Gerber et al., 2005), a web-based intervention (Estrada et al., 2011), and a nurse case management system (Gabbay et al., 2006) found changes in disease management and HbA1c percentages (Busetto et al., 2016). However, with the exception of the nurse case management system and shared medical appointments, these interventions relied on multimedia tools, but did not report including behavioral health to address the psychosocial concerns. Future research at integrated

behavioral health settings would be beneficial for determining the association between participation with behavioral health and disease management and HbA1c percentages. While considering the associations between the previously mentioned variables within an IBHC setting, it is critical to control for other variables (e.g., age, duration of diabetes diagnosis etc.) that may also interact with and influence the associations.

Control Variables

To acknowledge these psychosocial concerns and ignore other significant contributing factors would be inconsistent with the reality many patients with type 2 diabetes face. Factors like age (Young-Hyman et al., 2016), years with the illness (Young-Hyman et al., 2016), gender (Young-Hyman et al., 2016), and Medicaid status (Garfield et al., 2015) can all impact care within an IBHC setting. Place of residency is another key factor that interacts with psychosocial factors, T2D management and HbA1c percentages (Eberhadt & Pamuk, 2004; Gariepy, Smith & Schmitz, 2013; Strom et al., 2011). However, the sample did not include a sufficient number of participants from rural areas to control for this variable. Thus, in this study, control variables were age, duration of illness, gender, and Medicaid status.

Current Study

A growing body of evidence exists suggesting that IBHC settings and the services provided positively influence disease management behaviors and HbA1c percentages (Busetto et al., 2015; Katon et al., 2010; Sieber, Newsome, & Lillie, 2012). However, gaps exist regarding the psychosocial factors that have thus far been shown to impact T2D outcomes. By controlling for multiple constructs within the same statistical model, the confounding effects of other variables can be controlled for allowing for the unique effects of these factors on T2D outcomes (Walker et al., 2015). Previous literature has not examined this within an IBHC setting (Walker

et al., 2014; Walker et al., 2015). Thus, it is not known how IBHC efforts impact emotional

distress, social support and self-efficacy in patients with T2D, and more importantly, when

controlling for these efforts, how these factors then impact T2D outcomes.

Method

The primary aim of this study was to explore the associations that exist between

emotional distress, self-efficacy, social support, diabetes management behaviors and HbA1c

percentages within an integrated behavioral health clinic. To address the hypotheses detailed

below, a quantitative cross-sectional research design was employed to capture participants'

experiences at a singular moment in time (Creswell, 2009). Approval for this study was granted

in December 2016 from the (a) East Carolina University and Medical Center Institutional

Review Board (UMCIRB; See Appendix G), (b) St. Mary's Family Medicine review board (see

Appendix H), and (c) the Western Institution Review Board (WIRB; see Appendix I) prior to

data collection. Institutional oversight co-provided by UMCIRB and WIRB were adhered to

throughout this project to protect research participants.

Setting

A family medicine residency training site in the mountain west region of the United

States (US) served as the setting for this study. This clinic serves a population of over 314,000

people living in urban, suburban, rural and frontier communities (US Census Bureau, 2015). This

population is primarily white non-Hispanic (94%), 14% are at the poverty level, and 15% do not

have insurance (US Census Bureau, 2015). This site utilizes an integrated behavioral health care

model, made up of primary care providers (PCPs) (35 MDs and 2 NPs) and behavioral health

providers (4 Medical Family Therapists, 1 LPC, 2 case managers, and 1 community health

worker). PCPs and BHPs work collaboratively to extend services to families for acute and

chronic conditions that are part of any patient's presenting concern. This integrated care team operates provides both co-located (e.g., traditional therapy on site) and collaborative services (e.g., group medical visits, shared medical appointments) (Doherty et al., 1996).

Participants

Inclusion criteria required that participants were: (a) adults over 18 (b) diagnosed per their electronic medical record with type 2 diabetes mellitus, and (c) fluent in written and spoken English. Exclusion criteria omitted patients that were: (a) diagnosed per their electronic medical records with advanced severe diabetes outcomes including end stage renal disease, advanced heart failure, blindness, amputations, or metastatic cancer), and/or (b) diagnosed per their electronic medical record with psychosis/dementia/cognitive impairment. The total sample included 151 participants (see Table 1 for sample characteristics)

Recruitment

During data collection, the lead researcher reviewed the charts of all patients with scheduled medical appointments to identify patients meeting inclusion criteria. Patients meeting inclusion criteria were invited by a member of the behavioral health team to participate in the study while waiting for their primary care provider (PCP). While extending this invitation, pertinent information regarding the study purpose and requirements including permission to access medical records were explained. No incentives were offered for participation.

Procedure

Upon meeting the inclusion criteria per the chart review and consenting, the participant was assigned a unique identification number (UIN) and provided with a hard copy survey. Other than the UIN, no other identifying information was attached to the survey. Upon completion of their medical visit, participants returned surveys to the front desk. The principal investigator

entered the deidentified survey information into an online survey database (Qualtrics, 2016).

Chart review was used to pull demographic information including insurance type, zip code, age,

race, and gender, and the patient's most recent HbA1c. To secure data, medical information was

only accessed from a secure server provided through the hospital. Surveys and informed consents

were kept in a lockbox in the primary investigator's research office. Access to this office was

limited to authorized medical staff, and access to the lockbox was limited to the primary

investigator

Measures

      The World Health Organization-5 Well-Being Index (WHO-5). The WHO-5 is a

widely used measures of subjective psychological well-being (Topp, Ostergaard, Sondergaard,

Bech, 2015). It was also found to be a sensitive (>.93), reliable (α=.87) (de Wit et al., 2007;

Topp et al., 2015), and valid depression screening tool (Nicolucci et al., 2013; Topp et al., 2015).

It has been used previously with a diabetes patient population (Nicolucci et al., 2013; Topp et al.,

2015). The study also found this measure to be reliable (α= .91).

      Items were scored on the frequency of the stem statement occurring over the last two

weeks on a Likert scale of 5(all of the time) to 0 (at no time). A sample item was "I have felt

cheerful and in good spirits". Total scores are multiplied times 4, and a cutoff score of 50 is used

when screening for depression (Topp et al., 2015). Scores lower than 50 indicate depression and

scores less than 28 indicates moderate to severe depression (de Wit et al., 2007). In this study,

the mean was 43.61(24.46) with 29% within the range of major depressive disorder (scored less

than 28).

      Diabetes Distress Scale (DDS-17). The Diabetes Distress Scale-17 (DDS-17) is a

measure of diabetes-related emotional distress across four subscales: regimen distress, emotional

burden, physician-related distress, and diabetes-related interpersonal distress (Polonsky et al., 2005). Historically, reliability for the whole scale and four subscales was adequate ($\alpha > .87$) and was associated with measures of diabetes disease management and depression (Polonksy et al., 2005).

Items assessed the problem severity of stem statements over the last month. Items were scored on a Likert scale from 1 ("Not a Problem") to 6 ("A Very Serious Problem"). A sample stem statement was "Feeling that my doctor doesn't know enough about diabetes and diabetes care". Mean scores of 3 or higher are considered significant for the total score and subscales (Fisher et al., 2012). This study only used the regimen distress subscale which has demonstrated strong associations with both diabetes management and HbA1c percentages (Hessler et al., 2015). Regimen distress scale mean(sd) was 2.08(1.08) with 19% reporting significant distress (value greater than 3) and measure reliability was adequate ($\alpha = .89$). The mean score indicates that on average, over the last month sample participants did not find regimen adherence stressful.

Diabetes Empowerment Scale-Short Form (DES-SF). The Diabetes Empowerment Scale-Short Form (DES-SF) is an abbreviated version of the Diabetes Empowerment Scale (DES). The DES-SF measures diabetes self-management self-efficacy (Anderson et al., 2000; Anderson, Fitzgerald, Gruppen, Funnell, & Oh, 2003). Measure reliability was found to be adequate ($\alpha > .83$) (Anderson et al., 2003). This 8-item measure is scored on a likert scale of 1("Strongly Disagree)-5 ("Strongly Agree"), where higher item scores indicate higher reports of self-efficacy (Anderson et al., 2003). Historically, measure reliability was adequate ($\alpha = .84$) (Anderson et al., 2003). A sample item was "am able to turn my diabetes goals into a workable plan." For this sample, mean(SD) of Diabetes Self-Efficacy was 3.61(1.05) and reliability was adequate ($\alpha = .93$).

Modified Family Support Scale (FSS-AA T2DM). The Dunst Family Support Scale (FSS) was a valid and reliable measure of the perceived helpfulness of various support groups (Dunst, Jenkins, & Trivette, 1984). This measure was adapted for rural African American populations by Littlewood and colleagues (2015). The measure consists of three factors made up of a total of 16 items scaled from 0 ("not available") to 5 ("extremely helpful") (Littlewood et al., 2015). Reliability was adequate ($\alpha > .83$). While only currently valid with the rural African American population, the authors propose that with its current validity and reliability, it is worth testing with other populations, and is thus, included in this study (Littlewood et al., 2015). Some of the support groups included are parents, children, spouse, primary care provider. For this sample, mean(SD) Diabetes Social Support was 1.99(1.12) and $\alpha = .87$. To identify the specific effects of particular support persons (partner/spouse, children, and primary care provider), individual items were used. Mean(SD) for partner/spouse was 2.09(1.93), for children was 2.34(1.82), and for primary care provider was 3.96(1.22).

Diabetes Online Social Support. This measure seeks assess patient self-guided behaviors to seek social support and information regarding T2D. Items were based on items from the Online Social Support for Smokers Scale (OS4; Graham et al., 2011) and the 2013 Pew Health Online report (Fox & Duggan, 2013). 6 items were included that measured frequency of online information gathering and support, and perceived helpfulness. Sample items include: "I talk to others online about my diabetes" and "I feel supported and encouraged by others online" scored from 1 (Never) to 5 (Very Frequently). These items were developed for this survey and did not have any statistical validity or reliability prior. To improve model fit, the first two items were dropped from the measure. For this sample, mean(SD) Diabetes Online Support was 1.38(.64) and $\alpha = .86$.

The Revised Summary of Diabetes Self-Care Activities Measure (SDSCA). The

Summary of Diabetes Self-Care Activities Measure (SDSCA) is a self-report measure of diabetes

self-management in adults (Toobert, Hampson, & Glasgow, 2000). The revised version includes

a simplified scoring technique, reduced number of items, and is recommended as a research tool

(Toobert et al., 2000). It includes subscales capturing diet, activity, foot care, and smoking,

where items are scored by the number of day the item was completed in a week on a scale of 1 to

7. As the focus of this dissertation is T2D management per ADA, only items including diet,

physical activity, and medication were used. Of these, internal consistency was found to be

acceptable for general diet, physical activity, and medication (Toobert et al., 2000). Sample items

include "On how many of the last seven days did you take your recommended diabetes

medication." For this sample, mean(SD) daily diabetes medication adherence was 5.20(2.89),

daily diabetes diet adherence was 3.81(1.94) α= .65, and daily diabetes activity adherence was

2.48(2.23) α= .80.

  Integrated care. The goal of this project-specific measure was to capture the variety of

integrated care experiences patients experience at an IBHC setting. At this site, typical visits can

include one or more of the following: meeting with only the primary care provider (PCP),

meeting in a co-visit with the PCP and a behavioral health provider (BHP), meeting only with

the BHP, attending diabetes medical group or wellness group visits, receiving traditional

behavioral therapy, receiving education or assistance from care team members by phone,

nutrition information from clinic staff, attended a cooking class, and care coordination from

social workers. Participants were asked to mark how many of these experiences they recalled

having over the last three months. This was recoded to a 1 indicating that the patient recalled

receiving some level of care for a BHP or 0 indicating the patient recalled only visiting with a

medical provider in the last three months. Mean(SD) for behavioral health participation was .28(.45).

HbA1c. Nicknamed the "bloodcheck with a memory", the A1c or estimated average glucose is a measure of the average glucose over the past 2-3 months (ADA, 2014). It indicates a patient's overall average success in diabetes self-management (ADA, 2014). Generally healthy HbA1c percentages are below 7% (ADA, 2014). The lead researcher ensured that the HbA1c percentages used in this study were obtained within a three month range of survey administration. For this sample, the mean(SD) HbA1c percentage was 7.78% (1.87).

Control Variables. We controlled for gender, age, years since T2D diagnosis and Medicaid status. Dummy codes were used for gender (1 = female, 0 = male) and Medicaid status (1=yes, 0=no) (see Table 1).

Hypotheses

H1: While controlling for self-efficacy and in-person/online sources of social support, it was hypothesized that that a negative association between participation with behavioral health services in an IBHC setting and depression and diabetes distress existed.

H2: While controlling for depression, diabetes distress, and in-person/online sources of social support, it was hypothesized that a positive association existed between participation with behavioral health services in an IBHC setting and reported self-efficacy.

H3: While controlling for online sources of social support, self-efficacy, depression and diabetes distress, it was hypothesized that participation with behavioral health services in an IBHC setting would be positively associated with perceived in-person support.

H4: While controlling for in-person sources of social support, self-efficacy, depression and diabetes distress, it was hypothesized that a positive association existed between online social support and participation with behavioral health services in an IBHC setting.

H5: It was hypothesized that a) a negative relationships between emotional distress (diabetes distress and depression) and self-efficacy b) negative relationships between emotional distress (diabetes distress and depression) and in-person/online social support and c) a positive relationship between self-efficacy and in-person/online sources of social support.

H6: While controlling for the effect of the other included variables, it was hypothesized that unique associations with T2D management behaviors (daily diet adherence, medication adherence, and daily physical activity) would include:

a) a negative association with emotional distress

b) a positive association with self-efficacy

c) a positive association with in-person social support

d) a positive association with online social support

e) a positive association with participation with behavioral health services

H7: While controlling for the effect of the other included variables, it was hypothesized that unique associations with HbA1c percentages would include:

a) a positive association with emotional distress

b) a negative association with self-efficacy

c) a negative association with in-person social support

d) a negative association with online social support

e) a negative association with diabetes management behaviors

f) a negative association with participation with behavioral health services

Data Analysis

Participants from a sample of 151 adult patients receiving care for T2D responded to a cross-sectional survey assessing psychosocial factors regarding their T2D. With an adequately large sample and several latent constructs, structural equation modeling (SEM) was used to examine the relationships between the constructs, diabetes self-management behavior, and HbA1c percentages. Tabachnick and Fidell (2001) suggested structural equation modeling (SEM) is an appropriate analytical strategy to evaluate relationships that involve multiple variables and varied layers of relationships, as the current study has.

Descriptive statistics were run in Stata (v11.2) and SEM analyses were conducted in R (R Core Team, 2016) using the lavaan package (Rosseel, 2012). First, descriptive statistics were run in order to capture the frequencies, means, and standard deviations from the demographic questions (see Table 2). Outliers of three standard deviations or more were examined, but were not dropped as they did not significantly influence the analysis. Bivariate correlations were then used within items and between latent constructs (see Table 3) to understand relationships that exist between constructs and to inform the SEM analysis. To organize the latent constructs of the new measure (Diabetes Online Support), exploratory and confirmatory factor analyses were run in R. Approximately, five percent of data were missing and missing data were handled using Full Information Maximum Likelihood estimation (Rosseel, 2012).

When examining relationships using SEM it is important to assess goodness of model fit (Tabachnick & Fidell, 2006; Hooper, Coughlan, Mullen, 2008; Kenny, 2015). According to Berndt (2001), the two model tests least tainted by sample size are the comparative fit index (CFI) and the nonnormed fit index (NNFI). The following indices were used to test the model fit: (a) root mean square error of approximation (RMSEA; values lower than .10 indicate good fit

with a confidence interval less than .05 and less than .10; Kenny, 2015); and (b) Standardized Root Mean Square Residuals (SRMR; a value below .08 indicates good fit; Hu & Bentler, 1999). The Tucker Lewis Index or Non-normed Fit Index (TLI or NNFI) and Comparative Fit Index (CFI) were not used as the null model RMSEA was below .158 and thus, these tests are not as informative (Kenny, 2015).

Results

Following guidelines proposed by Matsunaga (2011), parallel analysis (Dinno, 2015) was exploratory factor analysis, and confirmatory factor analysis were run in R to confirm the measure reliability. Final factor loadings (see Table 4) show that not all items met the standard .40 cutoff (Matsunaga, 2011). However, the measures used in this study were relatively new and thus, it was decided that it was premature to remove items until further use to confirm the appropriateness of dropping items. Due to poor model fit, it was decided to only use the regimen-distress factor from the Diabetes Distress Scale (Polonsky et al., 2005). The final model demonstrated adequate fit χ^2(589, N=151)= 1078.590, $p< .001,$ RSMEA = .073, 90%CI = .066 − .080, SRMR = .084) (see Figure 2).

Hypothesis 1 − Hypothesis 4

It was hypothesized (H1-H4) that behavioral health participation would be negatively associated with emotional distress (regimen-distress and depression) and positively associated with self-efficacy, and in-person/online social support. These hypotheses were not supported (see Table 5).

Hypothesis 5

It was hypothesized that (a) negative associations exist between emotional distress and self-efficacy, (b) negative associations exist between emotional distress and in-person/online

social support and, (c) positive associations exist between self-efficacy and in-person/online social support. While not all hypothesized relationships were found to be significant (see Table 5), several of the hypothesized associations were confirmed.

Emotional distress and self-efficacy. Significant associations in the predicted direction were found between self-efficacy and depression (β(SE)= -.35(.10), p<.01) and regimen distress (β(SE)= -.25(.10), p<.01). Thus, when holding all other variables constant, as depression and regimen distress increased, self-efficacy decreased.

Emotional distress and in-person support. Significant associations in the predicted direction were found between depression and perceived support from children (β(SE)= -.36(.16), p<.01) and depression and perceived support from medical providers (β(SE)= -.24(.11), p<.05). If holding other variables constant, as depression increased, perceived support from their child(ren) and primary care provider decreased. Significant associations were also found in the predicted direction were found between regimen distress and perceived support from partner/spouse (β(SE)= -.19(.16), p<.05). Thus, if holding other variables constant, as regimen distress increased, perceived support from partner/spouse decreased.

Self-efficacy and in-person support. Significant associations in the predicted direction were found between self-efficacy and perceived support from primary care providers (β(SE)= .40(.14), p<.01), and self-efficacy and perceived partner support (β(SE)= .23(.16), p<.01). Thus, if all other variables were held constant, as self-efficacy increased, perceived support from partner/spouse and the primary care provider increased.

Online support. There were no significant associations found between online support and the other psychosocial variables.

Hypothesis 6

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It was hypothesized that while controlling for other variables, T2D management (daily medication adherence, diet adherence, and physical activity) would be negatively associated with emotional distress (depression and regimen distress) and positively associated with self-efficacy in-person social support (their child(ren), partner, and PCP), online social support and behavioral health participation. While not all hypothesized relationships were found to be significant (see Table 6), several of the hypothesized associations were confirmed.

Medication adherence. None of the hypothesized associations between the independent and control variables were found (see Table 6).

Diet adherence. Significant associations in the predicted direction were found between regimen distress and daily diet adherence (β(SE)= -.51(.18), $p<.01$), and years since diagnosis and daily diet adherence (β(SE)= .16(.01, $p<.05$). Thus, when controlling for other variables, increased regimen distress is associated with decreased diet adherence, and a longer duration since diagnosis is associated with increased dietary adherence (see Table 6).

Physical activity. Significant associations in the predicted direction were found between physical activity and regimen distress (β(SE)= -.26(.13), $p<.05$), and age (β(SE)= -.19(.01), $p<.05$). When controlling for other variables, increased regimen distress was associated with decreased adherence to physical activity and patients at an advanced age reported less adherence to physical activity. None of the other factors were significantly associated with daily physical activity (see Table 6).

Hypothesis 7

It was hypothesized that while controlling for other psychosocial variables that Hba1c percentages would be positively associated with emotional distress, and negatively associated with T2D management behaviors, self-efficacy, in-person/online social support, and participation

with behavioral health services. While not all predicted relationships were found to be significant (see Table 6), several predicted associations were found.

Significant associations in the predicted direction were found between daily medication and HbA1c percentages (β(SE)= .14(.05), p<.05), regimen distress and HbA1c percentages (β(SE)= .42(.25), p<.01), perceived support from child(ren) and HbA1c percentages (β(SE)= -.20(.09), p<.05), and HbA1c percentages and patient age (β(SE)= -.20(.02), p<.05). Thus, when controlling for other variables, increased regimen distress is associated with higher HbA1c percentages, greater adherence to medication is associated with higher HbA1c percentages, older patients reported lower HbA1c percentages, and increased perceived support from children was associated with lower HbA1c percentages.

Discussion

The primary purpose of the current study was to better understand the associations between emotional distress, self-efficacy, social support, diabetes management behaviors, and HbA1c percentages within an integrated behavioral healthcare setting (IBHC). Previous research examined some of these relationships within non-IBHC integrated care settings (Busetto et al., 2015) or all of these factors within a non-integrated medical setting (Walker et al., 2015). This was the first study to examine the simultaneous association between these factors within an IBHC setting. This study explored these associations using the Transactional Model of Stress and Coping (TMSC; Lazarus & Folkman, 1987). The results of this study revealed several new contributions to the literature and carry numerous implications for the research, clinical, and policy work. The significant contributions, limitations, and implications are provided below.

This study confirmed some already identified findings in the literature. First was the importance and unique effects of both depression and regimen-distress on T2D management and

outcomes. The TMSC predicts and previous literature supported that impact of regimen distress on HbA1c percentages, diet adherence, medication adherence, and physical activity (Cummings et al 2014; Hessler et al., 2014; Lazarus & Folkman, 1987). Our study confirmed some of these relationships. Higher regimen distress score was associated with higher HbA1c percentages, and lower reports of physical activity and diet adherence. These findings support the unique role of regimen distress on T2D management and outcomes and warrants the inclusion of regimen distress in future research within IBHC settings (Fisher, 2014).

A second significant confirmation was the association between emotional distress, self-efficacy, and social support. The TMSC predicted and previous literature has found relationships between these emotional distress, self-efficacy and social support (Lazarus & Folkman, 1987; Walker et al., 2014). This was the first study to examine all of these variables within an IBHC setting. This study confirmed the expected relationships predicted by the TSMC between these variables (positive association between self-efficacy and social support [primary care provider and child], negative associations between emotional distress and self-efficacy and negative associations between emotional distress and social support (partner, primary care provider, and child). The identification of these associations is important for treatment planning within an IBHC setting, where behavioral health providers (BHPs) can both screen and address these concerns (Young-Hyman et al., 2016).

A third significant confirmation was the reported prevalence of emotional distress and significant sources of diabetes treatment social support. Depression and distress can be common in patients with T2D (Fisher et al., 2012). Prevalence of depression rates and diabetes distress rates in research sample sizes ranged from 20-31% for depression (Semenkovic et al., 2015) and 18-45% for diabetes distress (Aikens et al., 2012) Within this sample, 29% of patients included

in the sample positively screened for major depressive symptoms and 19% positively screened for significant diabetes regimen distress. This confirms these previously reported statistics demonstrating that these psychosocial concerns are somewhat prevalent in our diabetes patient populations. Additionally, past research using the Modified Dunst Social Support Measure (Littlewood et al., 2015) reported that within a sample of African American women, primary care providers (PCP) were the greatest source of diabetes social support. This study found a similar relationship, where on average, the PCP was the highest rated source of diabetes social support. This suggests a relationships exists of which a PCP may not be aware of, and which may be better utilized in clinical practice and better studied in future research.

This study also contributes support for an association predicted by the TMSC (Lazarus & Folkman, 1987), but had not been previously studied within an IBHC setting, perceived support from child(ren) and HbA1c percentages. Social support has been found to play a significant positive and negative role for patients with T2D. With an older sample (average age of 60.28), adult children may be an important source of support. Our study found that increases in perceived support from child(ren) is associated with lower HbA1c percentages. While only one study within a sampled population of an IBHC setting, this finding promotes a greater role for adult children with patients with T2D. However, further research is needed to understand the specific nature of the helpful relationship between the patient and the child, particularly if separated by geographic distance.

This study also identified several findings that were contrary to those previously reported. Some of which reflect problems with the measures used, the limitations of the study methodology (cross-sectional), and the unique characteristics of the sample. First, while associated with emotional distress and social support as predicted, no association was between

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diabetes self-efficacy and diabetes management behaviors or HbA1c percentages. Previous research using the same measure found the tool comparably reliable to longer self-efficacy measures, an effective pre/post measure of the effect diabetes education, and not correlated with changes in HbA1c percentages (Anderson, 2003). The lack of association between diabetes self-efficacy and T2D self-management behaviors may reflect a similar problem in the measure. While optimal because of its size (8 items), future research likely would benefit by including a different tool of self-efficacy.

One of the primary objectives of this study was to identify associations between participation with behavioral health and the other variables included in this study. It was hoped that participation with behavioral health, a key characteristic in an IBHC setting, would adequately measure any significant associations found within an IBHC setting (Peek & National Integration Academy Council, 2013). No significant associations were found.

Several reasons potentially explain these findings. First, as opposed to chart review, this study asked patients to recall over the last three months any interactions they have may have had with a behavioral health team member listing specific examples. Thus, if the patients failed to remember any interactions, they were not recorded. Second, the study limited the recall to a three month window similar to the period caught by the HbA1c percentage, where other studies used a greater timespan to measure any associations (Chawstiak et al., 2016). It may be necessary in future research to expand the window of time to account for the effect of behavioral health. Third, to effectively measure associations between BHP services and patient variables, there needs to be consistent protocols in place to ensure the presence of BHPs when needed. At this site, this was not the case. Future research would benefit by specifically addressing these needs to determine the association of an IBHC settings, and BHP providers on these variables. Finally,

to identify any differences in effect, it would require using a pre-HbA1c and a post-HbA1c percentage. This study was cross-sectional and was not designed to measure an intervention or longitudinal changes. Future research to measure the effect of IBHC settings could potentially utilize these research designs.

While not one of the original included hypotheses, an interesting relationship was found regarding age. Increased age is generally associated with higher HbA1c percentages (Selvin, Coresh, & Brancati, 2006). However, this study found that older patients had lower HbA1c percentages. This would suggest that patients that were younger were experiencing greater difficulty managing their diabetes. Additionally, older patients may have a more difficult time subscribing to the regimen requirements (Selvin et al., 2006). However, we found that older patients, while reporting themselves to be less physically active, were more likely to report successfully following the diet regimen. Further research within this specific integrated care site would be needed to explore the different reasons for these findings, and what obstacles may be occurring in younger patients within this sample to impede diet adherence and increase HbA1c percentages.

Another surprising finding, Medicaid status was not significantly associated with outcomes. Previous findings indicated that patients with Medicaid have poorer T2D outcomes than other insurance types (Garfield et al., 2015; NCQA, 2013). Thus, it was included in this analysis. This was not found in this study. NCQA suggested that provision of integrated care may reduce the impact of the difficulties patients on Medicaid may face (NCQA, 2013). This may be one factor that explains the lack of association found in this study.

Thirdly, previous studies have applied the TMSC with T2D (Duangdo & Roesch, 2008; Hocking & Lochman, 2005; Hunt et al., 2012), from our review of the literature, this was the

first to do so in an integrated care setting. The TMSC is an effective model for understanding the interactions between key psychosocial variables, their effect on chronic condition management and behaviors (Glanz & Schwartz, 2008). While the desired association between psychosocial factors was found, only medication adherence was associated with HbA1c percentages. This study found that increases in medication adherence were associated with increases in HbA1c percentages. This increase was not expected. However, as this study was cross-sectional, this association likely indicates that patients with higher HbA1c percentages were more likely to also have daily medication requirements.

In an integrated care setting, where emotional distress screenings, and collaboration with behavioral health on chronic conditions may be more common (Blount, 2003), it was hoped that behavioral health participation would influence emotional distress, self-efficacy, social support, and HbA1c percentages. This relationship was not supported by the data. As our measures were limited to a recall of the last three months of services received, this may not be an adequate time to appropriately measure the impact of BHPs on these factors. Additionally, as already indicated, at this site, there was no set fidelity or protocol to patient care. BHPs visit the patients that PCPs ask them to visit. This inconsistency or the timespan may explain these relationships.

Finally, diabetes online support was not found to be associated with any of the factors and variables included in the study. While a new measure, it was hoped that this variable would capture online health behaviors becoming more prevalent among adults in the United States (Fox & Duggan, 2013). Our sample demographics, specifically the age of our patient sample, may have influenced the findings of this factor. While healthy and prominent adults over 65 commonly use the internet, adults over 65 with less education, less financial means, or poor health are less likely to access or use technology (Pew Research Center, 2014).

Limitations

Though the study yielded some important contributions to the literature, there were a few limitations that need to be taken into consideration. This study was cross-sectional and causation cannot be attributed to any of the relationships. Due to limitations of the methodology and the study setting, measures placed at the end of the survey had higher rates of incompletion. Several items required participants to recall behaviors and interactions from several weeks to several months back, which can influence results. Our sample size should be sufficiently large to minimize these effects. While our sample reflected the population served by the clinic, ethnic diversity was limited (87.42% White non-Hispanic) and place of residence was primarily urban (sample was 98% urban). There were also several age-based limitations in this study. Our sample age ranged from 31 to 85 with a mean(sd) of 60.28 (11.65). Due to the wide age range of patients, we chose not to address the appropriate Hba1c percentage for patients based on age and instead just addressed general trends in HbA1c percentages within the sample (ADA, 2014). Another age-based concern regards the measure of internet use. This finding may have been skewed by the older population included in this study, that may less be likely to use the internet or social media (Fox & Duggan, 2013). Another potential limitation was the data collection took place in the winter holiday season, when it is more common to be less active and eat more inflating HbA1c percentages and management behaviors (Ma et al., 2006). While several analyses were used to confirm the validity and strength of the measures used, several measures used were relatively new or were created for this study, and need further research to validate their use. Finally, the measures ranged in the time frames captured, from 3 months to the last week. This difference may have influenced the outcomes as well.

Research Implications

Several implications derived from the study should inform and guide future research. The first is the model used to organize this study. The research questions guiding the study and analysis emphasized the relationships between psychosocial factors within an integrated primary behavioral healthcare site. Thus, it may have been more appropriate to study these relationships using the model that guides IBHCC care, the biopsychosocial model (BPS) (Engel, 1977). The BPS, a meta-theory, appreciates the interconnected nature of biological, psychological, social constructs and their influence on mental and physical health (Suls, Krantz, & Williams, 2013).

Within the T2D self-management literature, the BPS model was utilized in several studies. It has served as a framework to guide T2D treatment (Segal et al., 2013), to improve glycemic control (Peyrot, McMurry, & Kruger 1999) and to organize qualitative T2D research (Aamar, Lamson, & Smith, 2015; Dreyfus et al., 2014). However, there has been a dearth of literature using the BPS framework to guide quantitative studies, to predict relationships between factors, or to indicate directional relationships between variables (Epstein & & Borrell-Carrio, 2005). As the TMSC has been used in quantitative studies, and predicts directional relationships, it was chosen. However, only medication adherence indicated any association with the outcome and the direction of the association was unexpected. Coping is a significant part of the TMSC, and if these behaviors were dropped from the model, the variables left would be the biopsychosocial factors (Hba1c percentages, depression, diabetes distress, self-efficacy, and social support). Thus, future researchers less interested in management/coping behaviors may find benefit from using the BPS framework.

Future research is also needed to understand the implications of self-guided online social support and the impact of adult children on patient HbA1c percentages. This study's findings did not support the relationship between self-guided online social support and diabetes management.

Future research collected among a sample of patients under 60 may yield more significant findings. The exact nature of the self-guided online behaviors needs clarity and open-ended items may offer that context. Similarly, open-ended items may offer to clarify the roles and helpful behaviors of adult children on their parents HbA1c percentages.

Finally, future research is needed to clarify and understand the impact of behavioral health providers on T2D outcomes within integrated care settings. This study offered a limited time frame of 3 months intended to match the time measured by HbA1c scores. This study also utilized patient self-report of visits with behavioral health. Building on this study, it would be recommended to use chart review as opposed to patient self-report to ensure the accurate measure of behavioral health participation. It would also be recommended to expand the timeframe of the behavioral health participation as their impact likely requires a longer view to have an impact on these behaviors. Additionally, it would be recommended that future research utilizes specific items or measures to assess the perceived helpfulness of behavioral health providers regarding T2D behaviors and outcomes.

Clinical Implications

Within an IBHCC, there are substantial opportunities to meet the complex psychosocial needs of patients with T2D. The 2016 statement by the ADA identified a consistent need to utilize assessments of patient psychosocial concerns to improve T2D management and outcomes. This study supports these guidelines. In particular, these study findings support the need to regularly assess diabetes distress and depression. Providers should determine which screening tools would be best for their patients and then make the administration of these screens a standard practice.

Additionally, it is recommended that a protocol be created to not only screen patients with T2D, but to create a protocol for the inclusion of behavioral health to address these concerns. A substantial number of patients included in this sample self-reported that they did not have any interaction with behavioral health (a mean of .28), while mean scores of regimen distress and depression indicate that emotional distress is on average a concern for our patients (the mean score for depression 8 is below the cut-off of 13). By creating a protocol that organizes services to be utilized upon the receipt of a positive screen, the IBHC model could be utilized to its maximum potential.

Finally, the findings of this study indicate that it would be worthwhile to consider assessing for the role of online and family support on T2D management and outcomes. If the patient reported feeling competent about their ability to seek information, it may be important to ensure that they are finding accurate and appropriate information. In addition, to the assessment, it may be appropriate to provide patients with online resources to use. If the patient identifies family support that is available, it may be useful to invite the patient to bring the support individual to a visit.

Policy Implications

Based on the findings from this study, the greatest policy awareness should be aimed at the significant impact diabetes distress has on HbA1c scores, and the involvement of behavioral health to address these concerns. Similar to past findings (Aikens, 2012, Anderson et al., 2001), this study found that diabetes distress and depression can impact more than a fifth of patients. In an ideal IBHC model, a protocol is established to ensure that patients with a positive screening for either concern receive support. However, this study found patients to have limited exposure to behavioral health, and thus behavioral health has limited impact on these variables. A policy

aim could include a mandate for any patient with a positive screen will have to speak with behavioral health provider.

Additionally, our view of the patient must begin to expand to include their family and friends. These individuals can play key roles in the care and outcomes of the patient. Our medical system often fails to address, acknowledge or include the family outside of medical visits, where the patient is not decisional. By moving in the direction of family visits, multiple concerns including diet, physical activity, mood, and perceptions of support can be addressed.

Summary

This is the first known study to assess multiple psychosocial factors within a cross-sectional sample of an IBHCC. Several previously identified significant relationships were confirmed, and several significant findings were found that were new. Based on the findings from this study, multiple implications were able to be constructed for future researchers, clinicians, and policy makers. T2D is a complicated illness that affects multiple domains, and we need to begin to effectively and efficiently treat these multiple domains to improve outcomes.

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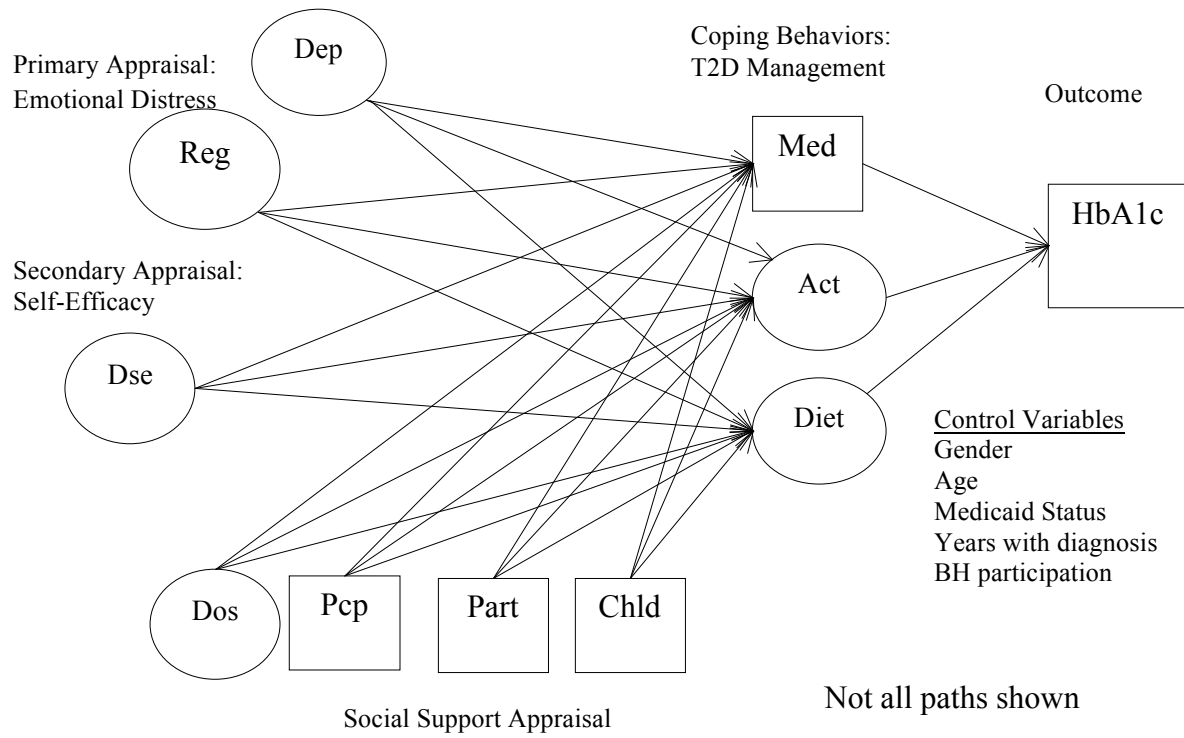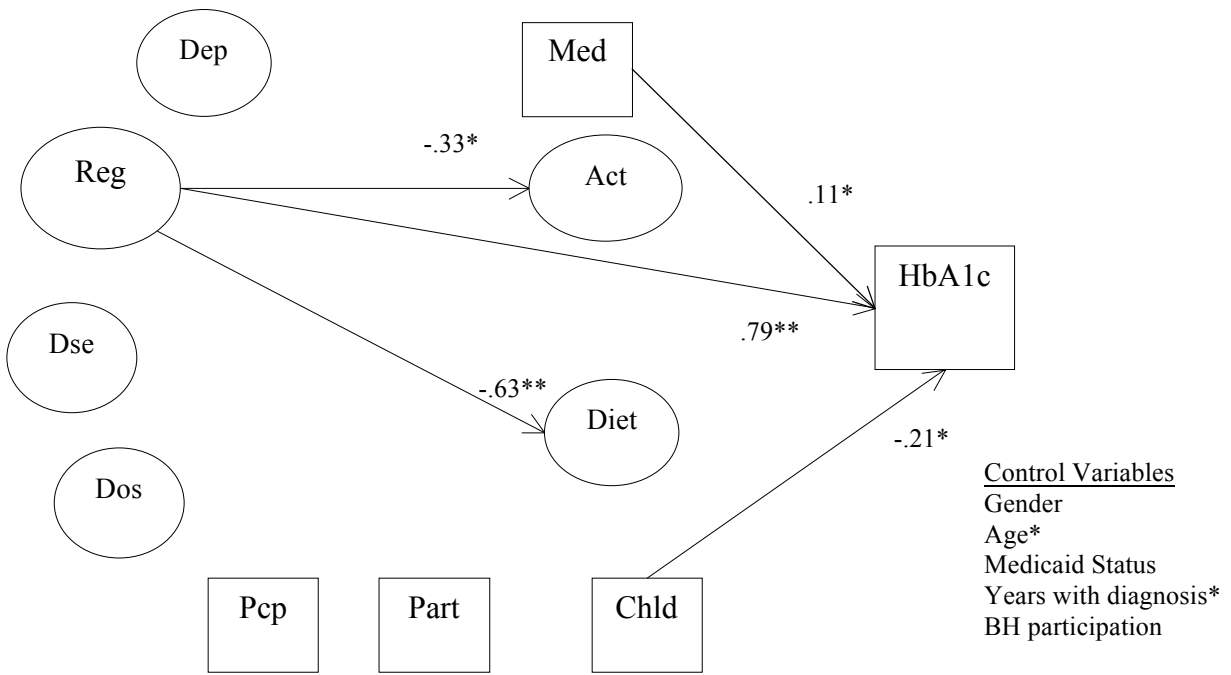117. doi: 10.1186/s12911-014-0117-3

Dep

Primary Appraisal:
Emotional Distress

Reg

Coping Behaviors:
T2D Management

Outcome

Med

HbA1c

Secondary Appraisal:
Self-Efficacy

Act

Dse

Diet

Control Variables
Gender
Age
Medicaid Status
Years with diagnosis
BH participation

Dos   Pcp   Part   Chld

Social Support Appraisal

Not all paths shown

Figure 1. Proposed Statistical Model

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Dep

Med

Reg   -.33*   Act

.11*

HbA1c

Dse

.79**

-.63**   Diet

Dos

-.21*

Control Variables
Gender
Age*
Medicaid Status
Years with diagnosis*
BH participation

Pcp   Part   Chld

Model fit: χ^2(589, N=151)= 1078.59, $p< .00,$ RSMEA = .073, 90%CI = .066 − .080, SRMR = .084)

Not all paths shown

Figure 2. Final Outcomes of Model. * <.05, **<.01

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Table 1

Demographic Information

	Range	Frequency (%) or Mean(SD)
Gender		
Women		102(67.55%)
Men		49(32.45%)
Age	30-85	60.28 (11.65)
Years since T2D diagnosis	0-55	10.07(9.59)
Relationship Status		
Single		46(30.46%)
Married		61(40.40%)
Separated		2(1.32%)
Widowed		14(9.27%)
Divorced		28(18.54)
Ethnicity		
White non-Hispanic		132(87.42%)
Hispanic		17(11.26%)
Native American		1(.66%)
Unknown		1(.66%)
Insurance Type		
Medicaid		47(31.3%)
Medicare		59(39.07)
Private		42(27.81%)
None		3(1.99%)
Urban/Rural		
Urban		148(98.01%)
Rural		3(1.99%)
HbA1c Percentage	5%-13.8%	7.79(1.86)

Table 2

Variable Key

Sex: Patient gender
Age: Patient age
Mcaid: Patient with Medicaid
Yrs: Length of time since T2D diagnosis
Reg: Diabetes regimen distress
Dep: WHO-5 depression index
Dse: Diabetes self-efficacy
Chld: Diabetes social support from children and friends
Part: Diabetes social support from spouse, spouse friends, and spouse family
Pcp: Diabetes social support from nurses, pharmacists, and urgent care providers
Dos: Diabetes self-guided online support
Med: Daily medication regimen adherence
Act: Daily recommended activity adherence
Diet: Daily recommended diet adherence
Alc: HbA1c percentages collected within 3 months of survey
BH: Particpation with behavioral health provider within 3 months of survey

Table 3

Bivariate Correlations, Means and Standard Deviations

	Sex	Age	Mcaid	Yrs	Reg	Dep	Dse	Chld	Part	Pcp	Dos	Med	Act	Diet	A1c	Bh
Sex	1															
Age	.05	1														
Mcaid	.01	-.41*	1													
Yrs	.11	.37*	-.05	1												
Reg	.02	-.17*	.25**	-.09	1											
Dep	.02	-.13	.19*	-.01	.40**	1										
Dse	-.03	.05	.07	-.09	-.26*	-.35**	1									
Chld	.16	-.00	-.08	-.02	-.18*	-.37**	.25**	1								
Part	-.14	-.21*	.09	-.10	-.20*	-.09	.30**	.15	1							
Pcp	.06	-0.12	.18*	-.09	-.07	-.29**	.47**	.21*	.17	1						
Dos	.07	-.15	.21*	-.19*	-.00	-.08	.10	.10	.07	.12	1					
Med	.02	.08	-.03	.16	-.10	-.19*	.07	.13	.05	.16	-.17	1				
Act	-.15	-.13	-.04	-.13	-.31**	-.29**	.11	.14	.19*	.15	.25*	.01	1			
Diet	.07	-.01	-.03	.04	-.43**	-.28*	.22*	.22*	.15	.14	.11	.16	.44**	1		
A1c	.02	-.18*	.11	.07	.34**	.24**	-.12	-.23*	.18	.02	.05	.10	-.11	-.07	1	
BH	-.09	-.04	.15	-.04	-.03	-.07	.05	.10	.07	.11	.21*	-.06	.22*	.04	.04	1
M	.68	60.28	.31	10.1	2.06	43.61	3.61	2.34	2.01	3.96	1.39	5.81	2.48	3.81	7.79	.28
SD	.47	11.65	.46	9.54	1.07	24.46	1.05	1.81	1.93	1.22	.64	2.41	2.23	1.94	1.86	.45
N	151	151	151	151	151	150	148	139	135	140	121	138	141	141	151	151

*p<.05 **p<.01

Table 4

Coefficients of Confirmatory Factor Analysis

Item	Latent Variable	β	B	SE
	Dse			
DSE_1		.35	.43	.12
DSE_2		.83	1.04	.07
DSE_3		.83	.98	.09
DSE_4		.87	1.10	.07
DSE_5		.84	1.04	.08
DSE_6		.83	1.07	.09
DSE_7		.90	1.14	.08
DSE_8		.88	1.12	.08
	Dep			
WHO_1		.86	1.08	.09
WHO_2		.85	1.18	.09
WHO_3		.73	1.02	.10
WHO_4		.83	1.25	.08
WHO_5		.84	1.28	.08
	Reg			
DDS_5		.65	.89	.12
DDS_6		.89	1.12	.09
DDS_10		.73	.93	.12
DDS_12		.83	1.00	.13
DDS_16		.85	1.06	.12
	Dos			
DOS_1		.58	.29	.10
DOS_2		.52	.40	.12
DOS_3		.77	.69	.13
DOS_4		.85	.85	.11
DOS_5		.73	.69	.13
DOS_6		.77	.64	.13
	Diet			
DSM_1		.89	1.66	.40
DSM_2		.54	.94	.23
	Act			
DSM_4		.85	1.73	.22
DSM_5		.77	1.44	.27

All items loaded significantly <.001

Table 5

Covariance

Outcome	Variable	β	B	SE
Dse	Dep	-.35**	.35	.10
	Reg	-.25*	.25	.10
	Dos	.13	.13	.08
	Part	..23**	.45	.16
	Pcp	.40**	.49	.14
	Chld	.14	.26	.16
	BH	.03	.01	.04
Dep	Reg	.41**	.41	.08
	Dos	-.13	-.13	.09
	Part	.00	.00	.16
	Pcp	-.24*	-.29	.11
	Chld	-.36**	-.65	.16
	BH	-.05	-.02	.04
Reg	Dos	-.04	-.04	.08
	Part	-.19*	-.36	.16
	Pcp	-.01	-.01	.11
	Chld	-.17	-.31	.16
	BH	-.03	-.01	.04
Dos	Part	.04	.08	.23
	Pcp	.13	.16	.10
	Chld	.13	.23	.19
	BH	.20	.09	.05
Diet	Med	.09	.20	.31
	Act	.47*	.47	.22
Med	Act	.03	.07	.27

* p<.05 **p <.01

Table 6

Regressions

Outcome	Independent Variable	β	B	*SE*
Med	Dse	-.06	-.14	.23
	Reg	-.03	-.07	.25
	Dep	-.15	-.36	.25
	Dos	-.16	-.39	.33
	Part	.03	.04	.13
	Pcp	.16	.31	.22
	Chld	.09	.11	.13
	Sex	-.01	-.03	.39
	Age	.04	.01	.02
	Mcaid	.04	.23	.50
	Years	.13	.03	.02
	BH	-.06	-.30	.45
Diet	Dse	.08	.10	.16
	Reg	-.51**	-.63	.18
	Dep	.01	.01	.17
	Dos	.03	.04	.13
	Part	-.02	-.01	.06
	Pcp	.03	.03	.12
	Chld	.06	.04	.09
	Sex	.01	.03	.24
	Age	-.18	-.02	.01
	Mcaid	-.02	-.04	.31
	Years	.16*	.02	.01
	BH	.10	.26	.24
Act	Dse	-.09	-.11	.18
	Reg	-.26*	-.33	.13
	Dep	-.19	-.23	.15
	Dos	.21	.26	.15
	Part	.09	.06	.06
	Pcp	.07	.07	.10
	Chld	-.00	-.00	.07
	Sex	-.17	-.45	.24
	Age	-.19*	-.02	.01
	Mcaid	-.10	-.26	.32
	Years	.06	-.01	.01
	BH	.18	.49	.26
HbA1c	Med	.14*	.11	.05
	Diet	.24	.37	.22
	Act	-.16	-.24	.20
	Dse	-.03	-.06	.21
	Reg	.42**	.79	.25
	Dep	.06	.11	.19
	Dos	.13	.24	.19
	Part	.10	.09	.08
	Pcp	.07	.11	.14
	Chld	-.20*	-.21	.09
	Sex	-.01	-.02	.31
	Age	-.20*	-.03	.02
	Mcaid	-.14	-.57	.39
	Years	.12	.02	.02
	BH	.06	.26	.32

*p<.05 **p<.01

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CHAPTER 6: IMPLICATIONS FOR PSYCHOSOCIAL FACTORS FOR PATIENTS

WITH TYPE 2 DIABETES WITHIN AN INTEGRATED CARE SETTING

Dissertation Overview

I was drawn to Medical Family Therapy intrigued at the notion of providing patient-centered biopsychosocial-spiritual care (Engel, 1977; Hodgson, Lamson, Mendenhall & Crane, 2014; Wright, Watson, & Bell, 1996). Treatment trends may apply to a wide range of people, but the application of biopsychosocial treatment must adapt to the complex context of each patient's circumstance (Engel, 1980). While a variety of illnesses warrant significant attention to this context, my experience providing behavioral health services in Federally Qualified Health Centers (FQHCs) drew my attention to type 2 diabetes (T2D). Time and time again, I witnessed the great frustration experienced by providers, patients, and patient families when dealing with type 2 diabetes. I became interested in the complex psychosocial interactions I found impacting the patient diagnosed with T2D and the patient's family (Shields, Finley, & Chawla, 2012).

I found my interests coincided with a recent statement written by Young-Hyman and colleagues (2016) on behalf of the American Diabetes Association (ADA) about psychosocial care for patients with T2D. Essentially, successful T2D treatment requires patient-centered care through context driven communication, psychosocial screening, and intervention accomplished through collaboration with behavioral health providers ideally co-located within the same medical setting (Young-Hyman et al., 2016). Building on this area of growing national attention, I sought in this dissertation project to capture the associations of psychosocial factors in two contexts of interest: rural locations and integrated behavioral health settings (IBHC).

In the first chapter of this dissertation, psychosocial and contextual factors of interest, and the framework chosen to organize these factors, the Transactional Model of Stress and Coping

(TMSC; Lazarus & Folkman, 1987), were introduced. It was necessary for this quantitative study that the framework or model be able to inform the directions of the statistical analysis. I believed that the TMSC could effectively accomplish that goal (Lazarus & Folkman, 1987). From the introduction, it was clear that closer examination of multiple psychosocial factors associated with T2D was warranted within rural populations, and integrated behavioral health settings.

There had been substantial work done regarding type 2 diabetes in rural populations. In order to clarify, the needed areas of further study, a systematic review was done. The specific question that guided this dissertation's systematic review was "What is known about emotional distress, self-efficacy, social support, and T2D management among rural populations when controlling for other psychosocial factors?" The systematic review highlighted: (a) 20 studies met the inclusion criteria of addressing at least 2 of the three psychosocial factors chosen; (b) of these 20 that were also quantitative, 4 included all three factors; (c) only 8 of the 20 included a multivariate analysis, but were limited in their ability to run complex analysis because of sample sizes; and (4) there were no studies that included a measure of on-line support. Recommendations from this systematic review called for consistency within measures of emotional distress, the need for more representative sampling of populations, and the inclusion of other types of social support.

Building on the findings of the systematic review, it was important to explore the relationships identified among these variables within integrated care settings. To this end, literature was reviewed that captured interactions between emotional distress, self-efficacy, and social support of patients with T2D within integrated behavioral healthcare (IBHC) settings. A key piece of this review was a recent systematic review that explored a similar question (Busetto, Luijkx, Elissen, & Vrijhoef, 2016). From this review, it was clear that specifying the role of the

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behavioral health provider in the collaborative role was important, as the systematic review did not, and none of the studies included all of the variables in the same model. Additionally, the importance of insurance status was identified as one worth including in the analysis.

The integration of findings from the systematic review, the literature review, and the TMSC informed the methodology found in chapter 4. It was critical to this study that measures chosen captured specific psychosocial concerns, demonstrated strong reliability, and could be accomplished quickly. To prevent the survey length from inhibiting participation, it was critical to identify those factors best suited to chart review and which were best suited to the participant. As indicated by the TMSC and literature review, hypotheses were formed measuring interactions across and within the psychosocial factors.

Following the methodology designated in chapter 4, a study was conducted that examined the relationships between emotional distress, self-efficacy, and social support on management behaviors and HbA1c scores within an integrated behavioral healthcare setting (IBHC). It had been intended to include a control variable distinguishing those living in rural areas and those living in urban areas. This would have allowed the simultaneous exploration of associations of patients from rural locations within an integrated behavioral health setting. Using the ERS county codes, zip codes were recoded as urban or rural resulting in over 98% (148 of the 151) of the participants located in urban areas (USDA ERS, 2016). With such an insignificant sample of rural patients, it was not possible to control for rural place of residence and the variable was dropped from the study. While unfortunate, it is representative of the population seen at the setting, where the study was conducted. Thus, this study primarily focused on studying these variables, while controlling for participation from behavioral health providers.

To our knowledge, this was the first study that assessed all three psychosocial factors within an IBHC, while also controlling for involvement from behavioral health.

This study confirmed several previously found relationships within the literature, and more importantly identified several associations that are contributions to the literature. The significant confirmations included: a) unique effects of regimen-distress on T2D management; b) the effect of regimen-distress on HbA1c percentages; c) the prevalence of emotional distress and greatest sources of social support; and d) the relationships among emotional distress, self-efficacy, and social support. The significant contributions of this study included: a) the significant associated between perceived support from child(ren) with HbA1c percentages. Research, clinical, and policy implications were indicated in the previous chapter. In this chapter, the needed recommendations reflect not only chapter 5, but of the entire dissertation.

The implications addressed here were organized by Peek's three simultaneous worlds of a healthcare organization or three-world view (Peek & Heinrich, 1995). Each of the three worlds of healthcare, the clinical, the administrative, and the financial, capture specific responsibilities that require attention to provide a whole view of the healthcare organization and to perpetuate lasting change (Peek & Heinrich, 1995).

The Clinical World

The clinical world of healthcare captures domains of patient health and health-related outcomes (Peek & Heinrich, 1995). As this dissertation focused primarily on the health-related outcomes, much of the implications derived from this dissertation will tie to this world. The implications indicated here include those for future research and clinical practice.

Research Implications

Based on the literature and research presented throughout this dissertation, several implications emerged that point to the need for future research surrounding T2D and patient and treatment context. The first implication is the need for greater research to understand the association between psychosocial factors and urbanization. The second is the need to add clarity to the impact of behavioral health providers on T2D management and psychosocial factors. The third is to understand the role that adult children can play on HbA1c percentages. Fourth is the need for better measures of social support and more research on online social support.

T2D and place of residence. From the systematic review included in this dissertation, there is great indication and need for more research regarding T2D in rural areas. T2D currently ranks third behind health service quality/accessibility and nutrition/weight status as the most pressing concern among rural populations in America (Bolin et al., 2015). Due to health determinants associated with rural areas such as limited access to medical and behavioral healthcare, psychosocial factors like depression, diabetes distress, and isolation may be more prevalent (Bolin et al., 2015; Cummings et al., 2014; Melkus, Whittemore, & Mitchell, 2009). However, chapter 2 determined that insufficient literature existed examining these multiple psychosocial factors simultaneously that it was difficult to ascertain the extent to which the psychosocial factors interact, and impact management and outcomes. Future research is needed examining not only the association between multiple variables, but the relationship between these variables within an integrated care setting. This would not only establish the prevalence of these psychosocial concerns within rural areas, but the potential positive impact behavioral health could have on these concerns.

Impact of behavioral health. Chapter 5 reported no significant associations between behavioral health providers and the other factors included in this dissertation. This finding may

be explained in part by the methodology. In this dissertation, the number of visits with behavioral health providers and patients were infrequent enough that it warranted a binary identifier (1 or 0). Future research could explore the nature of the co-visits/traditional visits over an expanded period of time to understand how these visits impact T2D management. This could potentially be done with a mixed-methods approach. While historically controversial, there is growing acceptance of mixed methodologies as a means to investigate complex social science dynamics allowing the researcher to capture both breadth and depth of a research question (Tashakkori & Teddlie, 2003). Specifically, by expanding the length of time and including open-ended measures as well as quantitative measures, more nuanced understanding might be found between emotional distress, self-efficacy and social support and behavioral health participation might also be found.

Impact of family support. Similar to our limited understanding of the associations between the BHPs, psychosocial variables, T2D management, and HbA1c percentages, Chapter 5 also concluded that greater context was needed to understand the associations between reports of the perceived helpfulness/support of children and HbA1c percentages. Historically, the impact of family members including adult children on T2D management and HbA1c percentages varied from helpful to unhelpful for a variety of reasons (Aamar et al., 2015; Mayberry, Harper, & Osborn, 2016; Mier et al., 2007). Due to the nature of the quantitative study and the measures used, minimal context was offered about the association within our sample (Tashakkori & Teddlie, 2003). Similar to the previous research question, a mixed-method approach to specifically address this question would offer both the depth and breadth to provide insight surrounding the roles of adult children on their parents HbAlc percentages. Among points to be included in a future project such as this is both the patient's experience and expectations about

the role of the support person, but the experience of the support person and the role they believed they serve.

Measures of social support. Throughout this dissertation, common problems identified in the measures of social support were the gaps regarding context and the lack of information surrounding online social support. While the Diabetes Social Support measure includes a wide-range of in-person support types (Littlewood, Cummings, Lutes, & Solar, 2015), the measure does not add qualifying statements to identify specific behaviors that are helpful that each identified support person does. It would benefit future research to identify from qualitative studies such as those used in chapter 2, those behaviors performed by support persons/groups that are helpful and unhelpful, and quantify them to develop a more nuanced quantitative measure of support. This dissertation was the first to assess self-guided online social support within an integrated setting. Our findings suggest that this is an area worth further exploring. Our results found the measure developed for this study had adequate fit, but did not correlate with the other psychosocial variables. Future research is needed on this measure to identify if it adequately measures online social support, and reasons why it does not correlate with the other psychosocial factors as predicted.

Clinical Practice Implications

Both chapters 2 and 5 confirmed the ADA's most recent statement suggesting that screening of specific psychological conditions is warranted for patients with T2D. In chapter 5, we found that diabetes distress and depression were associated not only with reduced management, but that diabetes distress was associated with increased HbA1c percentages. It is current best practice for NCQA certified patient-centered medical homes to utilize screening for certain psychosocial problems including substance use and common concerns such as depression

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and anxiety (NCQA, 2014). There are limitations of the generalizability of the findings from this dissertation. However, based on the findings from the systematic review in chapter 2 and the cross-sectional study in chapter 5, it is recommended that practices incorporate some measure of diabetes distress into their care plans for patients with T2D. Not only is it consistently found to impact outcomes, but it has been found to be associated and distinct from depression (Fisher, Glasgow, & Stryker, 2010). Ideally, a diabetes distress screening such as the DDS-17 provides specific information about multiple domains of distress, which can inform care (Polonsky, et al., 2005).

As a Medical Family Therapist providing behavioral healthcare in a PCBH setting, I am excited by the strides we have made to incorporate individual patients, and their primary care providers to address behavioral health concerns. One of the findings from Chapter 5 suggests that support from adult children positively associated with HbA1c percentages. It may be useful to identify ways to encourage patients with T2D to bring in a support person, either a spouse, adult child, or friend. While this is a leap based on the findings of chapter 5, the systematic review found that in rural communities, when patient's families understood and supported T2D treatment efforts, patient's reported feeling more capable of managing their T2D. Thus, this may be an appropriate effort to improve outcomes.

The Operational World

The operational world of healthcare captures domains of production and administrative systems (Peek & Heinrich, 1995). In the context of the other worlds, this world takes the needs of patient care and the need for financial sustainability, and addresses how to practically accomplish these goals. From this dissertation, two operational world concerns were identified:

the need for a protocol for both BHPs and family, and changes to the electronic medical record (EMR).

Clinical Operations Implications

It is important to suggest that clinics should have a protocol in place for patients with T2D (Young-Hyman et al., 2016). For example, there are already certain guidelines in place that are also common practice such as recommendations regarding HbA1c checks and expectations for assessments of psychosocial factors (ADA, 2016). In my experience the reality of T2D patient visits with primary care providers are limited by practical factors like time usually 15-30 minutes. Thus, quicker concerns easily measured like feet or glucose levels take priority. Based on my clinical experience, the current best practices outlined by the ADA (ADA, 2017), and the findings of this dissertation, these five steps capture the multiple concerns experienced by patients with T2D. These 5 steps are left general here in this paper to allow clinical administration to outline the most efficient process for their setting.

1) Patients receive screenings of diabetes distress and depression based on previous scores. For example, a positive score warrants more regular screening while, a negative score may warrant more infrequent screening.

2) If a patient screens positively for depression or diabetes distress, a member of the behavioral health team will meet with the patient to understand the concern and its association with T2D. This can happen before or after the visit with the PCP.

3) During the visit with the BHP or PCP, they will assess the current stressors/resources and social support present in the patient's life. If the patient identifies a specific person as a support, invite the patient to bring the support person at the next visit. If the patient is unable to identify a support person, invite the patient to attend a group medical visit if available, where

other patients in a similar circumstance can provide that social support. If the patient identifies specific resources that are missing from their life, the BHP or PCP will either identify resources available in the community or bring in a member of the care staff well-versed in these resources.

4) The BHP or PCP can identify T2D management concerns and needed educational resources. They can provide information via handouts, ensuring that patients understand the information provided by having them teach it to the BHP, and other means to assess understanding and confidence to manage their diabetes.

5) Either through the electronic health record or through an in-person discussion, the BHP and PCP consult and discuss their concerns. If further support is needed for the patient, they can discuss best plans of action.

Electronic health records (EHR). As found in chapters 2 and 5, context including support persons and place of residence impacts T2D management and HbA1c percentages. However, it is not common to find templates within the EHR to place this information (Kotay, Huang, Jordan, & Korin, 2016). As PCP-patient interactions can be driven by the data-entry demands of the EHR, if templates do not exist to enter this data, this information may remain under-utilized or not even explored (Kotay et al., 2016). To ensure that providers are pursuing this information and that it is accessible to other providers that may see the patient, it is suggested that those within the operation world, such as clinic managers and information and technology specialists collaborate with BHPs and PCPs to create a template within the EHR that captures relevant information about social support/family life.

<div align="center">

Financial World

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The financial world of healthcare captures domains of price and value (Peek & Heinrich, 1995). In the context of the other worlds, this world balances the clinical and administrative

drivers to ensure financial sustainability. From this dissertation, two financial world policy

issues were identified: incentivizing family-based care and medical family therapist

reimbursement.

Financial Incentives for Family Care

Both chapter 2 and 5 suggest that support people play key roles in T2D management and

outcomes. It can be difficult to promote this kind of care unless there is financial reimbursement

for this type of visit. Current reimbursement requires a certified diabetes educator or credentialed

health professional to be the lead educator and covers 10 hours of initial education and 2 hours of

follow-up (Powers et al., 2015). Within this limited scope, family and other support individuals

may not be present. It is recommended here that the original billing option remain the same, but

that an additional reimbursement option is provided to incentivize the inclusion of patient-

identified support individuals to attend. Thus, reimbursement is still an option if only the patient

is present, and would be higher if the education is provided to support persons also in attendance

for the appointment.

Medical Family Therapist Reimbursement

Not all BHPs are covered by the largest insurance providers in the United States

(AAMFT, 2005). In particular, Marriage and Family Therapists/Medical Family Therapists

(MFTs/MedFTs) are not able to bill Medicare and not all states allow MFTs/MedFTs to bill

Medicaid (AAMFT, 2005; AAMFT, 2017). Chapter 5, specifically measured the impact of visits

of primarily MedFTs (4 of 5 BHPs included in this study). While further context is still needed to

understand the association between the BHPs in that study and outcomes, associations have been

found previously (Katon et al., 2010). As of 2015, over a third of Americans are covered by

Medicare (14%) or Medicaid (20%) (Kaiser Family Foundation, 2016). As for the time being the

Affordable Care Act (ACA) expanded coverage, there is greater need now more than ever to increase access to behavioral health services (Croft & Parish, 2013). It is proposed that to meet this need MFTs/MedFTs receive coverage and reimbursement to continue to meet this ever growing need.

Medical Family Therapy Implications

I believe that while great overlap exists between the types of BHPs currently practicing in medical settings, each contributes something significant and distinct to patient care. Due to my own training and experience, I give preference and coverage here to Medical Family Therapists (MedFTs). Their unique skillset derived from training in Systemic theory and the BPS-S meta-theory, as well as in research, assessment/treatment, administration and policy, I believe especially qualifies us to navigate the three worlds of healthcare.

MedFTs already adept in assessment and brief intervention are capable and qualified to work with both patients and patient families. In this process, we bridge the gap that can exist between a patient and their families allowing them to commune over a chronic condition like T2D. MedFTs need to engage not just in this clinical effort, but to undertake in the further research indicated in this chapter. In so doing, MedFTs can continually advocate for treatment to include the extended family system, and advocate for their role in patient care.

MedFTs also play an important role advocating within the operational world to promote EMRs that are family-systems friendly, and the consistency of the protocol suggested here. I also believe that MedFTs can play a key role in moving policy that continues to reinforce the need to not whole-patient, but whole family care within a medical setting. Finally, MedFTs must continue to advocate for their place within the reimbursement world. It is by demonstrating their

effectiveness within integrated care settings with complex chronic patients that this can be moved forward.

Conclusion

Type 2 diabetes is a complex illness that intersects the biological, psychological, and social worlds of patient's lives (Aamar, et al., 2015; Dreyfus, 2014). This complexity and the need for greater understanding within different contexts prompted my interest in this dissertation project. This project hoped to capture both place of residence and integrated behavioral health care (IBHC) settings, but due to sampling limitations focused primarily on IBHC settings. The findings of this entire dissertation project were presented in this chapter. Additionally, future research and implications are presented here organized using the three-world view of healthcare (Peek & Heinrich, 1995). Medical family therapists, trained to address this intersection, may especially be able to address these implications and research questions. While these efforts will not remove type 2 diabetes, they will promote more effective self-management, and continue to move healthcare in the direction of collaborative patient care independent of the context.

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Young-Hyman, D., de Groot, M., Hill-Briggs, F., Gonzalez, J.S., Hood, K., & Peyrot, M. (2016). Psychosocial care for people with diabetes: A position statement of the American Diabetes Association. *Diabetes Care*, 39(12), 2126-2140. doi: 10.2337/dc16-2053

APPENDIX A: UMCIRB APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914**⊙ · Fax **252-744-2284**⊙ · **www.ecu.edu/irb**

Notification of Initial Approval: Expedited

From:	Social/Behavioral IRB
To:	Daniel Blocker
CC:	
	Damon Rappleyea
Date:	11/11/2016
Re:	UMCIRB 16-001605
	Sugar High: Psychosocial factors of patients with type II diabetes in an integrated care setting.

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 11/11/2016 to 11/10/2017. The research study is eligible for review under expedited category #5, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Blocker Dissertation.docx	Surveys and Questionnaires
HIPAA waiver.pdf	HIPAA Authorization
HIPAA-Authorization-Template-10-28-13-2.docx	HIPAA Authorization
Informed-Consent-Document-Template-No-More-Than-Minimal-Risk-07-29-15.doc	Consent Forms
Project protocol_v2.docx	Study Protocol or Grant Application

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418

APPENDIX B: SITE APPROVAL

St. Mary's
MEDICAL GROUP | SCL Health
FAMILY MEDICINE CENTER

East Carolina University Internal Review Board   August 24, 2016

To whom it may concern,

This letter is to acknowledge that St. Mary's Family Medicine Center (SMFMC) is offering their support to conduct research within their facilities pending IRB approval. Specifically, SMFMC is giving permission to Dan Blocker, as primary investigator, to administer the study "Sugar high: Associations between emotional distress, self-efficacy, and social support". I am aware that Mr. Blocker will be recruiting participants and administering surveys to adult patients "on site" as a part of their routine medical visits. Recruitment, data collection, office space is limited to the parameters set forth in his study design approved by the dissertation committee and the IRB.

Sincerely,

Cindy Wilbur RN
Clinical Operations Manager
St. Mary's Family Medicine Center

2698 Patterson Road, Grand Junction, CO 81506   P 970-298-2800   F 970-298-6902   www.stmarygj.org

St. Mary's
MEDICAL CENTER | SCL Health

October 31, 2016

Western IRB
1019 39th Avenue SE, Suite 120
Puyallup, WA 98374-4789

To Whom It May Concern:

Re: Sugar High: Psychosocial factors of patients with Type II Diabetes in an integrated care setting (P.I. Dan Blocker, Behavioral Health Fellow, SMFM)

St. Mary's Hospital & Medical Center's Research Oversight Committee is aware of and has authorized application to WIRB as a participating site in the above referenced protocol.

If you have questions regarding this authorization, contact Joann Martinez, Privacy and Assistant Compliance Officer, by phone at 970-298-2497 or via e-mail at joann.martinez@sclhs.net.

Authorization by:

Brian Davidson, MD, President
FWA Signatory Official

Cc: Marty Jacobson, PhD, St. Mary's Hospital
    Cindy Wilbur, RN, St. Mary's Family Medicine
    Randall Reitz, PhD, LMFT, St. Mary's Family Medicine

APPENDIX D: WIRB APPROVAL

!

THE FOLLOWING WERE APPROVED!!   !   !!!

INVESTIGATOR:! Daniel J. Blocker MS	
961 Lakeside Drive apt 202	
Grand Junction, Colorado 81506	

BOARD ACTION DATE:	12/07/2016
PANEL:	5
STUDY APPROVAL EXPIRES:	12/07/2017
STUDY NUM:	1170223
WIRB PRO NUM:	20162659
ONLINE TRACKING:	
INVEST NUM:	217020
WO NUM:	1-979351-1
CONTINUING REVIEW:	Annually
SITE STATUS REPORTING:	Annually
INST. NUM:	

SPONSOR: St. Mary's Hospital
PROTOCOL NUM: None
AMD. PRO. NUM:
TITLE:
Sugar High: Psychosocial factors of patients with type II diabetes in an integrated care setting

APPROVAL INCLUDES:
Investigator
Protocol
Consent Form [IN0]
Authorization to Use and Disclose PHI [IN0]
Blocker Dissertation Questionnaire #15247922.0 - As Modified

WIRB APPROVAL IS GRANTED SUBJECT TO:
The Board requires that all subjects must be able to consent for themselves to be enrolled in this study. This means that you cannot enroll incapable subjects who require enrollment by consent of a legally authorized representative.

WIRB HAS APPROVED THE FOLLOWING LOCATIONS TO BE USED IN THE RESEARCH:
St. Mary's Family Medicine Residency, 1160 Patterson Rd #42, Grand Junction, Colorado 81506

If the PI has an obligation to use another IRB for any site listed above and has not submitted a written statement from the other IRB acknowledging WIRB's review of this research, please contact WIRB's Client Services department.

ALL WIRB APPROVED INVESTIGATORS MUST COMPLY WITH THE FOLLOWING:

1. Conduct the research in accordance with the protocol, applicable laws and regulations, and the principles of research ethics as set forth in the Belmont Report.

2. Although a participant is not obliged to give his or her reasons for withdrawing prematurely from the clinical trial, the investigator should make a reasonable effort to ascertain the reason, while fully respecting the participant's rights.

APPENDIX E: CONSENT WAIVER FOR RECRUITMENT

UMCIRB #16-001605

PI: Daniel Blocker

University and Medical Center Institutional Review Board
Application for Waiver of Authorization

1. Select the types Protected Health Information (PHI) to be collected:
   [ ] Billing records   [ ] Hospital/medical records (in and out patient)
   [ ] Mental Health records   [ ] Lab, pathology and/or radiology results
   [ ] Physician/clinic records   [ ] PHI previously collected for research purposes
   [X] other: St. Mary's Family Medicine Center Residency

2. Select the responses below for all the identifiers to be captured in the research study:
   [X] Postal address   [ ] Health plan numbers   [ ] Telephone number
   [X] Account /medical record number [X] Name   [ ] Internet Protocol (IP) address number
   [ ] Certificate/license number   [ ] Name of employers   [ ] Web universal resource locator (URL)
   [ ] Name of relatives   [ ] Photographic images   [ ] Fax number
   [ ] E-mail address   [ ] Finger or voice prints
   [ ] Any device or vehicle identifiers and serial numbers, including license plate numbers
   [X] Date of birth, admission date, discharge date, date of death, all ages over 89
   [ ] Any other unique identifying number, characteristic or code

   Please note: Pursuant to North Carolina law, **social security numbers are not permitted to be collected in reliance on this waiver of authorization.** Unless social security numbers are required by law to be collected, the study subject must be given a written disclosure which (i) states that providing social security number is not required; and (ii) describes the purpose for which the social security number will be used.

3. Select the response below on how participant's Protected Health Information (PHI) is protected against improper use or disclosure:
   [ ] Research team members will sign a Confidentiality Agreement.
   [X] The information will not be shared unless it is stripped of all 18 identifiers.
   [ ] The information will be shared with a random code as outlined in the research protocol.

4. Explain the data management measures to protect the confidentiality of participant's data such as storage and access issues, including (i) safeguards for storage of any identifiers on computer workstations; and (ii) safeguards for storage of any identifiers on laptop computers, flash drives or any other portable electronic device, as applicable.

   > The purpose of this waiver is to receive permission to review charts to identify potential patients that meet study inclusion criteria. If the patient meets criteria, a note will be added to the schedule indicating to the primary investigator to invite the potential participant to the study.

5. Data will be stripped of all identifiers upon completion of:
   [ ] subject participation   [X] data analysis
   [ ] FDA approval   [ ] specimen processing
   [ ] other (please specify):
                                OR
   Identifiers will be retained indefinitely because:
   [ ] the study is longitudinal
   [ ] of federal requirements (specify):
   [ ] other (specify):

6. Provide any additional explanations on why the use/disclosure of PHI involves no more than minimal risk to participant privacy
   > The use of chart review by the primary investigator will only be used for recruitment purposes. PHI obtained through this will not be linked to survey or data.

7. Explain why the participant's Authorization cannot be attained and, therefore, research cannot be practicably carried out without the Waiver of Authorization.

   > The purpose of accessing PHI information is for recruitment. We cannot receive participant authorization before identifying potential participants that meet recruiting criteria.

8. Select the response or explain why research can not practicably be conducted without the participant's PHI.

[☒] PHI is needed to identify eligibility for the study
[☐] PHI is the focus of the study (e.g. – epidemiological studies)
[☐] Other (specify):

I verify that protected health information will not be re-used or disclosed to any other person or entity, except as required by law, research oversight, or those uses outlined above. I will only collect the information as specified above, and limit access to that information to the greatest extent possible as previously described. I will destroy the identifier at the earliest opportunity consistent with the conduct of the research as specified above.

_____   10/5/2016
Principal Investigator's signature   Date

Title of Study: *Sugar High: Psychosocial factors of patients with type II diabetes in an integrated care setting*

APPROVED
Dec 07, 2016
WIRB®

East Carolina University

Informed Consent to Participate in Research
Information to consider before taking part in research that has no more than minimal risk.

TITLE:	Sugar High: Psychosocial factors of patients with type II diabetes in an integrated care setting
PROTOCOL NO.:	None WIRB® Protocol #20162659
SPONSOR:	St. Mary's Hospital
INVESTIGATOR:	Dan Blocker, MS, MFTC Child Development & Family Relations 108 Rivers Building, Mail Stop 505, East Carolina University Greenville, NC 27858 United States
STUDY-RELATED PHONE NUMBER(S):	Dan Blocker, MS, MFTC (252) 737-1415 (801) 970-5760

Researchers at East Carolina University (ECU) and St. Mary's Family Medicine Residency study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?
The purpose of this research is to understand your experience with type 2 diabetes and the care you receive at the St, Mary's Family Medicine Residency. You are being invited to take part in this research because you are an adult resident of the Western Slope of Colorado with a diagnosis of type 2 diabetes. The decision to take part in this research is yours to make. By doing this research, we hope to learn more about your feelings surrounding diabetes, how supported you feel and how confident you feel about diabetes management, and how St. Mary's Family Medicine is helping.

If you volunteer to take part in this research, you will be one of about 150 people to do so.

Are there reasons I should not take part in this research?
The only reasons you should not volunteer is if you are below the age of 18 or have experienced serious side effects due to your diabetes including renal failure, amputations, blindness, or stroke.

What other choices do I have if I do not take part in this research?
You can choose not to participate.

Where is the research going to take place and how long will it last?
The research will be conducted at the St. Mary's Family Medicine Residency in the waiting area or after meeting with your provider for a regularly scheduled visit. The total amount of time you will be asked to volunteer for this study is for 30 minutes one time only.

What will I be asked to do?
You will be asked to do the following:
- You will be asked to complete a survey
- You will be asked to give the researcher permission to access your chart to obtain your last recorded HbA1c, and demographic information including zip code, age, gender, race, and insurance type.

What might I experience if I take part in the research?
We don't know of any risks (chances of harm) associated with this research. Any risks that may occur with this research are no more than what you would experience in everyday life. We don't know if you will benefit from taking part in this study. There may not be any personal benefit to you, but the information gained by doing this research may help others in the future.

Will I be paid for taking part in this research?
There will be no compensation for participation in this survey.

Will it cost me to take part in this research?
It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?
St. Mary's Hospital and Family Medicine Practice and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:
- Any agency of the federal, state, or local government that regulates human research. This includes the Department of Health and Human Services (DHHS), the Colorado Department of Health, and the Office for Human Research Protections.
- The Western IRB Board (WIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.
- Personnel designated by St. Mary's Family Medicine Residency

Absolute confidentiality cannot be guaranteed because of the need to give information to these people. The results of this research study may be presented at meetings or in publications. Your identity will not be disclosed in those presentations.

How will you keep the information you collect about me secure? How long will you keep it?
Electronic data will be kept for the duration of the study on a secure server utilized by St. Mary's Family Medicine Residency. This data will be stripped of any identifying information. The written surveys and

consent forms will be kept in a locked file cabinet for five years, per IRB requirements. After this duration, the on-site behavioral health supervisor will dispose of the paper forms via St. Mary's Family Medicine Residency confidential waste system. After removing all identifying information, the data collected from these surveys may be used in future research without anyone knowing it is information from the participant.

What if I decide I don't want to continue in this research?
Your participation in this study is voluntary. You may decide not to participate or you can stop at any time after you have started. Your decision will not result in any penalty or loss of benefits to which you are entitled. There will be no consequences if you stop and you will not be criticized.

Your participation in this study may be stopped at any time by the Principal Investigator without your consent for any reason.

Who should I contact if I have questions?
The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at (252) 737-1415 or (801) 970-5760 (days, between 5pm and 8pm MST) if you have concerns or complaints about the study or if you have a research-related issue.

If you have questions about your rights as someone taking part in research or would like to ask a question or report a complaint or concern about this research study, you may call Western Institutional Review Board® (WIRB®) at 1-800-562-4789 or 360-252-2500, write to 1019 39th Avenue SE Suite 120, Puyallup, Washington 98374-2115, or email: Help@wirb.com.

WIRB is a group of people who perform independent review of research.

WIRB will not be able to answer some study-specific questions. However, you may contact WIRB if the research staff cannot be reached or if you wish to talk to someone other than the research staff.

I have decided I want to take part in this research. What should I do now?
The person obtaining informed consent will ask you to read the following and if you agree, you should sign this form:

- I have read all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that I can stop taking part in this study at any time.
- By signing this informed consent form, I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

_____

Participant's Name (PRINT)   **Signature**   **Date**

Person Obtaining Informed Consent: I have conducted the initial informed consent process. I have orally reviewed the contents of the consent document with the person who has signed above, and answered all of the person's questions about the research.

Person Obtaining Consent (PRINT)   **Signature**   **Date**

APPENDIX G: SURVEY

Questionnaire ID

How many years has it been since your diabetes diagnosis?

Over the last two weeks:

	All of the time	Most of the time	More than half the time	Less than half the time	Some of the time	No time
I have felt cheerful and in good spirits.	◯	◯	◯	◯	◯	◯
I have felt calm and relaxed.	◯	◯	◯	◯	◯	◯
I have felt active and vigorous.	◯	◯	◯	◯	◯	◯
I woke up feeling fresh and rested.	◯	◯	◯	◯	◯	◯
My daily life has been filled with things that interest me.	◯	◯	◯	◯	◯	◯

Select how much each item has bothered you over the last month.

	Not a problem	A slight problem	A moderate problem	Somewhat serious problem	A serious problem	A very serious problem
Feeling that diabetes is taking up too much of my mental and physical energy every day	◯	◯	◯	◯	◯	◯
Feeling that my doctor doesn't know enough about diabetes and diabetes care	◯	◯	◯	◯	◯	◯
Feeling angry, scared, and/or depressed when I think about living with diabetes	◯	◯	◯	◯	◯	◯
Feeling that my doctor doesn't give me clear enough directions on how to manage my diabetes	◯	◯	◯	◯	◯	◯
Feeling that I am not testing my blood sugars frequently enough	◯	◯	◯	◯	◯	◯
Feeling that I am often failing with my diabetes routine.	◯	◯	◯	◯	◯	◯
Feeling that friends or family are not supportive enough of self-care efforts (e.g. planning activities that conflict with my schedule, encouraging me to eat the "wrong" foods).	◯	◯	◯	◯	◯	◯
Feeling that diabetes controls my life	◯	◯	◯	◯	◯	◯

Select how much each item has bothered you over the last month.

	Not a problem	A slight problem	A moderate problem	Somewhat serious problem	A serious problem	A very serious problem
Feeling that my doctor doesn't take my concerns seriously enough.	❍	❍	❍	❍	❍	❍
Not feeling confident in my day-to-day ability to manage diabetes.	❍	❍	❍	❍	❍	❍
Feeling that I will end up with serious long-term complications, no matter what I do.	❍	❍	❍	❍	❍	❍
Feeling that I am not sticking closely enough to a good meal plan.	❍	❍	❍	❍	❍	❍
Feeling that friends or family don't appreciate how difficult living with diabetes can be.	❍	❍	❍	❍	❍	❍
Feeling overwhelmed by the demands of living with diabetes.	❍	❍	❍	❍	❍	❍
Feeling that I don't have a doctor who I can see regularly enough about my diabetes.	❍	❍	❍	❍	❍	❍
Not feeling motivated to keep up my diabetes self-management.	❍	❍	❍	❍	❍	❍
Feeling that friends or family don't give me the emotional support that I would like.	❍	❍	❍	❍	❍	❍

In general I believe that I:

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
know what part(s) of taking care of my diabetes that I am dissatisfied with.	❍	❍	❍	❍	❍
am able to turn my diabetes goals into a workable plan.	❍	❍	❍	❍	❍
can try out different ways of overcoming barriers to my diabetes goals.	❍	❍	❍	❍	❍
can find ways to feel better about having diabetes.	❍	❍	❍	❍	❍
know the positive ways I cope with diabetes-related stress.	❍	❍	❍	❍	❍
can ask for support for having and caring for my diabetes when I need it.	❍	❍	❍	❍	❍
know what helps me stay motivated to care for my diabetes.	❍	❍	❍	❍	❍
know enough about myself as a person to make diabetes care choices that are right for me.	❍	❍	❍	❍	❍

How helpful have the following people been in your diabetes care

	Not available	Not at all helpful	sometimes helpful	generally helpful	very helpful	extremely helpful
your spouse/partner	○	○	○	○	○	○
your partner's/spouse's family	○	○	○	○	○	○
your partner's/spouse's friends	○	○	○	○	○	○
regular (primary care) physician/doctor	○	○	○	○	○	○
church member/minister	○	○	○	○	○	○
nutritionist/dietician	○	○	○	○	○	○
professional agencies (public health, social services, mental health)	○	○	○	○	○	○
Urgent/emergency care physician	○	○	○	○	○	○
professional helpers (nurses, pharmacist, social workers)	○	○	○	○	○	○
your own children	○	○	○	○	○	○
your relatives	○	○	○	○	○	○
family members with diabetes	○	○	○	○	○	○
your friends	○	○	○	○	○	○
friends with diabetes	○	○	○	○	○	○

On how many of the last seven days, have you:

	0	1	2	3	4	5	6	7
followed a healthful eating plan	○	○	○	○	○	○	○	○
eaten five or more servings of fruits and vegetables	○	○	○	○	○	○	○	○
eaten high fat foods such as red meat or full-fat dairy products	○	○	○	○	○	○	○	○
participated in at least 30 minutes of physical activity	○	○	○	○	○	○	○	○
participated in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work	○	○	○	○	○	○	○	○
taken your recommended diabetes medication	○	○	○	○	○	○	○	○
taken your recommended insulin injections	○	○	○	○	○	○	○	○
taken the recommended number of diabetes pills	○	○	○	○	○	○	○	○

In the last 3 months, have you:
- ❑ talked with your provider about diabetes care
- ❑ talked with your provider and a therapist/counselor during the same visit
- ❑ met with a just a therapist/counselor at our clinic
- ❑ attended our diabetes/wellness group
- ❑ received a call from our clinic about your diabetes medication
- ❑ received nutrition information from Timi or Ginny
- ❑ attended a cooking class at our clinic
- ❑ met with Timi outside of the clinic for community health visits

How often are you doing any of the following?

	Never	Sometimes	About half the time	Most of the time	Very Frequently
I talk to others online about my diabetes.	○	○	○	○	○
I feel supported and encouraged by others online	○	○	○	○	○
It is helpful going online and seeing that I am not alone with my diabetes.	○	○	○	○	○
I go online to get information and education about my diabetes.	○	○	○	○	○
When I have diabetes symptoms that worry me, I look online.	○	○	○	○	○
Advice and support from others online helps me manage my diabetes.	○	○	○	○	○

Thank you for completing the survey. Please return this to the front desk

APPENDIX H: PERMISSION TO USE MEASURES

Diabetes Self-Management Behaviors

Deborah Toobert
to me

Feb 28 (8 days ago)

Dear Dan,

Thank you for your payment of $25 for permission to use the Summary of Diabetes Self Care Activities (SDSCA) in your study. Now that we have received your payment, you have our permission to use the English version of the Summary of Diabetes Self-Care Activities Questionnaire in your research project and we will be able to provide answers to any questions you may have.   We have attached the 2000 Diabetes Care article with the SDSCA psychometric information. At the end of the article, there is an appendix with the English version of the questionnaire, and the scoring information. We have also attached a user-friendly copy of the English version of the SDSCA instrument.

If you need a translation of the SDSCA please contact me first, as the SDSCA has been translated into many languages.

Please be sure to check our website first for the most frequently asked questions:

http://www.ori.org/sdsca

We wish you every success with your research,
Deborah

DDS-17

Dr. Fisher,
I am working on my dissertation, and will be examining diabetes distress within rural populations. I was hoping to have permission to use the DDS-2 or DDS-17. The length of the survey as it stands is why I am weighing both DDS-2 and DDS-17 as options. I look forward to hearing from you.
Dan Blocker, MS
PhD Candidate
St. Mary's Marriage and Family Fellow
d.joseph.blocker@gmail.com

Fisher, Lawrence <Larry.Fisher@ucsf.edu>
to me

7/7/16

Hi

Yes, feel free to use the scale. I recommend NOT using the DDS-2. Although the DDS is longer, it will give you far more reliable information than the DDS-2. In fact, we no longer use the DDS2 in our work.

Good luck.

L.
Lawrence Fisher, Ph.D., ABPP
Professor Emeritus
Department of Family and Community Medicine

WHO-

Per Bech <Per.Bech@regionh.dk>   7/7/16

to me

Dear Dan Blocker

Thank you for your e-mail concerning use of the WHO-5.
This questionnaire is in the public domain and may freely be used without any charge for research purposes with referencing to:

Bech P. Clinical psychometrics. Oxford, Wiley-Blackwell 2012.

**Topp CW, Østergaard SD, Søndergaard S, Bech P. The WHO-5 Well-being Index:
A systematic review of the Literature. Psychotherapy & Psychosomatics
2015;84(3):167-76.**

As for information about the WHO-5: we have just recently published a review describing its properties and use in different connections. I'm attaching this review together with its supplementary material.

On behalf of Professor Per Bech and with kind regards
Lone Lindberg

Psychiatric Research Unit
Mental Health Centre North Zealand, University of Copenhagen
Dyrehavevej 48, DK 3400-Hillerød
Tel.: +45 38 64 30 95   Fax: +45 38 64 30 99

5

Diabetes Empowerment Scale

Dr. Anderson,
I am working on my dissertation and looking to use the diabetes empowerment scale-short form. I am seeking permission to use this assessment. Thank you in advance for your reply.
Dan Blocker, MS
PhD Candidate
St. Mary's Marriage and Family Fellow
d.joseph.blocker@gmail.com

Robert Anderson <boba@umich.edu>   7/7/16 ☆ ↩ ▾
to me ▾

Hi Dan,
You are welcome to download <www.med.umich.edu/mdrtc> and use, translate or revise any or all of our diabetes questionnaires. As long as you acknowledge the source in any articles or reports emanating from their use. Please understand that any changes you make to one our questionnaires requires you establish the psychometric properties of the revised questionnaire. The directions for scoring the instruments and the references describing the psychometric properties of the questionnaires can also be found on our web site. The short article describing the psychometric properties of the DES-SF can be found on the website itself. Please feel free to contact me if you have have further questions. <boba@umich.edu>
Under the title click "tools", then select "Survey Instruments"

Diabetes Social Support

Kerry,
unfortunately, and as I am sure you are well aware, there are not many existing great measures that address in adequate depth the social support provided by not only family, but by other members of each person's support team. It appears that others have adapted the Dunst scale as well. I appreciate that not only have you begun to examine multiple systems, but have examined them specifically to diabetes care. I would like your permission to build off the modified version you created in application to rural population in Western Colorado.

Dan Blocker, MS
PhD Candidate
St. Mary's Marriage and Family Fellow
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Littlewood, Kerry <littlewood@usf.edu>   7/7/16 ☆ ↩ ▾
to me ▾

Hi Dan. Thanks so much for the email. Of course you have my permission and please let me know how I can best assist you. Would love to help out in any way you need. Thanks. Kerry

Kerry Littlewood, Ph.D., MSW

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