RELATIONSHIPS AMONG SELF-EFFICACY, SOCIAL SUPPORT, SOCIAL PROBLEM-SOLVING, AND SELF-MANAGEMENT BEHAVIORS OF PEOPLE LIVING WITH TYPE 2 DIABETES IN RURAL ALABAMA

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ABSTRACT

Self-management behaviors are the cornerstone for control of type 2 diabetes mellitus (T2DM). Patients living with T2DM manage their own care on a daily basis using a variety of self-care strategies. Rural people living with diabetes are diagnosed later and receive less than optimal care compared to people living with T2DM in urban areas. Research evidence supports a relationship between self-efficacy and self-management behaviors of people living with T2DM. Determining mediators of the relationship between self-efficacy and self-management can provide direction for development of interventions to improve participation in self-management behaviors, which can in turn improve diabetes outcomes.

The purpose of the current study was to examine whether social support and social problem-solving were mediators of the relationship between self-efficacy and diabetes self-management behaviors in rural Alabamians living with T2DM. Additionally, relationships among self-efficacy, social support, social problem-solving, and diabetes self-management behaviors in rural Alabamians living with T2DM were examined in this mediational study. A descriptive, correlational design was used to explore the relationships examined in the study, based on the theory of stress, appraisal, and coping by Lazarus and Folkman. A convenience sample of 152 rural Alabamians living with T2DM participated in the study. Participants ranged in age from 19 to over...
81 with the majority (56.6%) being between 51 and 70. The majority of the sample was African American (58.6%), female (65.8%), and had at least a high school education (57.9%). Concerning marital status, 33.6% were single and 36.8% were married. Most (59.3%) of the participants had been diagnosed with T2DM for 10 years or less.

Self-efficacy was found to be a strong predictor of diabetes self-management. The effect of social support on diabetes self-management differed among men and women in the sample. Social support and social problem-solving were significantly associated with diabetes self-management in men in this sample. Multiple regression was used in four steps of mediation testing. Social support and social problem-solving were not mediators of the relationship between self-efficacy and diabetes self-management in this sample of people living with T2DM in rural Alabama.

Keywords: Type 2 diabetes mellitus, self-efficacy, social support, social problem-solving, self-management
DEDICATION

I dedicate this work to my family who has supported me throughout this process in so many ways. Thank you especially to my parents, Glenn and Barbara Weeks, for your enduring support and encouragement. Your love and confidence in me has always made me believe I could achieve any goal. Most of all, thank you to my husband, Chuck, and our two boys, Corey and Carter, for listening, supporting, encouraging, and loving me. You have suffered and rejoiced with me throughout this process. I could not have made it through without you.
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<td>ADA</td>
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<td>ADPH</td>
<td>Alabama Department of Public Health</td>
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<td>Alabama Rural Health Association</td>
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<td>Statistical Package for the Social Sciences</td>
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<td>T2DM</td>
<td>Type 2 diabetes mellitus</td>
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<td>TDAQ</td>
<td>The Diabetes Activities Questionnaire</td>
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CHAPTER 1

INTRODUCTION

Diabetes mellitus (DM) is a chronic disease that affects more than 25 million people in the United States. In addition to this number, an estimated 79 million have prediabetes. Diabetes is the seventh leading cause of death in the United States. Those at highest risk for the disease are African Americans. Type 2 diabetes mellitus (T2DM) is the most common form and accounts for 90-95% of all cases (United States Department of Health and Human Services [USDHHS], Centers for Disease Control [CDC], 2011).

The prevalence of T2DM is higher in rural areas than in urban settings (Dabney & Gosschalk, 2003; Gamm, Hutchison, Bellamy, & Dabney, 2002). The state of Alabama ranks third in the nation for percentage of adults living with diabetes (Levi, Vinter, Laurent, & Segal, 2010). Of the 40 counties with the highest percentage of diagnosed diabetes cases in Alabama, 35 are rural counties (CDC, 2007). Alabama has the fifth highest diabetes mortality rate among all fifty states (Alabama Department of Public Health [ADPH], 2007).

A large percentage of the population in rural south Alabama counties is comprised of those at highest risk for T2DM: African Americans (ADPH, 2007). The percentage of African Americans living with diabetes is almost twice as high as for Caucasian, non-Hispanic Americans; 14.7% for African Americans compared to 9.8% for Caucasians. The most prevalent type of diabetes in African Americans is T2DM. The incidence of
diabetes complications and disabilities is also higher in African Americans than Caucasians (USDHHS, CDC, 2011). Important factors contributing to poor outcomes for African Americans living with T2DM include insufficient self-management skills and lack of adherence to a self-management behavior plan (Egede, Strom, Durkalski, Mauldin, & Moran, 2010). Inclusion of African Americans living with T2DM in research studies is important considering the high incidence of diabetes and diabetes complications among this population.

While research has shown that African Americans recognize the value of research and the possibility of improved treatments for the African American community from research, several barriers to research participation exist for this population (Farmer, Jackson, Camacho, & Hall, 2007). Barriers include mistrust of academic and research institutions, past negative encounters with health care providers, inadequate information about the study, and belief that research findings will be used to reinforce negative stereotypes about African Americans (Scharff, Mathews, Jackson, & Hoffsuemmer, 2010).

Management of T2DM requires knowledge, skill, and long-term attention to multiple self-care and preventive behaviors. Patients living with T2DM manage their own care on a daily basis using a variety of self-care strategies. Rural people living with diabetes are diagnosed later and receive less than optimal care compared to people living with T2DM in urban areas (Dabney & Gosschalk, 2003). Further, self-care management can be especially challenging for those living in rural areas with limited access to healthcare providers and diabetes education (O’Brien & Denham, 2008).
Self-management behaviors are the cornerstone for control of T2DM. Self-management is defined as a patient’s ability to understand their health condition and manage key elements of their care (Harvey et al., 2008). The American Association of Diabetes Educators (AADE) identified seven behaviors as key to diabetes self-management. These behaviors include physical activity, healthy eating, taking medications as prescribed, self-monitoring of blood glucose, problem solving for blood glucose fluctuations, reducing risk of complications, and psychosocial adaptation (Peeples, Tomky, Mulcahy, Peyrot, & Siminerio, 2007). Improvements in glycemic control are linked to participation in these self-management activities. Effective self-management contributes to blood glucose control, lowered blood pressure and cholesterol, avoidance of complications, and improved quality of life (Funnell et al., 2007). Diet, exercise, blood glucose self-monitoring, and taking medications are related to significant improvements in metabolic control (Jones et al., 2003; Sousa, Zauszniewski, Musil, Lea, & Davis, 2005).

Self-efficacy beliefs influence self-management behaviors of people living with T2DM (Wu et al, 2007). People living with T2DM vary regarding their self-efficacy in self-management behaviors (King et al., 2010; Sousa et al., 2005; Sturt, Whitlock, & Hearnshaw, 2006). Individuals with high levels of self-efficacy expect successful goal attainment, whereas those with low levels of self-efficacy doubt their ability to reach goals (Pajares, 2002). Stronger self-efficacy beliefs are positively related to participation in diabetes self-management behaviors (King et al.; Krichbaum, Aarestad, & Buethe, 2003).
Social support and social problem-solving may be mediators of the relationship between self-efficacy and self-management behaviors of people living with T2DM (Lazarus & Folkman, 1984). Mediator variables intervene between independent and dependent variables and account for their relationship (Polit & Beck, 2008). Research evidence supports a relationship between self-efficacy and self-management behaviors of people living with T2DM. As coping resources, social support and social problem-solving are viewed as mediators between the cognitive appraisal of stressful situational demands and the response to those demands (D’Zurilla & Nezu, 2007). Whether social support and social problem-solving mediate the relationship between self-efficacy and self-management behaviors for T2DM has not been previously studied. Determining mediators of this relationship can provide direction for development of interventions to improve participation in self-management behaviors, which can in turn improve diabetes outcomes.

A relationship between social support and self-efficacy has been established in previous research. People living with T2DM who have adequate support demonstrate higher diabetes self-efficacy than those without adequate support (Coffman, 2008). Low self-efficacy and low levels of social support have been identified as barriers to diabetes self-management (Glasgow, Toobert, and Gilette, 2001).

The relationship between social problem-solving and self-efficacy is supported both theoretically and empirically. Social problem-solving supports effective coping and in turn can increase a person’s self-efficacy over the long term (D’Zurilla & Nezu, 2007). Both situational coping and competence to perform behaviors are enhanced through social problem-solving (D’Zurilla & Nezu). For example, a group diabetes self-
management education intervention that included problem-solving exercises found improved self-efficacy among participants (Utz et al., 2008). Further, in a study to examine coping strategies in patients with eating disorders, patients with higher problem-solving scores also had higher perceived self-efficacy, whereas those with lower problem-solving scores had lower perceived self-efficacy (Lobera, Estebanez, Fernandez, Bautista, & Garrido, 2009). Social support and self-efficacy also were found to predict increased use of problem-focused coping in patients with early psychosis (Macdonald, Pica, Mcdonald, Hayes, & Baglioni, 1998).

Both social support and social problem-solving are shown to be effective approaches to improve diabetes self-management behaviors (Glasgow, Fisher, Skaff, Mullan, & Toobert, 2007; Nam, Chesla, Stotts, Kroon, & Janson, 2011; Tang, et al. 2005). Participation in self-management behaviors, including physical activity, healthy food choices, taking medications, and glucose monitoring are improved with social support (Shaw, Gallant, Riley-Jacome, & Spokane, 2006).

In addition to social support, people living with T2DM must develop skills necessary for self-management of their disease. The AADE identified problem-solving as a core self-management outcome (Mulcahy et al., 2003). Social problem-solving is the process of dealing with problems that occur in a person’s natural environment and includes intrapersonal, interpersonal, and environmental issues (D’Zurilla, Nezu, & Maydeu-Olivares, 2004). Problem-solving is necessary to translate knowledge about diabetes into effective self-care management (Bodenheimer, Lorig, Holman, & Grumbach, 2002). Further study is needed to more accurately define relationships among

In summary, people living with T2DM experience varying degrees of self-efficacy and participate in diabetes self-management behaviors at varying levels. Based on the stress, appraisal, and coping theory of Lazarus and Folkman, social support and social problem-solving may be mediators of the relationship between self-efficacy and diabetes self-management behaviors. Existing literature has yet to examine social support and social problem-solving as potential mediators of this relationship.

Purpose of the Study

The purpose of the current study is to examine whether social support and social problem-solving are mediators of the relationship between self-efficacy and diabetes self-management behaviors in rural Alabamians living with T2DM. Relationships among self-efficacy, social support, social problem-solving, and diabetes self-management behaviors in rural Alabamians living with T2DM will be examined in this mediational study.

Significance

Diabetes is a primary area of focus for Healthy People 2020. Objectives associated with diabetes address the importance of diabetes self-management. The Healthy People 2020 goal is to reduce occurrence of this disease, decrease the economic burden associated with diabetes, and improve quality of life for people living with
diabetes. Objectives to meet these goals include increased participation in diabetes self-management practices (USDHHS, 2011).

Another national priority set forth by Healthy People 2020 is elimination of health disparities (USDHHS, 2011). Disparities in access to health care may be related to lack of available care or insurance coverage or cost of care. Lack of access due to these factors leads to delay in receiving care, development of complications, and unnecessary hospitalizations (USDHHS, 2011).

Rural Alabama populations, largely composed of African Americans, are at greater risk for poor health, yet experience numerous obstacles in accessing health care. Knowledge generated from this study may be useful in identifying interventions that can improve participation in diabetes self-management behaviors and facilitate meeting the Healthy People 2020 diabetes goal.

Numerous complications are associated with diabetes including: heart disease, stroke, hypertension, blindness, kidney failure, neuropathy, and amputations (USDHHS, CDC, 2011). Diabetes self-management behaviors can help people living with diabetes decrease the incidence of these complications (AADE, 2006). This study may identify factors which promote self-management behaviors. Once such factors are identified, interventions can be developed by healthcare professionals that are predictably effective in promoting self-management and decreasing complications.

People living with T2DM spend only a small amount of time with healthcare professionals (Barnes et al., 2004). The ability to problem-solve for changes in daily management is a necessary skill for this population (Mulcahy et al., 2003). Family, friends, and coworkers play an important role in diabetes management and outcomes.
These resources are especially important for those living in rural areas who have limited access to care (O’Brien & Denham, 2008). Social support and social problem-solving may improve the self-management skills of people living with T2DM. An understanding of the potential mediational effects of social support and social problem-solving will aid healthcare professionals as they assist patients to coordinate diabetes care and resources.

In academia, nurse educators must provide information about diabetes as a disease process. In addition to the physiological basis for the disease, educators also address psychosocial aspects of diabetes management. Findings from this study may be used to discuss methods to improve self-efficacy and therefore, self-management behaviors through social support and social problem-solving.

Research Questions

The current study is designed to answer the following research question: Do social support and social problem-solving mediate the relationship between self-efficacy and diabetes self management behaviors of rural Alabamians living with T2DM? Questions related to these relationships are based upon the four steps of mediation identified by Baron and Kenny (1986). The first step is to verify that a relationship exists between the independent and dependent variable. Second, a determination is made whether the independent variable is correlated with each mediator. Third, a regression equation is done to test the effect of the potential mediating variable on the dependent variable while controlling for the independent variable. The fourth step can be estimated at the same time as the third step and involves testing the effect of the independent
variable on the dependent variable while controlling for each potential mediating variable (Kenny, 2009).

*Mediation Testing*

The study will answer the following questions using the mediation guidelines of Baron and Kenny:

**Step 1:** Examine the relationship between the independent variable and the outcome variable:

1. What is the relationship between self-efficacy and diabetes self-management behaviors in people living with T2DM in rural Alabama?

**Step 2:** Examine the relationship between the independent variable and each potential mediator:

2. What is the relationship between self-efficacy and social support in people living with T2DM in rural Alabama?

3. What is the relationship between self-efficacy and social problem-solving in people living with T2DM in rural Alabama?

**Step 3:** Examine the relationship between each potential mediator and the outcome variable, controlling for the independent variable:

4. What is the relationship between social support and diabetes self-management behaviors, controlling for self-efficacy, in people living with T2DM in rural Alabama?
5. What is the relationship between social problem-solving and diabetes self-management behaviors, controlling for self-efficacy, in people living with T2DM in rural Alabama?

Step 4: Examine the relationship between the independent variable and the outcome variable, controlling for each potential mediator:

6. What is the relationship between self-efficacy and diabetes self-management behaviors, controlling for social support, in people living with T2DM in rural Alabama?

7. What is the relationship between self-efficacy and diabetes self-management behaviors, controlling for social problem-solving, in people living with T2DM in rural Alabama?

8. What is the relationship between self-efficacy and diabetes self-management behaviors, controlling for social support and social problem-solving, in people living with T2DM in rural Alabama?

Theoretical Framework

The theoretical framework guiding this study is Lazarus and Folkman’s theory of stress, appraisal, and coping (Lazarus & Folkman, 1984). This theory describes the processes individuals use to adapt to stressful situations. Lazarus and Folkman describe primary and secondary cognitive appraisal processes for evaluating stressful life situations. Primary appraisal is a person’s perception of a stressor’s relevance to personal values, beliefs, and intentions (Lazarus, 1999). Secondary appraisal refers to the person’s cognitive evaluation of resources and coping mechanisms available to deal with the
stressor (Lazarus). Secondary appraisal also involves evaluating whether a coping resource will accomplish the desired response and the likelihood of being able to apply coping mechanisms effectively. The concept of secondary appraisal parallels Bandura’s self-efficacy concept which includes outcome expectations and efficacy expectations. Outcome expectations refer to the belief that a behavior will lead to a certain outcome. Efficacy expectations refer to a person’s belief that the behavior required to achieve certain outcomes can be performed (Lazarus & Folkman). The model by Lazarus and Folkman also describes coping resources that function as mediating factors and affect the outcome of a situation. Mediator variables intervene and explain the relationship between the stressor and the outcome. Both the processes of cognitive appraisal and coping are affected by antecedents. Antecedents are personal and situational variables that affect primary and secondary appraisal and coping resources.

Selected constructs from Lazarus and Folkman’s stress, appraisal, and coping theory will provide the framework for this study of the role of social support and social problem-solving as mediators of the relationship between self-efficacy and diabetes self-management behaviors of rural Alabamians living with T2DM. A model of study variables is shown in Figure 1. According to Lazarus and Folkman (1984), self-efficacy is a method of secondary appraisal that influences coping. Persons with positive self-efficacy beliefs will appraise themselves as able to cope, thereby promoting their coping ability. Persons with negative self-efficacy beliefs will appraise themselves as being unable to cope, thereby inhibiting their coping ability.
Social support is a coping resource that if used, will result in positive adaptational outcomes (Lazarus & Folkman, 1984). Social support has been linked to improvements in diabetes management, self-efficacy, satisfaction with self, and quality of life (Klug,
Types of social support include tangible, emotional, and informational (Lazarus & Folkman).

Lazarus and Folkman (1984) describe another coping resource, problem-solving, as the ability to analyze situations, generate courses of action, weigh the courses of action with respect to outcomes, and implement the appropriate action. Problem-solving is a recommended behavior for daily diabetes self-management (Mulcahy et al., 2003).

Problem-solving has been associated with improved diabetes self-management behaviors and self-efficacy (Glasgow et al., 2007; Glasgow, Toobert, Barrera, & Strycker, 2004; Hill-Briggs et al., 2007). Ineffective social problem-solving styles have been related to poor glycemic control (Hill-Briggs et al., 2006). Additionally, the effect of race, age, gender, socioeconomic status, educational level, and number of years diagnosed with T2DM as antecedents of self-efficacy, social support, and social problem-solving will be evaluated in this study.

Definition of Terms

The following terms were defined for the purpose of this study:

**People Living with Type 2 Diabetes Mellitus**

People living with T2DM are individuals who have a metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency (Lewis, Heitkemper, Dirksen, O’Brien, & Bucher, 2007).
Operationally, the term is defined as individuals age 19 years and older with a physician documented diagnosis of T2DM.

Rural Alabama

Conceptually, rural Alabama is any area in Alabama that is not considered metropolitan or urban. The Alabama Rural Health Association (ARHA, 2007) designated Alabama counties as rural based on four criteria, which include percentage of total county employment comprised by the public school system, per capita agricultural sales, population per square mile of land, and the size and number of cities in a county. Rural Alabama will be operationally defined by counties designated by the Alabama Rural Health Association. Using these criteria, 55 out of 67 counties are considered rural in the state of Alabama.

Self-efficacy

For the current study, self-efficacy will be defined as “people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances” (Bandura, 1986, p. 391). Self-efficacy will be operationalized by the sum of Likert scale responses to the Diabetes Management Self-Efficacy Scale (van der Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, 1999).

Social Support

Social support will be conceptually defined as assistance received from others that has the potential to enhance the recipient’s well-being (Schaffer, 2009). Social support
may be emotional/informational, tangible, and affectionate as well as positive social interaction provided to individuals (Sherbourne & Stewart, 1991). Emotional support generally comes from family and close friends and is the most commonly recognized form of social support. Emotional support involves empathy, concern, caring, love, and trust, and causes the recipient to feel admired, respected, and loved. Informational support is the offering of advice, information, guidance, or feedback (Sherbourne & Stewart). Tangible support is also referred to as instrumental support. This is the most concrete form of social support and encompasses help in the form of money, time, or services provided. Social companionship is another form of social support and involves spending time with others (Cohen & Willis, 1985). For this study, social support will be operationalized as an overall average social support score and individual subscale score averages on the Medical Outcomes Study (MOS) Social Support Survey (Rand Health, 2009).

Social Problem-solving

Social problem-solving is “the process of analyzing situations and taking action to correct a problem as it occurs in the natural environment” (D’Zurilla et al., 2004, p. 11). The problem-solving process includes impersonal, intrapersonal, interpersonal, and community problems. Social problem solving is composed of two constructs known as problem orientation and problem-solving style. Problem orientation refers to a person’s cognitive and emotional structure which reflects beliefs, appraisals, and feelings about problems of daily life as well as problem solving ability related to those problems. Problem orientation may be positive or negative. Problem-solving styles are cognitive
and behavioral activities through which a person understands and solves problems. A rational problem-solving style is a constructive style, whereas impulsivity-carelessness and avoidance styles are dysfunctional problem-solving styles (D’Zurilla et al., 2004). The concept of social problem-solving will be operationalized as an overall average score and five individual subscales averages of Likert scale responses to the Social Problem-Solving Inventory-Revised: Long version (SPSI-R:L) (D’Zurilla et al., 2004).

**Self-management Behaviors**

Self-management behaviors are conceptually defined as goal-directed, learned activities performed by individuals with the purpose of promoting and maintaining health and well-being (Orem, 2001). For people living with T2DM, these behaviors enhance clinical status, reduce diabetes complications, and improve health status. The AADE identified self-management behaviors necessary for people living with T2DM. These include participating in physical activity, following an appropriate meal plan, monitoring blood glucose, taking medications as prescribed, and monitoring for complications (Mulcahy et al., 2003). Self-management behaviors will be operationalized by the Summary of Diabetes Self-care Activities-Revised (SDSCA-R) measure (Toobert, Hampson, & Glasgow, 2000).

**Antecedents**

Antecedents are personal and situational variables that affect primary and secondary appraisal and coping resources. In this study, the effect of race, age, gender, socioeconomic status, educational level, and number of years diagnosed with T2DM as
antecedents of self-efficacy, social support, and social problem-solving will be evaluated. Socioeconomic status and education will be operationalized by the sum of two weighted values on the Hollingshead Four Factor Index of Social Status to determine participants’ social status (Nakao & Treas, 1992). Additionally, number of years diagnosed with diabetes will be operationalized by categories of years.

Assumptions

Study assumptions include:

1. Study variables, including self-efficacy, social support, social problem-solving, and diabetes self-management behaviors, can be assessed and measured.

2. Study participants will provide accurate and honest answers when completing study instruments.

CHAPTER 2
REVIEW OF LITERATURE

The purpose of the study was to examine whether social support and social problem-solving are mediators of the relationship between self-efficacy and diabetes self-management behaviors in rural Alabamians living with T2DM. The review of literature related to the variables under investigation, organized by sections, is presented in this chapter. The first section provides an overview of mediators and moderators. The second section discusses antecedents important to the study. The third section provides a discussion of diabetes self-management behaviors. The fourth section provides a review of published studies related to study variables including self-efficacy, social support, and social problem-solving. Relationships among study variables are also addressed in this section. The fifth section provides a summary of the literature review.

Overview of Mediators and Moderators

Mediator and moderator variables increase an understanding of the relationship between independent and dependent variables (Burns & Grove, 2009). A classic and frequently quoted reference on mediating and moderating variables is by Baron and Kenny (1986). These authors detail conceptual and statistical differences between the two types of variables.
**Moderator Variables**

A moderator is a qualitative or quantitative variable that affects the strength or direction of a relationship between independent and dependent variables (Polit & Beck, 2008). Moderating variables are frequently characteristics of the population being studied or of the researcher. Age and sex are examples of population characteristics that may moderate a relationship between independent and dependent variables. Moderating variables can also be characteristics of the situation such as rural versus urban setting (Polit & Beck, 2008).

A moderator variable occurs simultaneously with the independent variable (Baron & Kenny, 1986). Figure 2 illustrates the relationship of a moderator variable to the independent and dependent variables. A variable is said to have a moderating effect if the interaction term between the independent variable and the hypothesized moderator variable is significantly related to the dependent variable. Moderators can increase or decrease the influence of the independent variable on the dependent variable (Baron & Kenny, 1986).

Statistical analysis of moderator variables involves testing the effect of the independent variable on the dependent variable and differentiating between that effect and the effect that occurs as a function of the moderator. A multiple regression analysis can be done to determine whether the regression of the dependent variable on the independent variable differs across levels of the moderator (Wuensch, 2009). Moderator effects are noted if the interaction term, the product of the moderator variable and the independent variable, is significantly related to the dependent variable with the independent and moderator variables controlled (Baron & Kenny, 1986).
Mediator Variables

A mediator variable intervenes between independent and dependent variables and explains why a relationship exists between these variables (Polit & Beck, 2008). Mediator variables do not occur simultaneously with the independent variable, but rather they lead to the effect of the independent variable after it has occurred (Baron & Kenny, 1986). The effect of the independent variable may occur partially or completely through the mediator variable (Burns & Grove, 2009). Figure 3 illustrates the relationship between the independent, mediator, and dependent variables when there is partial mediation. If the independent variable occurs completely through the mediator, there is no direct path between the independent and dependent variables.
In order for a variable to be classified as a mediator, the relationship between the independent variable and the mediator variable, the independent variable and the dependent variable, and the mediator variable and the dependent variable should be significant. The relationship between the independent variable and the dependent variable should be decreased after controlling for the relationship between the mediator and dependent variable. In the case of complete mediation, the relationship between the independent and dependent variable will be reduced to zero (Baron & Kenny, 1986).

Four steps have been described for establishing mediation of a relationship between variables. The first step is a regression equation to verify that there is an effect that may be mediated. In the second step, a determination is made whether the independent variable is correlated with the mediator. The third step involves setting up a regression equation to test the effect of the potential mediating variable on the dependent variable while controlling for the independent variable. The fourth step can be estimated at the same time as the third step and involves testing the effect of the independent
variable on the dependent variable while controlling for the potential mediating variable (Kenny, 2009).

In summary, while moderating and mediating variables are often confused or used interchangeably in research, there are differences between the two. Moderator variables are those that influence the strength of a relationship between two other variables, and mediator variables explain the relationship between the two other variables (Baron & Kenny, 1986).

Selection of Antecedent Variables

Antecedent variables (covariates), including race, age, gender, socioeconomic status, educational level, and number of years diagnosed with diabetes were evaluated for their effect on self-efficacy in the current study. Selection of these antecedents was based on previous research that indicated variability among study participants on these factors. Literature also supports the existence of antecedents that affect appraisal of coping ability and coping resources.

Self-efficacy is shown to differ among age groups (O’Hea et al., 2009; Wang & Shiu, 2004) and ethnicity (Bean, Cundy, & Petrie, 2007). In another study of patients with end stage renal disease undergoing hemodialysis, age, gender, educational level, and income were all determinants of self-efficacy (Bag & Mollaoglu, 2010). In a study of patients living with T2DM, self-efficacy was positively related to years of education (Coffman, 2008). A model describing effects of individual and environmental factors on diabetes self-management was tested in a sample of people with T2DM. Duration of
diabetes in years had a direct effect on diabetes self-management as well as an indirect effect through self-efficacy (Xu, Toobert, Savage, Pan, & Whitmer, 2008).

In previous research, coping resources, social support and social problem-solving are affected by various antecedents. For example, social support varied according to race and ethnicity (Chlebowy & Garvin, 2006; Misra & Lager, 2009). Both social support and social problem-solving differed among age groups (Glasgow et al., 2004; Hill-Briggs et al., 2007; Toljamo & Hentinen, 2001; Westaway, Seager, Rheeder, & Van Zyl, 2005; Whitfield & Wiggins, 2003). Differences in social support were noted between males and females (Chlebowy & Garvin, 2006; Misra & Lager; Tang et al., 2008; Toljamo & Hentinen). Problem-solving was related to socioeconomic status (Glasgow et al., 2004). Lastly, educational level was associated with social support and social problem-solving (Coffman, 2008; Hill-Briggs et al., 2007; Hill-Briggs et al., 2006; Tang et al., 2008; Toljamo & Hentinen; Whitfield & Wiggins).

Diabetes Self-management Behaviors

Self-management of T2DM requires knowledge and skill as well as long-term attention to multiple self-care and preventive behaviors (Rickheim, Weaver, Flader, & Kendall, 2002; Tang et al., 2005). Self-care behaviors are defined as a set of complex behavioral actions which must be integrated into daily life (Gatt & Sammut, 2008). Further, self-management requires the incorporation of behavioral, personal, and environmental factors into the daily performance of activities (Sarkar, Fisher, & Schillinger, 2006).
The American Association of Diabetes Educators (AADE) identifies seven self-care behaviors as the standard for measuring self-care management (Peeples et al., 2007). These seven behaviors are eating healthy, being active, monitoring blood glucose, taking medications, problem solving to address diabetes-related issues, coping in a healthy manner, and reducing risks through preventive behaviors such as annual eye examinations and daily foot inspection. These behaviors are further described by Mulcahy et al. (2003). Healthy eating plans need to be individualized, but people with diabetes need to be able to adhere to their prescribed meal plan, implement appropriate treatment of hypoglycemia, respond promptly to hyperglycemia, and eat an appropriate evening snack. Being active involves 20 to 40 minutes of exercise three to four times per week. Monitoring of blood glucose is a critical element in the management of patients with T2DM. Daily monitoring of blood glucose keeps patients engaged in day-to-day management of diabetes and provides immediate assessment of glycemic responses to diet, activity, and medications (Gavin, Stolar, Freeman, & Spellman, 2010). Guidelines for blood glucose monitoring in people living with T2DM are unclear and the frequency of blood glucose monitoring should be dictated by their individual needs in achieving personal goals. Consistent taking of medication by people with T2DM should be evaluated by healthcare providers with each patient interaction or at least every year.

Problem-solving by people with T2DM is facilitated by health providers who introduce scenarios, particularly related to how to respond to high and low blood glucose and sick days, and actively involve patients in identifying strategies to deal with these situations. Healthy coping is what people with T2DM do to adapt to their disease, how they perceive their situation, and how they relate to others in their lives, and involves
aspects of motivation, self-efficacy, and quality of life. Finally, reducing risks by people with T2DM involves practices such as annual eye examinations, follow-ups with a medical provider, smoking cessation, and daily foot inspection (Mulcahy et al., 2003).

In many published studies, diabetes self-management behaviors are conceptually defined using all or selected behaviors described by the AADE. For example, one study described self care as a regimen of meal planning, daily foot care, regular physical activity, weight control, administration of insulin or oral medications, and self-monitoring blood glucose (Skelly, Carlson, Leeman, Soward, Burns, 2009). In another study, self-management was defined as the actual performance of diabetes self-care activities of eating healthy, being active, monitoring blood glucose, and taking medications (Sousa, Hartman, Miller, & Carroll, 2009).

Participation in self-management behaviors is a daily activity. Assisting people living with T2DM to manage their diabetes should be ongoing and aimed at long-term goal maintenance (Thoolen, de Ridder, Bensing, Gorter, & Rutten, 2008). The overall goal is to improve glycemic control and prevent or delay onset of complications (ADA, “Clinical Practice”, 2008). Literature shows those people who implement diabetes-related behaviors daily have improved outcomes. For example, routine monitoring of blood glucose and healthy eating are linked to significant improvements in metabolic control, as measured by hemoglobin A1C levels (Jones et al., 2003). In contrast, patients who do not participate in daily self management activities have an increased risk for developing diabetes-related complications including stroke, heart disease, kidney disease, limb amputation, and blindness (AADE, 2006).
Diabetes self-management is operationalized in a number of ways. Some studies measure only one self-management behavior. For example, one study measured only the self-management behavior of physical activity using the 7-day Physical Activity Recall (Dutton et al., 2009). Since diabetes self-management requires attention to multiple behaviors, other instruments are designed to measure several different behaviors. The Diabetes Self-management Scale and the Diabetes Activities Questionnaire are two instruments that measure multiple behaviors (Chlebowy & Garvin, 2006; Sousa et al., 2009). The Summary of Diabetes Self Care Activities (SDSCA) is frequently used to measure self-management behaviors (Bean et al., 2007; Xu et al., 2008;). The SDSCA assesses the frequency with which a patient participates in diabetes self-management behaviors including diet, exercise, blood glucose monitoring, foot care, and medication-taking for a seven day period (Toobert et al., 2000).

Self-efficacy

Bandura (1986) defined self-efficacy as “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances” (p. 391). The ability to perform diabetes self-management activities is affected by individuals’ belief in their ability to perform these tasks (Bandura, 1986). Prior accomplishment of these tasks, verbal persuasion by others, observation of others accomplishing a task, and self-evaluation of physiological and emotional status determine individuals’ sense of self-efficacy (Bandura). Self-efficacy integrates cognitive, social, and psychomotor skills necessary to perform diabetes self-management activities.
Self-efficacy and Diabetes Self-management Behaviors

Findings from research indicate self-efficacy varies among people living with diabetes. Higher levels of self-efficacy are shown to improve diabetes management behaviors (Lanting et al., 2008; O’Hea et al., 2009; Sousa, Zauszniewski, Musil, McDonald, & Milligan, 2004). For example, Wu et al. (2007) found that participants who had higher levels of self-efficacy were better able to manage their diabetes self-care and participated in an increased number of self-care behaviors. This descriptive correlational study, conducted in Taiwan, examined efficacy expectations and outcome expectations as described by Bandura. The non-probability sample from one clinic in Taiwan was composed of primarily female participants over the age of 60 with an educational level below primary school.

Patients who presented for scheduled appointments at the clinic were asked to participate in the study. Those who agreed were consented and completed a self-administered questionnaire. Diabetes self-management behaviors were measured with the Chinese version of the Summary of Diabetes Self-Care Activities (SDSCA). Cronbach’s alpha coefficient for the study was 0.74. Reference was made to a previous study that demonstrated adequate validity for the instrument, but validity was not discussed for this study. The Diabetes Management Self-Efficacy Scale (DMSES) was translated into the Chinese language for the study and tested for reliability and validity in a Taiwanese population. Cronbach’s alpha values ranged from 0.77 to 0.93. Test-retest reliability as measured by the Pearson correlation coefficient was 0.86. Factor analysis supported the four subscale composition of the instrument. The major predictor of self-
management behaviors in this study was efficacy expectations, also referred to as self-efficacy (Wu et al., 2007).

Higher levels of self-efficacy also have been shown to be significantly associated with diabetes self-care components that measure diet, exercise, medication taking, blood glucose testing, foot care, and hyper/hypoglycemia treatment (Wang & Shiu, 2004). This cross-sectional study, conducted in China, used a non-probability sample of 130 patients composed of relatively even numbers of males and females. Most were married and living with their family. Additionally, over half had completed secondary education. Data were collected using a self-administered questionnaire. The two instruments used in the study, Diabetes Self-efficacy Scale and Diabetes Self-care Scale, were developed in the West, but were previously translated to Chinese and tested for reliability and validity. Reliability coefficients for this study were high at initial testing (0.96 and 0.87) as well as at retest (0.89 and 0.92). Instrument validity was not provided for the study. Additional study methodology was not reported.

Another study conducted in China used structural equation modeling to test a model describing the effects of individual and environmental factors on diabetes self-management (Xu et al., 2008). The cross-sectional study included 201 participants recruited from an outpatient endocrinology department. Patients waiting for a scheduled office visit were approached by the primary investigator and screened for eligibility. Patients who met study inclusion criteria were given information about the study including its purpose, risks and benefits. Those who agreed to participate completed a pencil and paper survey while waiting and returned it directly to the investigator before leaving. Self-management was measured with an instrument developed by the
investigators and modeled after the SDSCA. Nine items measured how many days in the past week participants performed self-care activities. Cronbach’s alpha for the instrument was low at 0.68. Self-efficacy was measured by converting the DMSES into Chinese. The Chinese version had a Cronbach’s alpha of 0.87. Factor analysis revealed five factors that explained 97.9% of the variance, and the five factors were consistent with the five aspects of diabetes self-management behaviors measured. Data were analyzed according to subgroups of those treated with insulin and those not treated with insulin. Imputation procedures were used to account for missing data. In the final model, diabetes self-efficacy directly affected diabetes self-management (Xu et al., 2008).

Self-efficacy also has been shown to be significantly associated with testing blood glucose, following a diabetes meal plan, exercising and checking feet for complications (Sarkar et al., 2006). This cross-sectional study was done to determine whether diabetes self-efficacy was associated with self-management behaviors among a sample of varying ethnicity, health literacy, and diabetes factors, including duration of diabetes, medication regimen, and diabetes-related complications. Adjusting for ethnicity, health literacy, and diabetes factors did not alter associations among self-efficacy and the above named self-management behaviors. The sample was urban and primarily low income and uninsured. The sample also was ethnically diverse and included Asian, African American, Latino, and Caucasian participants. In order to be eligible for study inclusion, participants had to have seen the same physician at least twice over the last 12 months and at least once in the last 6 months. Potential study participants were identified from a hospital database. Bilingual interviewers enrolled participants when they presented for a scheduled clinic
appointment. After informed consent was obtained, an oral questionnaire was administered in the participant’s preferred language.

The 8-item diabetes self-efficacy scale used in the study was evaluated for internal consistency using Cronbach’s alpha for the entire sample as well as for the four most common racial/ethnic groups included in the study. The overall Cronbach’s alpha for the scale was 0.78. Cronbach’s alpha scores ranged from 0.71 for the white/non-Hispanic group to 0.80 for the African American group. Analysis of instrument validity was not discussed. The SDSCA was used to measure diabetes self-management, but no reliability or validity information was reported for the study. For analysis, responses to foot care, self-monitoring of blood glucose, and medication adherence categories of the SDSCA were dichotomized rather than using the number of days of participation for the past seven days. Although the relationship between self-efficacy and medication adherence also was evaluated in this study, no significant association was noted (Sarkar et al., 2006).

Another cross-sectional study conducted primarily to examine the relationship between social support and self-management behaviors also evaluated the effect of self-efficacy on self-management behaviors (Rosland et al., 2008). The recruited study sample was largely composed of urban dwelling, African American and Latino women. Study participants were enrolled in a community health worker-led diabetes self-management intervention, which may have led to recruitment of a sample that was motivated and interested in improving diabetes self-management. Of the 578 eligible participants, 28% completed the baseline assessment. A trained interviewer of the same
nationality as the study participant conducted the survey in the participant’s home in either Spanish or English, depending on participant preference.

The SDSCA was used to measure self-management behaviors and as earlier described in a separate study, the responses to foot care, self-monitoring of blood glucose, and medication adherence were dichotomized for analysis (Rosland et al., 2008). A 4-item diabetes specific self-efficacy scale, the Perceived Competence for Diabetes Scale, was used in this study. Instrument reliability was not reported for either instrument. The researchers state that the scale has been previously validated, but no validity information is reported for this study. The study found that self-efficacy was significantly associated with testing blood glucose, following a diabetes meal plan, and checking feet for complications (Rosland et al.).

Self-efficacy has been linked to specific self-management behaviors. To illustrate, in a randomized trial of 463 adults living with T2DM, the relationships between self-efficacy and dietary, exercise, and medication-taking behaviors were evaluated (King et al., 2010). The multiethnic sample had an average age of 60 years, approximately 50% were female, and over 20% were Latino and had less than a high school education. Participants recruited from primary care clinics in a metropolitan area completed researcher administered surveys during a recruitment call and baseline visit for a computer-assisted diabetes self-management study. Multiple instruments were used to assess self-management behaviors. Six self-efficacy items were added to the Diabetes Self-Efficacy Scale to measure confidence regarding participation in diabetes management behaviors. Information on instrument reliability and validity were not available in this article which was electronically published ahead of print. While self-
efficacy was related to all measured self-management variables in this study, maintaining healthy eating patterns and physical activity were most strongly related to self-efficacy.

Similarly, in examining the role of personal factors in diabetes self-management, Weijman et al. (2005) found higher levels of self-efficacy were related to lower perceived burden when performing these activities. Self-efficacy was examined as a personal factor and measured using the Diabetes Management Self-Efficacy Scale (DMSES) in this cross-sectional study. Instrument validity was not addressed in the study report. The alpha coefficient for the DMSES was 0.91 in this sample of 292 participants living with either Type 1 DM or T2DM. Physicians from three outpatient diabetes clinics in the Netherlands selected potential participants. In one clinic, all physician-recommended patients were asked to participate while in the other two clinics, one researcher randomly selected a group of patients to participate. The physician wrote a letter to potential participants inviting them to join the study. Though not discussed in the article, physician recruitment may be considered a threat to the study since patients may have felt obligated to participate in a study their physician asked them to join. Study information and a consent form also were sent. A response rate of 55% was achieved and approximately equal numbers of people living with Type 1 DM and T2DM were enrolled (166 and 151, respectively). Surveys were sent to those who agreed to participate in the study. Participants who did not return surveys were sent a reminder after four weeks. Participants with low levels of self-efficacy were more likely to perceive dietary self-management, insulin injections, blood glucose monitoring, and adjusting insulin as a burden (Weijman et al.). These findings support previous research that found low levels
of self-efficacy were identified as one of the strongest psychosocial barriers to diabetes self-management (Glasgow et al., 2001).

Although the majority of studies found self-efficacy to be related to improvements in self-management behaviors, one study did not find a significant relationship between the two variables. In this study to examine the relationship between self-efficacy and diabetes self-care behaviors in Caucasian and African American adults with T2DM, no significant relationship was noted for the Caucasian, African-American, or combined groups (Chlebowy & Garvin, 2006). This two-group, comparative descriptive design study utilized three different outpatient sites in the Southeastern United States to recruit a convenience sample of 91 participants. More than half of the sample were women, with a mean age of 55 years, and most were married. Participants were scheduled for an outpatient visit at one of three sites. At the first site, they attended two all day self-management sessions taught by a multidisciplinary healthcare team. At the second site, participants were evaluated and treated by a physician and a registered nurse and/or dietician. Participants at the third site learned about diabetes self-management through dialogue with a registered nurse and/or dietician. Details of the self-management education were not included in the report. Data were collected prior to the educational sessions for all three sites. At the first site, surveys were mailed, completed, and returned prior to the first session. At the remaining sites, surveys were completed at the time of the outpatient visit. Study comparisons were made between African American and Caucasian participants, but no comparisons were made between the three different sites.
The Self-efficacy Questionnaire (SEQ) was used to measure self-efficacy and The Diabetes Activities Questionnaire (TDAQ) was used to measure self-management activities (Chlebowy & Garvin, 2006). Terminology and scaling of the SEQ were modified for the study. Items were rewritten with simpler terminology to ease completion for participants and the scaling was simplified for scoring. Cronbach’s alpha for the overall SEQ score was 0.92 and individual subscale scores ranged from 0.83 to 0.92. TDAQ measures adherence to a diabetes regimen using the subscales of lifestyle/monitoring and treatment. A modified scoring was used for the TDAQ. The researchers used a 4-point Likert scale rather than the visual analog scale measured in millimeters to simplify scoring. Cronbach’s alpha coefficient for the TDAQ score in this study was 0.84. Tests of instrument validity were not reported for either instrument. No relationship was noted between self-efficacy for glucose testing, exercise, eating habits, or medication-taking and self-care behaviors either by race or for the entire sample (Chlebowy & Garvin).

Self-efficacy and Social Support

A descriptive correlational study examined the relationship between diabetes tangible support and diabetes self-efficacy (Coffman, 2008). A convenience sample of 115 Hispanic adults living in the United States was recruited from eight senior housing centers using snowball recruitment. Most were women, with mean age of 69 years. Face-to-face interviews were conducted in Spanish by the primary investigator and a research assistant. The data collection process was assessed each week by the primary investigator, but details of the assessment were not provided. The researchers allowed
participants to be interviewed in pairs if they preferred, which may have led to reporting of socially desired answers. The Diabetes Tangible Support Scale was designed, translated into Spanish, and used for measuring social support in the study. Content and construct validity as well as reliability were evaluated for the instrument. Three diabetes experts used a 4-point scale to rate the instrument for clarity of items and relevance to the construct. The mean score for clarity was 3.78 and relevance to the construct was 3.8. The content validity index was 0.84. Cronbach’s alpha for the scale in this study was 0.91. The DMSES was translated into Spanish and used to measure diabetes self-efficacy. Cronbach’s alpha coefficient for the study was 0.87, but instrument validity was not described. Evaluation of the relationship between diabetes-related tangible support and diabetes self-efficacy revealed a significant negative relationship, indicating that participants who need more support have lower levels of self-efficacy.

Self-efficacy has also been examined as a mediator between social support and diabetes self-management behaviors (Rosland et al., 2008). This cross-sectional study specifically examined family/friend and professional support among 164 Latino and African American adults with T2DM in a metropolitan United States city. The majority (71%) of participants were female. Surveys were completed as part of a baseline assessment of participants enrolled in a community health worker-led diabetes self-management intervention. Surveys were conducted in participant homes in their preferred language by a trained African American or Latino interviewer. Support from family and friends was measured with one item from the Diabetes Care Profile that asked participants to rate their support in following a meal plan, taking diabetes medications, taking care of feet, getting physical activity, and testing blood glucose. Professional
support was measured with one item for physician support and one for health professionals. The questions examined perceived disease-specific support and did not distinguish between different types of support, nor between family versus friend support. Self-efficacy was measured with the Perceived Competence for Diabetes Scale. Reliability and validity were not reported for any of the study instruments. Mediation testing using Baron and Kenny’s method found that self-efficacy could be mediating the relationship between friend/family support and diabetes meal plan adherence and foot care. The adjusted odds ratio of family/friend support for following a meal plan and checking feet decreased when self-efficacy was included in the model.

Self-efficacy also has been examined as an outcome criterion for peer support intervention studies. For example, researchers conducting a study with 345 adults living with T2DM randomized participants to a usual care control group or a community-based, peer-led diabetes self-management program (Lorig, Ritter, Villa, & Armas, 2009). Control and intervention groups were compared at 6 months and data were collected again for the intervention group at 12 months. Self-efficacy was measured with the Diabetes Self-efficacy Scale. Psychometric evaluations supported the validity of the scale and the instrument had a reliability coefficient of 0.85 for the study and a test-retest coefficient of 0.80. There were no significant differences in self-efficacy between the two groups at baseline. At the 6 month follow-up, self-efficacy scores were significantly improved for the intervention group when compared to the control group.

A second peer support intervention study tested the effect of a free diabetes self-management health education program offered to adults over the age of 55 who were living with T2DM (Klug et al., 2008). The 13 weekly sessions were led by peer leaders
and included time for participants to offer support for one another primarily related to dietary management and physical activity. A total of 243 primarily Caucasian female participants enrolled in the program. Attrition was high for the study with 179 completing baseline assessments, 147 at four month follow-up, 50 at eight months, and only 43 at 12 months. Of the 147 who completed follow-up assessments at four months, only 97 were included in the study due to missing data. Dietary and exercise self-efficacy were measured as well as confidence in overcoming challenges to illness management, but no information was given about the instrument used to measure self-efficacy. Self-efficacy was significantly improved in these three categories at four months when compared to baseline values.

In another study, a facilitated telephone peer support intervention was done with 38 patients receiving care for T2DM at one Veteran’s Affairs medical center (Heisler & Piette, 2005). Following the six week intervention, self-efficacy was assessed and compared to baseline using the Perceived Competence Scale, a four-item scale that measured competence with carrying out a diabetes treatment regimen. No reliability or validity information was given for the scale. Significant improvements were noted in self-efficacy from baseline to post-intervention follow-up.

Self-efficacy and Social Problem-solving

Literature discussing the relationship between self-efficacy and social problem-solving is sparse. A quasi-experimental study conducted to evaluate the effectiveness of a lifestyle modification program designed to decrease risk of coronary heart disease among women with T2DM examined both self-efficacy and problem-solving (Glasgow et
al., 2004). Participants were recruited through 59 primary care providers. The primarily Caucasian sample of 279 participants had a mean age of 61 and 90% had completed high school. Recruited participants were randomized to either usual care or the lifestyle modification program after completing a baseline assessment. The usual care group received ongoing diabetes care from their physician, while the intervention group participated in a six month program addressing primary behavioral risk factors for heart disease in postmenopausal women. The program began with a two and a half day retreat followed by weekly meetings that included physical activity, stress management, potluck meals, and support groups.

Problem-solving was assessed using a modified version of the Diabetes Problem-Solving Inventory (Glasgow et al., 2004). This instrument asks respondents to provide a written summary of how they would react to various problem scenarios. Coders rated answers on a 5-point scale with “1” being a very poor strategy and “5” being an excellent strategy. Prior to the study, coders participated in ten hours of training that included reading and discussing a detailed coding manual, coding practice responses, and discussing coding disparities. Coders were blinded to treatment condition. Two scores were produced from the coding; an average rating of problem-solving skill and the number of different proposed problem solutions. Inter-rater reliability was assessed for 114 randomly selected surveys and was r= 0.60 for the average rating and r= 0.86 for number of problem solutions. Reliability of the modified instrument was tested in this study, yielding a Cronbach’s alpha coefficient of 0.77 and six month test-retest stability correlation coefficient of 0.59. Construct validity was assessed by measuring correlations between baseline problem-solving constructs and outcomes including healthful eating,
physical activity, and self-efficacy. All correlations indicated significant, but modest relationships. Additionally, validity of the DPSI was evaluated by measuring sensitivity to intervention effects. Problem-solving scores improved significantly in the intervention group when compared to the control group. These findings support the instrument’s construct validity (Glasgow et al.).

Self-efficacy was assessed with the Sallis Self-Efficacy for Diet and Exercise Behaviors Scale (Glasgow et al., 2004). Additionally, the Confidence in Overcoming Challenges to Illness Management scale assessed confidence in overcoming obstacles to exercise, diet, and stress self-management. No reliability or validity information was given for these instruments. Using Baron and Kenny’s mediation model, problem-solving was found to be a partial mediator of the relationship between the intervention and self-efficacy (Glasgow et al.).

A quasi-experimental study that tested a problem-solving, self-care, and empowerment intervention was conducted in older adults with type 1 or 2 diabetes (DeCoster & George, 2005). This peer-led, self-help group met weekly for one hour at a senior activity center. Sessions were led by participants with social workers serving as facilitators, resource brokers, and outcome evaluators. As participants presented self-management challenges, the social worker prompted group problem-solving, including breaking down the problem’s cause and importance, brainstorming for solutions, and determining a course of action. A pre- and post-test design was used to collect data with post-test occurring at six months. Participants functioned as their own controls and within subject comparisons were made between baseline and six month assessments. The Self-Efficacy for Diabetes Scale was used and had a reliability of 0.90. Instrument
validity information was not provided. The study was a pilot for the intervention; therefore sample size was small with only 11 of the 13 participants completing assessments. Post-intervention assessment demonstrated significantly increased self-efficacy scores compared to baseline.

**Summary of Studies on Self-efficacy**

Self-efficacy is related to better self-management in people with T2DM (Gleeson-Kreig, 2006; King et al., 2010; Sousa et al., 2005). Studies examining the relationship between self-efficacy and diabetes self-management behaviors were conducted with ethnically diverse samples from countries including the United States, China, and the Netherlands. None of the studies examining self-efficacy and diabetes self-management were conducted with a rural Southern population. The majority of studies were of a non-experimental design. Bandura’s self-efficacy theory was frequently used as the theoretical basis for self-efficacy studies, although some authors did not describe the theoretical basis or conceptual definitions (King et al., 2010; Rosland et al., 2008). A variety of instruments were used to measure self-efficacy, making comparisons across studies difficult. The SDSCA was commonly used to measure diabetes self-management activities however; some studies dichotomized the responses rather than analyzing scores using the suggested number of days per week (Rosland et al., 2008; Sarkar et al., 2006). A relationship between self-efficacy and social support was established in descriptive, mediational, and intervention studies. While self-efficacy was shown to be related to social problem-solving, the literature on this relationship is still lacking.
Social Support

Social support is described as the “perception of the value of social interactions” (Lazarus & Folkman, 1984, p. 247). This refers to evaluation of the supportiveness of interactions that occur in social relationships (Lazarus & Folkman). Sherbourne and Stewart (1991) refer to this type of social support as functional support. Functional support refers to the extent that interpersonal relationships serve a particular function. They further describe types of support most often needed as emotional, tangible or practical, informational, appraisal, and social companionship. Sources of social support include family members, social programs, medical professionals, friends and neighbors, and informal networks such as churches (Coffman, 2008). Higher levels of social support are linked with improved health and well-being (Westaway et al., 2005).

Social Support and Diabetes Self-management Behaviors

Self-management of T2DM can be increased with social support (Sousa et al., 2004). To illustrate, a cross-sectional study of African American adults living with T2DM assessed the relationship between social support and self-care behaviors (Tang et al., 2008). Eighty-nine participants living with T2DM for at least one year were recruited from a metropolitan city to participate in a community-based diabetes self-management intervention. Baseline data were collected during a study orientation in which participants were informed of the study purpose and completed informed consent procedures.

Self-management behaviors were measured with the SDSCA (Tang et al, 2008). Instrument reliability and validity were not discussed except to state that they have
previously been found to be adequate. Four social support variables were investigated in this study, including amount of support, satisfaction with support, positive support behavior, and negative support behavior. The frequency of positive and negative support behavior provided was assessed with the Diabetes Family Behavior Checklist II (DFBC-II). Internal consistency was reported for the positive and negative subscales as 0.71 and 0.64, respectively. Convergent validity was assessed by comparing patient and family member scores for the positive and negative subscales which were 0.53 and 0.56, respectively. Amount of social support and satisfaction with social support were assessed with two additional items (Tang et al.).

Social support enhanced performance on five of the seven self-care behaviors evaluated (Tang et al, 2008). Higher levels of satisfaction with received social support were associated with more frequent blood glucose monitoring. Participants who reported greater positive support followed a healthy eating plan, spaced carbohydrates evenly throughout the day, and participated in at least 30 minutes of physical activity more frequently during the week. Study participants who received more negative support behavior took their recommended medication less frequently. The amount of social support received was not a predictor of any self-care behavior (Tang et al.).

Another descriptive study was conducted that used the Information-Motivation-Behavioral Skills model of health behavior change to conceptualize determinants of diabetes self-care behavior (Osborn & Egede, 2009). This model posits that being informed and having a positive attitude and social support leads to performance of health promoting behaviors. A total of 130 predominantly African American women participated in the study. Research assistants reviewed the daily clinic roster at one
internal medicine clinic in the Southeastern United States to identify eligible patients. Patients were approached about study participation while in the clinic waiting room. Those who were interested in participating consented and were taken to a private area in the clinic to complete study instruments.

Social support was measured using the Medical Outcomes Study (MOS) Social Support Survey and self-management was measured using the SDSCA (Osborn & Egede, 2009). Reliability coefficients were not reported for this study sample. The MOS measures support in the emotional/informational, tangible, positive social interaction, and affection domains. Although no instrument validity information was provided for this study, reference was made to a study that established validity of the instrument and supported the scoring of these subscales. For this study, an overall support index was obtained and used in the analysis. Structural equation modeling revealed that higher levels of social support were associated with performing diabetes self-care behaviors regarding following a diabetes diet plan, caring for feet, and monitoring blood glucose. While the researchers noted that social support was independently associated with diabetes self-care behaviors, the role of potential moderators such as race, age, and gender was not explored in the analysis (Osborn & Egede).

Sources of social support and the effect of that support on diabetes self-care management were studied by Shaw, Gallant, Riley-Jacome and Spokane (2006). Convenience sampling with quotas was used to recruit 100 adults from each of two communities, one urban and one rural for this descriptive study. Participants were largely recruited from community sites such as senior centers, housing complexes, churches, and community fairs. Recruitment from community sites may have accessed
individuals who had higher levels of social support than the average community member. Interested individuals spoke to a member of the research team either in person at the recruitment site or over the telephone. Once the study was explained and consent obtained, an interview was scheduled. In-person interviews were conducted at convenient locations throughout the study communities. Interviews lasted about 35 minutes. No information about data collector training was provided. The final sample consisted of 104 participants from each community, with approximately 60% being female in both groups. In the rural sample, most participants were Caucasian and the urban sample was predominantly non-white.

The SDSCA was used to measure diabetes self-management behavior performance frequency (Shaw et al., 2006). Mean scores for general diet, specific diet, foot care, blood glucose monitoring, as well as an overall summary score for the SDSCA were dichotomized for analysis. This dichotomous approach created two groups of approximately equal size. Reliability coefficients and validity information were not given for the subscales or entire instrument. The Chronic Illness Resource Survey (CIRS) was used to assess social and environmental support for self-management. Reliability coefficients for the four subscales ranged from 0.44 for community to 0.82 for family and friends. Reference is made to construct validity of the instrument from a previously reported study, but no validity information is presented for this study. Participants identified four sources of support for diabetes self-care: family and friends, organizational, neighborhood, and community support. Positive, significant relationships were found for family and friends support and following a general diabetes meal plan, foot care, and adhering to three or more self-care behaviors. Organizational support and
general diabetes meal plan, eating a high-fiber, low-fat diet, and blood sugar monitoring were positively significantly related. A positive, significant relationship was found between neighborhood support and general diet adherence, foot care, physical activity, and adherence to three or more self-care behaviors. No significant relationship was found between community support and any self-care behaviors (Shaw et al.).

A descriptive study done to examine the role of personal factors in diabetes self-management found a statistically significant positive relationship between support from family and friends and frequency of participation in dietary self-management (Weijman et al., 2005). The primary focus of the study was to examine self-management issues in the workplace. All participants were currently employed in the Netherlands and living with type 1 or type 2 diabetes treated with insulin. Participants were selected by physicians and invited to join the study. Complete data sets were obtained on 292 of 347 who completed informed consent procedures. Social support in the workplace was measured using the 9-item Support from Colleagues Scale and the 9-item Support from the Direct Superior Scale. The reported Cronbach’s alpha for these scales was 0.89, but no information on validity was given. Support from the social environment, which included family and friends, was measured with a scale based on the Colleagues and Direct Superior support scales. The alpha coefficient for this scale was 0.87. The Multidimensional Diabetes Self-Management Checklist (MDSC) was developed by the researchers to measure frequency and perceived burden of self-management performance. The instrument consisted of four domains. Reliability was tested separately for each domain with alpha coefficients ranging from 0.75 to 0.90. No other reliability or validity information was given, although reference was made to an internal report about the
instrument. For the participants living with T2DM, lack of support at work was significantly inversely related to following dietary guidelines indicating that these participants had more difficulty following their prescribed diet. A significant, inverse relationship was noted between lack of family and friend support and eating regularly.

Another descriptive study was conducted to identify types of social support for people living with insulin-treated diabetes and the effects of that support on self-management behaviors (Toljamo & Hentinen, 2001). The study, conducted in Finland, included a sample of 213 participants of whom 58% were men from two outpatient clinics. The self-report instruments used were developed and previously tested by the authors. The self-care adherence instrument was a 20 item 5-point Likert response tool that asked questions regarding insulin treatment, diet, exercise, self-monitoring of blood glucose, activity, and responsibility. Factor analysis of the instrument revealed two factors, with internal consistency coefficients of 0.82 and 0.71. Social support also was measured on a 5-point Likert scale and included items related to emotional, instrumental, informational, peer, and financial support. Internal consistency for the instrument was 0.78. Those with higher levels of self-care participation reported more friend and family social support than those who neglected self-care. None of the other identified sources of social support were significantly related to self-care participation. Those who felt they received peer support from other people living with diabetes actually had higher blood glucose levels in this study.

Other researchers have examined the relationship between social support and specific self-management behaviors. For example, a descriptive correlational study based on a social-ecologic approach was conducted to describe sources and the effect of social-
environmental support for physical activity as perceived by people living with T2DM (Gleeson-Kreig, 2008). Subjects were recruited from northern New York State. Those living with diabetes who were able to engage in 30 minutes of low to moderate physical activity were eligible to participate in the study. A sample of 58 participants completed the study, with over half of these being men. All participants were Caucasian and the mean number of years of education was 15.

Self-report instruments were administered to participants at the researcher’s office, the participant’s home, or another mutually agreed upon site (Gleeson-Kreig, 2008). Social support was measured with a modified version of the Chronic Illness Resources Survey (CIRS). Reliability and validity of the revised instrument were tested prior to the study. The overall reliability was 0.90 with subscales ranging from 0.71 to 0.96. Construct validity was demonstrated by significant comparisons of subscales with similar measures. Convergent validity was also established by comparing the modified measure to an alternate measure of social support (alpha= 0.81 to 0.97). For the study, overall reliability was 0.90 and individual subscale reliability ranged from 0.68 to 0.92. Physical activity was measured with a modified version of the Habitual Physical Activity Index. Internal consistency for the revised scale was 0.76. Validity for the present study was not addressed, but the authors referenced previous research in which validity was supported with comparisons between instrument scores and corresponding activities in an activity log. Additionally, the instrument was previously validated by comparing scores to an objective measure of physical activity using an accelerometer. Evaluation of physical activity revealed low to moderate levels in the sample. Personal, media, and
community support were related to improved participation in physical activity while family/friend, healthcare, and workplace support were not (Gleeson-Kreig).

Increased frequency of glucose monitoring has been shown to be related to higher levels of support (Brody, Kogan, Murry, Chen, & Brown, 2008). In this descriptive study, structural equation modeling was used to test an ecological model of diabetes self-management. Participants were asked by contacts at healthcare offices, social services offices, churches, and businesses to participate and contact information was gathered from interested individuals. Research staff then contacted potential participants by phone to screen for eligibility. Eligible participants were consented at the time of data collection. African American field researchers from a local university and the community collected data through private interviews conducted in participants’ homes. The field researchers received 28 hours of training in administering the study protocol. The sample consisted of 200 rural African American people living with T2DM who were receiving ongoing care from a physician and were able to identify a person who provided them support for diabetes management (Brody et al.).

Due to the high level of intercorrelation, three separate scales were summed to form an index of diabetes-specific support (Brody et al., 2008). Cronbach’s alpha for the combined scale was 0.80. Relationship quality, a measure of relational warmth and provision of social and emotional support, was also assessed using the relationship quality index, which had an alpha coefficient of 0.86 for the study. No information about instrument validity was presented. To assure accurate assessment of blood glucose monitoring, participants were provided with a glucometer and an educational session on use of the glucometer. The total number of times blood glucose testing occurred during a
one month period was recorded and downloaded directly from participants’ glucose meters. Data supported the proposed model; increased levels of support for diabetes self-management were associated with a higher frequency of glucose tests (Brody et al., 2008).

Researchers also have conducted social support intervention studies and examined the effect of that intervention on diabetes self-management. To illustrate, a social support intervention study was conducted with 62 African-American men and women living with T2DM recruited from a large, metropolitan city (Tang et al., 2005). This pretest-posttest design study evaluated the effect of 24 weekly diabetes self-management support/education group sessions on self-management. The groups met in a local community center, were led by a certified diabetes educator, and focused on patients’ holistic experience of living with diabetes. Session discussions were driven by participant questions or concerns and the group worked together to generate solutions for self-management issues. Training of interventionists was not addressed in the article. Self-management behaviors were measured with the SDSCA, but instrument reliability and validity for this study were not reported. Significant improvements were noted for self-management behaviors of choosing a healthy diet, carbohydrate spacing, exercise, blood glucose testing, and foot care from baseline to the 6 month post-intervention follow-up.

Peer support has been linked to improvements in diabetes self-management behaviors in other intervention studies. For example, a community-based, peer-led diabetes self-management program for adults with T2DM was assessed for effects on dietary management, physical activity, and glucose monitoring (Lorig et al., 2009). This
six week program offered one hour weekly sessions led by peer leaders. Sessions were held in community settings and 10 to 15 participants were included in each class. Peer leaders were from the same communities as participants. Prior to the program, peer leaders were trained to provide instruction on self-management behaviors and facilitate group communication on action planning and problem-solving. A total of 345 adults living with T2DM were randomized to a usual care control group or the peer-led intervention group. Group comparisons were made at baseline and six months using a physical activity scale, a researcher developed 3-item healthy eating scale, and a question about weekly frequency of glucose monitoring. Reliability and validity information were not given for the scales. Improvements were noted for the intervention group compared to the control group for glucose monitoring, healthy eating, and reading food labels at six months follow-up.

The importance of social support in self-management has been described by people living with diabetes. For example, identification of strategies to enhance diabetes self-management was the focus of a qualitative study with 24 adults diagnosed with T2DM (Nagelkerk, Reick, & Meengs, 2006). Participants were recruited from a rural primary care facility to participate in one 2-hour focus group session. A facilitator began the sessions by reading the ground rules and during the sessions, offered probing questions to clarify and expand discussions. Sessions were audiotaped and a trained observer documented non-verbal behaviors of participants. The investigating team identified major concepts from the sessions and grouped these into theme categories. Reliability and validity of the coding were assessed using an independent expert panel to categorize data into themes. Additionally, each interview was coded by an independent
researcher trained in qualitative research. Only minor discrepancies were noted and these were reviewed until consensus was achieved. Content analysis of the audio taped sessions revealed various strategies for enhancing self-management including, developing a supportive relationship with a healthcare provider, having a support person for encouragement and assistance with self-management, and participating in peer discussions about self-management.

Another qualitative study identified factors that promoted or inhibited an ability to self-manage diabetes (Utz et al., 2006). African Americans from three rural communities were recruited for the study with a total of 73 attending one group session. Of the 73 participants, 31 were men. Groups were divided according to gender and an experienced facilitator who was African American and of the same gender as the group facilitated discussions. Sessions were tape-recorded, transcribed, compared and corrected with field notes taken by the research team. Content analysis was conducted to identify themes. Group-centered analysis of data revealed social support to be an important facilitator for self-management. Participants described the importance of social support from peers successfully managing diabetes, church-sponsored programs, healthcare professionals, relatives, and friends.

Most studies, except one, found significant positive relationships between social support and diabetes self-management behaviors. Chlebowy and Garvin (2006) investigated the relationship between social support and self-management behaviors in Caucasian and African American patients. This study did not find a significant relationship between self-efficacy and diabetes self-management behaviors. The relationship between social support and self-management behaviors also was not
significant in this study. The two group, comparative descriptive design study used a convenience sample of 91 adults living with T2DM from three different outpatient clinics in the Southeastern United States. Comparison groups were unequal with 64 being Caucasian and 27 being African American. Other group differences included, 74% of the African American sample was female while only 48% of the Caucasians were female, and only 32% of the African American sample was married compared to 70% of the Caucasian sample. The sample consisted of 51 women and 40 men, and was well educated, with over 48% having some college experience.

The Social Support Questionnaire was used to measure the number of individuals providing social support and participants’ satisfaction with those individuals (Chlebowy & Garvin, 2006). Cronbach’s alpha coefficients were 0.97 for number scores and 0.98 for satisfaction scores. The Diabetes Activities Questionnaire was used to measure adherence to a diabetes regimen using the subscales, lifestyle/monitoring and treatment. Reliability measured with Cronbach’s alpha coefficient was 0.84 for the study. Validity information was not discussed for either instrument. Correlations were computed between number of social support persons and self-care behaviors and satisfaction with social support persons and self-care behaviors. Social support was not significantly related to self-care behaviors in the Caucasian, African-American, or combined groups. However, African Americans reported less social support satisfaction than did Caucasians (Chlebowy & Garvin).
**Social Support as a Mediator Variable**

While no studies were identified that examined social support as a mediator for people living with T2DM, mediation effects of social support were noted in other conditions. For example, in a 12 month prospective study with 69 women who were breast cancer survivors, social support was a mediator between optimism and distress (Trunzo & Pinto, 2003). Religious and personal support were examined as mediators in the relationship between symptom distress and quality of life in women living with breast cancer (Manning-Walsh, 2005). This study, with 100 predominantly Caucasian women, found that personal support from family and friends was positively related to quality of life and partially mediated the effects of symptom distress on quality of life. A secondary data analysis examined a mediation model of acculturation and ethnic pride as predictors of physical and mental health in 561 Mexican American women (Dinh, Castro, Tein, & Kim, 2009). Family support was a significant mediator in the relationship between ethnic pride and mental health problems.

**Summary of Studies on Social Support**

Reported results from research studies indicate that social support is related to improved diabetes self-management. The majority of studies examining social support and diabetes self-management are descriptive studies however; qualitative and social support intervention studies have also studied this relationship. Studies examining social support and diabetes self-management were conducted in the United States, Finland and the Netherlands. Two of the studies were conducted in the Southeastern United States, but included an urban population. Rural samples were recruited for study participation.
from other parts of the United States. Caucasian and African American samples were frequently studied. Convenience sampling was the most common sampling method. This may have skewed findings since people who are more interested in improving self-management are more likely to participate in the study. A variety of theoretical frameworks were used for the studies, but the Socio-ecological model of social support was the most common (Brody et al., 2008; Gleeson-Kreig, 2008; Shaw et al., 2006). Conceptual definitions were rarely given in studies. Operational definitions for social support varied among studies. This difference in instruments makes comparison across studies difficult. Also, reliability coefficients were not adequate for some study instruments.

Conceptual definitions of social support varied across studies. Some studies distinguished between types of social support while others did not (Brody et al., 2008; Osborn & Egede, 2009). Sources of social support and the effect of different sources were examined in some studies (Shaw et al., 2006; Weijman et al., 2005). Amount of support and satisfaction with that support was measured in other studies (Chlebowy & Garvin, 2006; Tang et al., 2008).

Social Problem-solving

Social problem-solving is both a cognitive and behavioral process in which solutions for problems encountered in everyday life are identified (D’Zurilla & Nezu, 2007). The problem-solving process is a self-directed and focused activity that provides solutions for a problem and increases the likelihood of selecting the most effective solution (D’Zurilla & Nezu). The ultimate goal of social problem-solving is a decrease in
negative effects of stressful life situations on well-being. D’Zurilla and Nezu identify three variables involved in the problem-solving process: orienting responses, problem-solving skills, and basic cognitive abilities.

Orienting responses are initial cognitive-emotional responses to problems. These responses include deciding to recognize or ignore problems and describe how people think and feel about problems and their personal ability to solve them. People’s orienting responses may be positive, which promote problem-solving, or negative, which inhibit problem-solving performance.

Problem-solving skills are a set of tasks performed to successfully solve a problem. Tasks include defining the problem, generating solutions, making a decision, implementing the solution, and evaluating the outcome (D’Zurilla & Nezu, 2007). These tasks are cyclical in nature and provide either positive reinforcement for solutions which lead to effective outcomes or negative reinforcement for solutions which are not effective.

Underlying problem-solving skills are basic cognitive abilities. Cognitive abilities most important for effective problem-solving are not well established, but include the ability to understand that thoughts, actions, and feelings occur in response to prior social events, anticipate the effects of behaviors on self and others, produce possible solutions to problems, and perceive situations from another’s perspective (D’Zurilla & Nezu, 2007).

This problem-solving model consists of five factors which are included in two categories; problem orientation dimensions and problem-solving style. The problem orientation dimension is comprised of positive and negative problem orientations. Those
with a positive problem orientation view problems as an opportunity for improvement, believe that problems have solutions, believe in their ability to solve problems with time and effort, and commit to solving, rather than avoiding problems. Those who have a negative problem orientation view problems as a threat, self-doubt their ability to solve problems, and experience frustration when confronted with problems (D’Zurilla & Nezu, 2007).

Rational, impulsivity, and avoidance are three problem-solving styles. Rational is the only identified positive problem-solving style and involves the application of effective problem-solving skills by people. The impulsive style of problem-solving by people entails a hurried and careless generation of alternatives and impulsive choice of solutions. The avoidance problem-solving style is used by people who avoid problems for as long as possible and hope that problems will resolve on their own or someone else will solve their problems for them (D’Zurilla & Nezu, 2007).

Problem-solving outcomes are determined by the processes of problem orientation and problem-solving style. According to the model by D’Zurilla and Nezu (2007), a positive problem orientation facilitates rational problem-solving and increases the likelihood of producing positive problem-solving outcomes. In contrast, a negative problem orientation is linked with either impulsive or avoidant problem-solving styles and produces negative outcomes.

**Social Problem-solving and Diabetes Self-management Behaviors**

People who live with T2DM are daily faced with situations that require adjustments in their self-management plan. Problem-solving is an important skill for
managing these situations. People living with T2DM report that every day is different and being able to problem-solve for daily situations is important (Toljamo & Hentinen, 2001). The AADE recommends assisting people living with T2DM to develop problem-solving strategies for situations that affect their daily management plan (Mulcahy et al., 2003).

Glasgow, Fisher, Skaff, Mullan, and Toobert (2007) found problem-solving to be related to diabetes self-management behaviors. This cross-sectional study was conducted with 506 multiethnic participants recruited from physicians and diabetes education centers in a large metropolitan city in the United States. Letters signed by a member of the research staff and a facility project representative were sent to eligible patients. Patients who did not return the enclosed decliner postcard or call the toll-free phone number received a telephone call from a project staff member. During the screening telephone call, patients were reviewed for study eligibility and an appointment was made for those who were eligible. Project staff met with patients in their home, the project office, or a community setting to collect informed consent and gather data.

The Diabetes Problem-Solving Interview (DPSI) was used to measure problem-solving for healthful eating and physical activity (Glasgow et al., 2007). In this instrument, hypothetical situations or problems are presented and respondents are asked to describe how they would react to each scenario and provide up to three coping strategies for each situation. Coders provide an overall problem-solving rating for each situation on a 5-point scale with “1” being a poor strategy and “5” being an excellent strategy. Ratings are then summed across items on the scale to produce an average rating of problem-solving skill for diet and physical activity. Coders received 10 hours of
training and participated in discussions of coding disparities throughout the study. Inter-rater reliability was evaluated for a randomly selected set of surveys and was 0.96. Tests of convergent and divergent validity revealed moderately significant relationships between the DPSI and psychosocial and self-management behaviors. Average calories from saturated fat were measured using items derived from the Block 2000 Brief Food Frequency Questionnaire and physical activity was assessed with the International Physical Activity Questionnaire. Reliability and validity for these measures were not given. In a regression analysis, the DPSI dietary behavior score was found to be a significant predictor of dietary self-management and the DPSI exercise score was a significant predictor of exercise self-management (Glasgow et al.).

Problem-solving ability also is associated with better medication adherence and more frequent self-monitoring of blood glucose (Hill-Briggs et al., 2007). The primary purpose of this study was to examine the psychometric properties of the Diabetes Problem-Solving Scale (DPSS). Participants were recruited from a randomized controlled trial of an intervention for diabetes management. A subsample of 64 African American participants living with T2DM completed surveys to evaluate problem-solving and self-management. The survey questions were read aloud and participants selected answers from a response book containing response choices in written format. Ability to read was not listed in the study inclusion criteria and there was no mention of how participants who were unable to read and select the answers were handled. Average years of education for the sample was 11.8 years.

Medication adherence was measured with the Medication-Taking subscale of the Hill-Bone Compliance With Therapy Scale and self-monitoring of blood glucose was
assessed with a single question about how often participants had used a machine at home to check blood sugar in the last 2 weeks (Hill-Briggs et al., 2007). While validity for this present study was not addressed, reference was made to previous studies in which factor analysis and predictive validity for the instruments were established. Cronbach’s alpha for the DPSS total scale was 0.77 and subscale coefficients ranged from 0.72 to 0.78. Both construct and predictive validity of the DPSS were supported in this study. Higher scores on the DPSS were significantly associated with higher medication adherence and more frequent blood glucose monitoring (Hill-Briggs et al.).

Problem-solving also is linked to other specific self-management behaviors. For example, in a randomized trial of 463 multiethnic adults living with T2DM, the relationship between problem-solving and dietary, exercise, and medication-taking behaviors was examined (King et al., 2010). The sample had an average age of 60 years, approximately 50% were female, and over 20% were Latino and had less than a high school education. Participants recruited from primary care clinics in a metropolitan area completed researcher administered surveys during a recruitment call and baseline visit for a computer-assisted diabetes self-management study.

Problem-solving was assessed with the Positive Transfer of Past Experience subscale from the DPSS. Several instruments were used to assess self-management behaviors including the NCI Percent Energy from Fat screener, Starting the Conversation scale, Community Health Activities Model Program for Seniors, and the Medication-Taking subscale of the Hill-Bone Compliance With Therapy Scale. No information on instrument reliability or validity was available in this article. Regression analysis revealed significant positive relationships between problem-solving and all measured
self-management variables, but most strongly to maintaining healthy eating patterns (King et al., 2010).

Another study evaluated the relationship between problem-solving and the self-management behaviors of medication taking, physical activity, and glucose monitoring (Hill-Briggs et al., 2006). The predominantly female sample consisted of 65 urban dwelling African Americans who were part of a larger randomized controlled trial for an intervention study. The subsample of participants was selected using a sampling method based on digits in the participant’s medical history numbers. Participants in the randomized controlled trial completed baseline assessments and the subsample completed additional measures reported in this study.

The Social Problem-solving Inventory-Revised: Short form (SPSI-R: S) was used to assess everyday problem-solving (Hill-Briggs et al., 2006). Physical activity was measured using the Atherosclerosis Risk in Communities/ Baecke Leisure Time Activity Scale. Previous reliability and validity testing with references was discussed for these two instruments, but was not given for the current study. Medication adherence was measured with the Medication-Taking subscale of the Hill-Bone Compliance With Therapy Scale and self-monitoring of blood glucose was assessed with a single question about how often participants had used a machine at home to check blood sugar in the last 2 weeks. No reliability or validity information was given for either of these instruments. Multiple regression analysis revealed a significant positive relationship between the total SPSI-R: S and medication adherence. No other significant relationships were identified between the total scale nor any of the subscales for physical activity or self-monitoring of blood glucose (Hill-Briggs et al.).
A qualitative study of people living with T2DM compared diabetes-related problem-solving in urban African Americans in good and poor diabetes control (Hill-Briggs, Cooper, Loman, Brancati, & Cooper, 2003). Good control was defined as hemoglobin A1C less than 8 and poor, greater than 9. Participants were recruited and assigned to focus groups based on hemoglobin A1C values obtained from a controlled trial in which participants were enrolled. Focus groups were conducted by a trained moderator who asked five questions related to diabetes problem-solving especially pertaining to the self-management areas of medication taking, maintaining a prescribed diet, exercising, blood glucose self-monitoring, and managing complications. An assistant moderator audiotaped and took notes during sessions. At the end of focus group sessions, the assistant moderator summarized the main points and gave participants the opportunity to clarify or modify the moderator’s conclusions. Data were coded, reviewed by a panel of experts, and analyzed using a complementary quantitative count method. Researchers found those who have a predominantly negative problem-solving orientation were less likely to participate in self-management of their diet, glucose monitoring, exercise, and medications, whereas those with a positive problem-solving orientation described the importance of participating in these behaviors.

Social Problem-solving as a Mediator Variable

While research examining social problem-solving as a mediator is limited, one study was identified that evaluated social problem-solving as a mediator between a lifestyle modification program and dietary and exercise behaviors (Glasgow et al., 2004). A randomized controlled trial with 279, primarily Caucasian, postmenopausal women
living with T2DM tested the effects of a multiple lifestyle behavior change program. After completing baseline assessments, participants were randomized to usual care or the Mediterranean Lifestyle Program.

Problem-solving was measured with the previously described DPSI (Glasgow et al., 2004). Internal consistency as assessed by Cronbach’s alpha for the overall scale was 0.77. Inter-rater reliability was tested for a group of randomly selected surveys and was r=0.60. The dietary and physical activity portions of the SDSCA were used in conjunction with the Fat and Fiber Behavior Questionnaire, dietary fat intake and fiber, fruit, and vegetable intake screeners from the National Cancer Institute, the Women’s Health Initiative Food Frequency Questionnaire, and The CHAMPS Activities Questionnaire for Older Adults. These instruments were described as being widely-used, valid instruments, but reliability and validity for this study was not reported. Using Baron and Kenny’s method of mediational analysis, a relationship between the intervention and problem-solving was evaluated and found to be significant. A significant relationship also was noted between the intervention and dietary and physical activity outcomes. Finally, problem-solving was evaluated as a mediator between the intervention and dietary and physical activity measures. Problem-solving was found to be a partial mediator of the effects of the intervention on dietary outcomes, specifically on fat consumption. As previously described, social problem-solving also was found to partially mediate the relationship between the intervention and self-efficacy (Glasgow et al.).
Summary of Studies on Problem-solving

The role of problem-solving in diabetes self-management has not been studied extensively. Problem-solving has been identified as a key component of diabetes self-management and therefore warrants further research (Peeples et al., 2007). Studies conducted on problem-solving have found significant relationships between problem-solving and diabetes self-management behaviors including medication taking, healthy eating, blood glucose monitoring, and exercising. No study was identified in the literature that measured problem-solving in relation to all five self-management behaviors of health eating, exercising, medication-taking, blood glucose monitoring, and monitoring for complications. Research has shown that people vary in their approach and ability to problem-solve for daily self-management issues (Elliott, Shewchuk, Miller, & Richards, 2001).

Of the studies that found relationships between social problem-solving and diabetes self-management behaviors, two were conducted with small African American samples (Hill-Briggs et al., 2006; Hill-Briggs et al., 2007). Two studies were conducted with large, multiethnic samples, but one of these recruited from only one healthcare organization (Glasgow et al., 2007; King et al., 2010). The one study that examined social problem-solving as a mediator variable was conducted with a large predominantly Caucasian population (Glasgow et al., 2004). All of the studies were conducted in urban areas and did not include rural participants.

Problem-solving instruments varied among studies making comparison of findings difficult. Many studies measure overall problem-solving ability without
distinguishing between different styles of problem-solving. The SPSI distinguished between problem-solving styles and is a useful instrument for evaluating relationships between specific problem-solving orientations and self-management behaviors.

Summary of the Science Related to the Research Purpose

The purpose of the current study is to examine whether social support and social problem-solving are mediators of the relationship between self-efficacy and diabetes self-management behaviors in rural Alabamians living with T2DM. A relationship between self-efficacy and diabetes self-management behaviors has been well established in diverse ethnic groups. Higher levels of self-efficacy are related to improvements in self-management behaviors identified by the AADE including healthy eating, exercising, medication-taking, blood glucose monitoring, and monitoring for complications.

A variety of self-efficacy instruments were used making comparisons across studies difficult. The DMSES was frequently used in research, but only one study was identified that tested the instrument in a United States population (Coffman, 2008). Further testing of this instrument should be conducted in the United States. The current study will examine reliability and validity of the instrument in a rural Southern population.

Several different instruments also were used to measure self-management behaviors, but the SDSCA was one of the most commonly used. In some cases, however, the scores on the SDSCA were dichotomized rather than interpreted as an average. Additionally, reliability for individual SDSCA subscales was usually reported, but overall reliability for the tool was rarely reported. Both the DMSES and SDSCA ask questions
about each self-management behavior described earlier and therefore allow direct comparison between self-efficacy for a particular self-management behavior and performance of that behavior.

Self-efficacy also is related to both social support and social problem-solving. Researchers have shown that self-efficacy is higher among those with higher levels of social support. Many of these studies are intervention studies in which participants were part of a program designed to improve participation in diabetes self-management behaviors. The relationship between self-efficacy and social problem-solving is not well studied. In two separate intervention studies, social problem-solving mediated the relationship between a lifestyle intervention program and self-efficacy and levels of self-efficacy increased following a problem-solving and empowerment intervention (DeCoster & George, 2005; Glasgow et al., 2004). Although a relationship between self-efficacy and social support and self-efficacy and social problem-solving has been established in the literature, studies examining social support and social problem-solving as mediators between self-efficacy and diabetes self-management behaviors are lacking.

Both qualitative and quantitative studies support the relationship between social support and social problem-solving and diabetes self-management behaviors. A limitation of studies examining social support is that they often do not differentiate between sources or types of support. Different types of support may affect different self-management behaviors and thus should be examined separately. The data on social problem-solving and diabetes self-management is limited. Only one study was identified that used the SPSI-R to evaluate the relationship between social problem-solving and diabetes self-management (Hill-Briggs et al., 2006). This study used the short rather than
long version of the instrument and was conducted with a small sample of urban African Americans.

In summary, while relationships among the study variables are established in the literature, no studies are identified that examine social support and social problem-solving as mediators of the relationship between self-efficacy and diabetes self-management. Additionally, the DMSES is an instrument with good reliability, but needs validation in a United States population. Finally, studies of self-efficacy, social support, social problem-solving, and diabetes self-management have been done in people living with T2DM throughout the United States and in other countries. No studies were identified that examined these variables in a rural, Southern population.

The current study adds to the existing body of knowledge related to self-management in people living with T2DM. Evidence exists to support self-efficacy, social support, and social problem-solving as important factors in diabetes self-management, but these relationships have not been adequately studied in a rural Southern population. This study was conducted with a rural Southern sample and provides information about self-efficacy and diabetes self-management in that population.

Overall, studies related to social problem-solving and diabetes self-management are lacking. This study adds to the small body of existing literature on social problem-solving and diabetes self-management. Moreover, social support and social problem-solving are identified by Lazarus and Folkman (1984) as coping resources. As such, these factors may act as mediators between a person’s self-efficacy for diabetes self-management and participation in self-management behaviors. Research examining social support and social problem-solving as mediators between self-efficacy and diabetes self-
management was non-existent in the literature reviewed. The current study is a step toward filling that gap in research by evaluating the potential mediating response of social support and social problem-solving.

Additionally, many studies do not differentiate between various types of social support. The current study evaluates the relationship between four different types of social support and diabetes self-management behaviors and provides information about which type of support is most beneficial for diabetes self-management behavior participation.
CHAPTER 3

METHODOLOGY

A descriptive correlational design was used in this study of relationships among self-efficacy, social support, social problem-solving, and diabetes self-management behaviors of people living with T2DM in rural Alabama. The purpose of this descriptive correlational study was to examine whether social support and social problem-solving are mediators of the relationship between self-efficacy and self-management behaviors of people living with T2DM in rural Alabama.

Settings

Rural Alabama was defined in this study according to the description used by the Alabama Rural Health Association (ARHA, 2007). The ARHA classifies entire counties as either urban or rural according to four criteria which include percentage of total county employment comprised by the public school system, per capita agricultural sales, population per square mile of land, and the size and number of cities in a county. Using these criteria, 55 out of 67 counties are considered rural in the state of Alabama.

Settings for this study included physician’s offices and clinics located in rural Alabama counties that provide care for adults with T2DM. Lake Martin Family Medicine is a practice in Tallapoosa County of five physicians and two nurse practitioners who see patients six days a week in the office. On average, 60 to 70 patients
are seen each day with approximately 20% of those having T2DM. Tuskegee Medical and Surgical Center is a group of two primary care physicians and one nurse practitioner. The office also has foot care and weight loss centers. A certified diabetes educator holds regular educational sessions at the office. Of the approximately 75 patients seen each day in the office, 60% have a diagnosis of T2DM. A second clinic in Macon County, Notasulga Health Care, is staffed by a nurse practitioner with a primary care physician making bimonthly visits. The nurse practitioner sees about 150 patients each week in the office with approximately 50 to 60% having a T2DM diagnosis. Data collection occurred in a quiet area of waiting rooms or private rooms in these offices.

Research Participants

A convenience sample of patients who visited select offices in the above named rural areas was recruited for study participation. The required sample size was based on a power analysis done following a pilot study. Using Cohen’s formula for a moderate effect size of 0.13 with a desired power of 0.85 at a significance level of 0.05, the required sample size for this study was 143 participants. A preliminary analysis of the regression model revealed a significant pathway between self-efficacy and social problem-solving. The pathway between self-efficacy and social support was near the level of significance. A power analysis revealed that with a required sample size of 151 participants, the pathway between self-efficacy and social support would obtain a significance level <0.05 with 0.8 power. The final sample for the study included 152 participants.
Due to the large percentage of African American people living with T2DM in rural Alabama, additional measures were instituted to encourage their participation in the study. In order to assuage concerns of African American participants, offices with African American healthcare providers were selected for the study, an African American data collector was part of the research team, and information was provided to participants explaining their role in the study and how the study will benefit others living with T2DM.

Inclusion criteria included (a) a type 2 diabetes mellitus diagnosis confirmed by a primary health provider or patient chart; (b) age 19 years or older; (c) residence in rural Alabama, as defined by the ARHA; and (d) ability to speak English. Exclusion criteria included an inability to perform own self care behaviors.

Protection of Human Subjects

Consent was obtained by the investigator from office managers and physicians to recruit participants from the previously listed offices. None of these offices receive federal funding and thus, do not have their own Institutional Review Board (IRB) affiliated agency. IRB approval from the University of Alabama at Birmingham and Auburn University was obtained. Participation in the study was voluntary. Office staff and healthcare providers encouraged patients to participate in the study, but patients were assured that their choice not to participate would not affect their care in any way. Steps were taken to ensure confidentiality including: completion of consent forms and surveys in a private room in the office if preferred; exclusion of participant names on surveys; storage of data on an encrypted jump drive; and storage of consent forms and surveys in a locked filing cabinet only accessible to the principal investigator.
If data were collected by a data collector other than the primary investigator, consent forms and questionnaires were stored in a locked filing cabinet that was only accessible by the personnel at each site who were designated to screen participants until the materials were collected by the primary investigator. Data were input to a password protected computer and stored on an encrypted jump drive. Completed surveys were kept in a locked filing cabinet in the investigator’s office. Only the principal investigator had access to this filing cabinet.

Pilot Study

A pilot study assessed (1) the plausibility of data collection procedures; (2) the understandability of all questionnaires, including the investigator-developed sociodemographic questionnaire; and (3) reliability coefficients of all the measures for rural Alabamians living with T2DM. The pilot was conducted at all three data collection sites from January, 2010 through April, 2010, following approvals from respective Institutional Review Boards. The primary investigator collected all data for the pilot study.

Out of 50 potential research participants who met the inclusion criteria and were screened, 50 (17 males and 33 females) were eligible and recruited into this pilot. These 50 participants were also included in the final study sample. The majority of participants were over the age of 50. Sixty percent of participants were African American. Half of the participants had been diagnosed with T2DM for 10 years or less. Slightly over half (52%) had at least a high school education and 42% of the participants were married.
The mean score on the Hollingshead Four Factor Index of Social Status was 24, which is low (Nakeo & Treas, 1992).

Study procedures were tested and appeared to be practical, with only slight modifications needed. Participants completed all questionnaires in approximately 20 minutes. Five items on the SDSCA required modifications. In response to questions about checking blood glucose at home, some participants reported not being asked to check at home. Additionally, some participants managed diabetes without medication so the medication question on the SDSCA was not applicable to them. These three problematic items were revised by adding a “not applicable” option to the question. Two questions asked participants about checking feet and the insides of shoes. Some participants had unilateral or bilateral amputations. These items were revised by adding a checking amputation site and checking prosthetic device option to the question.

Using SPSS statistical software, reliability coefficients of all measures from this pilot were satisfactory. Cronbach's alphas ranged from .76 for the SDSCA to .96 for the MOS Social Support Survey.

Data Collection Procedures

The investigator met with the appropriate contact person at offices where patients were asked to complete surveys. At all three sites, the contact person was a nurse practitioner. Designated office personnel at the three sites were nurses.

The study protocol was clearly outlined on a fact sheet (see Appendix D) that was distributed to designated office personnel. Designated office personnel were given the opportunity to ask the researcher any questions about the study or their role in participant
referral. Contact information for the investigator was given to personnel in each office in case of additional questions or concerns. Flyers (see Appendix E) describing the study were placed in waiting and examination rooms of physicians’ offices.

The survey containing four instruments and a demographic questionnaire was compiled using a random table of numbers to vary order of the instruments. Surveys were coded with a letter linked to a particular office. Each individual survey was also coded with a number. Participants were given a copy of the informed consent letter which contained the survey number and the primary investigator contact information in case they later decided to withdraw from the study.

In addition to the primary investigator, two other health care providers assisted with data collection. These data collectors all had certification in protection of human subjects research. The primary investigator provided training on the study protocol and administration of the survey for the two data collectors prior to their participation in data collection. During this four-hour training session, data collectors practiced administering the survey to people living with T2DM who volunteered to be questioned. These participants were used for data collector training only and their data were not included in the study. Data collectors were evaluated by the primary investigator during the training process using the study protocol manual. Training continued until achieving a reliability coefficient of at least .90 for both a minimal level of intra-rater and inter-rater reliability. If intra-rater and inter-rater reliability coefficients fell below .90 during data collection, retraining of data collectors occurred until achieving a minimal reliability of .90. Additionally, each of the data collectors observed data collection by the primary investigator prior to collecting data on their own. The primary investigator monitored the
data collection process throughout the study by observing each data collector at their initial data collection and periodically thereafter.

When patients presented for regularly scheduled appointments, designated office personnel assessed their eligibility for study inclusion by comparing the criteria listed on the fact sheet with the patient’s chart. Those who met eligibility requirements were referred to the primary investigator or member of the research team. Nurse practitioners and/or physicians in each participating office encouraged patients to participate in the study if they met eligibility requirements. Office staff served as intermediaries to give information about the study and refer those interested to the data collector. If patients agreed to participate, they met with a data collector in a private area of the waiting room or in a private room in the office. The data collector reviewed the informed consent letter with potential participants. If they agreed to participate, the consent form was signed and a copy was provided to the participant. Following the consent process, the data collector read the survey questions and marked answers provided by the participant. Researcher contact information and a survey number were provided to participants in the informed consent letter so that if participants later decided not to participate in the study, they were able to contact the researcher, give the survey number, and have their survey removed.

Surveys completed by data collectors other than the primary investigator were placed in an envelope and stored in a locked filing cabinet in the physician’s office only accessible by the designated office personnel. Completed surveys were then picked up by the primary investigator and stored in a locked filing cabinet in the primary investigator’s office.
Instruments

Self-report questionnaires were used to collect data. The questionnaires included the: (a) Diabetes Management Self-efficacy Scale (van der Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, 1999); (b) Medical Outcomes Study (MOS) Social Support Survey (Sherbourne & Stewart, 1991); (c) Social Problem-Solving Inventory-Revised, sixth grade version (D’Zurilla, Nezu, & Maydeu-Olivares, 2002); (d) Summary of Diabetes Self-care Activities-Revised (SDSCA-R) measure (Toobert et al, 2000); and (e) Hollingshead Four Factor Index of Social Status (Hollingshead, 1975). All of the questionnaires are in the public domain with the exception of the Social Problem-Solving Inventory-Revised, which was purchased from the company. In addition to sociodemographic information assessed with the Hollingshead Index, questions consisting of race, age, and number of years diagnosed with diabetes were included. The order of questionnaires in the packet was randomized using a random table of numbers.

Self-efficacy

Self-efficacy was measured with the Diabetes Management Self-efficacy Scale (DMSES). The DMSES is a measure of self-efficacy of people with type 2 diabetes (van der Bijl et al., 1999). The 20-item instrument is based on self-care activities people living with type 2 diabetes must perform to manage their diabetes, including eating a heart healthy diet, participating in physical activity, monitoring blood sugar, taking medications, and monitoring for complications. According to Bandura, self-efficacy should be measured in terms of specific judgments of ability rather than as a general concept. Generalized self-efficacy measures require participants to make judgments
about capabilities without a clear activity in mind and therefore, the measure has little explanatory value (van der Bijl & Shortridge-Baggett, 2002). Based on this principle, the DMSES was designed to address specific diabetes self-management issues. The 10-point Likert scale assesses patients’ confidence in their ability to manage their diabetes, with higher scores indicating higher levels of self-efficacy (van der Bijl et al., 1999).

Internal consistency for the total scale was 0.81 and test-retest reliability was 0.79. Factor analysis revealed four factors that were all related to clusters of diabetes self-management activities (van der Bijl et al., 1999). The DMSES was originally developed and tested in the Netherlands. The scale has been revised and tested in Australia, Turkey, the United Kingdom and the United States. The instrument was translated into Spanish and tested in a Hispanic sample of older adults in the United States. Internal consistency for the instrument in this sample was 0.87 (Coffman, 2008). Reliability of the DMSES was tested in the pilot study. Cronbach’s alpha for this pilot study sample was .92.

**Social Support**

The Medical Outcomes Study Social Support Survey (Sherbourne & Stewart, 1991) was used to measure social support. This 19-item instrument provides an overall functional social support score as well as four social support subscales, including emotional/informational support, tangible support, affectionate support, and positive social interaction. Participants rate the extent to which each type of support is available to them on a 5-point Likert scale with (1) being “none of the time” and (5) being “all of the
time”. Items are summed for a total score, with higher scores indicating more support (Sherbourne & Stewart).

Internal consistency, stability coefficients, and discriminant validity were all high for the instrument when tested in a sample of 2,987 adult patients from metropolitan areas in the United States with one or more chronic diseases, including diabetes (Sherbourne & Stewart, 1991). Factor analysis of the instrument supported the four factor structure of the measure. Internal consistency reliability for the total scale was 0.97 and the reliability for each subscale was 0.91 or greater. Convergent validity testing revealed correlations of 0.72 and higher between items and their hypothesized scale. Items in the four subscales correlated higher with their own scale than other social support scales demonstrating discriminant validity (Sherbourne & Stewart).

Overall reliability for the MOS as measured by Cronbach’s alpha for the pilot study sample was .96. Reliability for individual subscales was .94 for emotional/informational support, .90 for tangible support, .93 for affectionate support, and .87 for positive social interaction.

Social Problem-solving

Social problem-solving was assessed using the sixth-grade version of the Social Problem-Solving Inventory-Revised Long (SPSI-R:L; D’Zurilla et al., 2002). This 52-item instrument provides an overall measure of a person’s social problem-solving ability. Based on a factor analysis, the scale is divided into five subscales. Two of these subscales, positive problem orientation and negative problem orientation, measure generalized problem orientation. The remaining three subscales assess problem-solving
style and include rational, impulsivity/carelessness, and avoidance styles. The rational problem-solving style is composed of four dimensions including: problem definition and formulation; generation of alternative solutions; decision-making; and solution implementation and verification. Respondents report their typical response to problems based on a 5-point Likert scale ranging from “not at all true of me” (0) to “extremely true of me” (5). Items are summed and raw scores are obtained for each subscale and for a total score. Raw scores are converted to standard scores to enable interpretation of scores for a particular age group or population. Higher scores indicate good problem-solving ability and lower scores indicate poor problem-solving ability. Higher scores on the positive problem orientation and rational problem solving subscales indicate more effective problem-solving whereas higher scores on the negative problem orientation, impulsivity/carelessness, and avoidance subscales indicate more defective problem-solving.

The scale has demonstrated strong reliability and validity in studies of various populations (D’Zurilla et al., 2002). Evaluation of SPSI-R reliability in a population of middle-aged and elderly adults revealed scores of 0.96 and 0.93, respectively. Reliability coefficients for each of the five subscales ranged from 0.79 for positive problem orientation to 0.95 for rational problem-solving in the middle-aged population (D’Zurilla et al., 2002).

The SPSI-R has previously been used in studies with adults living with diabetes. Two of the subscales, impulsivity/carelessness and avoidance, were found to be significantly associated with glycemic control in a sample of patients with type 2 diabetes (Hill-Briggs et al., 2006). Differing profiles of problem-solving ability were identified
based on levels of positive and negative problem orientation in a sample of adults living with diabetes (Elliot et al., 2001).

Overall reliability for the SPSI-R in the pilot sample was .87. Subscale reliability scores ranged from .72 for rational problem solving-decision making to .94 for negative problem orientation.

**Diabetes Self-management**

Participation in diabetes self-management behaviors was measured using the Summary of Diabetes Self Care Activities-Revised (SDSCA) questionnaire (Toobert et al., 2000). The instrument contains 11-items which evaluate the frequency participants engage in self-management behaviors that include diet, exercise, medication-taking, blood glucose testing, and foot care categories. Respondents are asked to rate how many of the last seven days they participated in each self-management behavior. Mean number of days is calculated for each category of self-management behaviors, with higher scores indicating more frequent participation in self-management behaviors.

In a review of seven studies, the original version of the SDSCA demonstrated adequate internal and test-retest reliability and evidence of validity and sensitivity to change (Toobert et al., 2000). Participants in the seven reviewed studies were primarily Caucasian women between the ages of 45 and 67. Reliability and validity of each scale or area of self-management behavior were examined. Internal consistency of the scales assessed by inter-item correlations averaged 0.47 with the exception of specific diet which ranged from 0.07 to 0.23. Test-retest reliability correlations were moderate and
ranged from 0.40 to 0.78. Criterion-related validity for the exercise, general and specific diet scales revealed validity coefficients ranging from 0.20 to 0.58.

Based on the review of these seven studies, revisions were made to the questionnaire including the addition of foot care and smoking items, deletion of medication-taking questions due to low test-retest reliability of those items, deletion of the specific diet scale due to its lack of internal consistency, and simplification of the scoring system to include days of the week instead of percentages. The revised version has been used in studies of adults with diabetes (Eigenmann, Colagiuri, Skinner, & Trevena, 2009; Klug et al., 2008; Utz et al., 2008; Xu et al., 2008). Overall internal consistency of the self-care instrument is 0.75 with Cronbach’s alpha values for individual subscales ranging from 0.65 to 0.84 (Johnston-Brooks, Lewis, & Garg, 2002). In the pilot sample, overall reliability was .76 with individual subscales ranging from .61 for diet to .95 for blood glucose testing.

**Sociodemographic Information**

To determine socioeconomic status, the Hollingshead Four Factor Index of Social Status was used. This scale assesses the four factors of education, occupation, gender, and marital status to estimate social status. The measure accounts for household social status or individual status. Education is scored on a 7-point scale and weighted by three. Occupation is coded from 1 - 9 and weighted by five using an updated occupation coding list based on the 1992 census (Nakao & Treas, 1992). These two weighted values are summed to determine the participant’s social status. In cases where information was available for the spouse, the two weighted scores are summed and divided by two to
obtain an average household social status score. Scores range from 8 to 66 with higher scores indicating higher social status.

Data Analysis

Data were entered into a spreadsheet by the primary investigator and accuracy of data entry was assessed by the primary investigator for all completed questionnaires. Further, to assure accuracy of data entry, data checking was performed by one of the trained data collectors who compared accuracy of data entry for 10% of the completed surveys. Surveys were randomly selected for comparison.

Data were analyzed using SAS version 9.2 software with all tests for statistical significance set at an alpha level of .05. Descriptive statistics are reported for the sample characteristics. Frequencies and percentages were used to describe all variables including gender, age, race, educational level, marital status, and length of time with diabetes. The mean and standard deviation for the Hollingshead Four Factor Index of Social Status are reported. Means and standard deviations also are reported for scores on all study variables including self-efficacy, social support, social problem-solving, and diabetes self-management behaviors. Correlations among study variables were analyzed using Pearson product moment correlation coefficients. Internal consistency of instruments used in the study was assessed using Cronbach’s alpha coefficients, with a minimum acceptable level of .70.
Mediation Testing

Multiple regression analysis was performed to test the mediation effects of social support and social problem-solving. Simple regression was used to examine the relationship between self-efficacy and study antecedents including, race, age, gender, socioeconomic status, and educational level. Multiple regression analysis was done using the mediation steps identified by Baron and Kenny (1986). The first step was to examine the relationship between the independent variable and the outcome variable. Simple regression was used to examine the relationship between self-efficacy and diabetes self-management behaviors using a total score for the SDSCA.

The second step was to examine the relationship between the independent variable and each potential mediator. Simple regression was used to examine the relationship between self-efficacy and social support and self-efficacy and social problem-solving. Multiple regression was done to evaluate each relationship while controlling for antecedent variables.

The third step in Baron and Kenny’s mediation model was to examine the relationship between each potential mediator and the outcome variable, controlling for the independent variable. Multiple regression analysis was done to assess the relationship between social support and diabetes self-management behaviors, controlling for self-efficacy. Additionally, the relationship between social problem-solving and diabetes self-management behaviors was evaluated with multiple regression while controlling for self-efficacy.

The fourth and final step in the mediation testing process was to examine the relationship between the independent variable and the outcome variable, controlling for
each potential mediator. Once again, multiple regression was used to examine the relationship between self-efficacy and diabetes self-management behaviors, controlling for each potential mediator separately and collectively. The direct relationship between self-efficacy and diabetes self-management behaviors was then examined, controlling for antecedent variables, to determine if social support and social problem-solving were mediating variables and if so, whether they partially or completely mediated the relationship.

Limitations

Limitations of this study were as follows:

1. The use of a convenience sample limits generalizability of findings.

2. Potential participants who were more ill are less likely to complete the survey, limiting the ability to generalize findings to that population.

3. Participant’s awareness of being in a study may have affected their response to questions on the survey.

4. The self-efficacy scale that was used in the study has only been tested once in the United States with a Hispanic population.
A description of the study sample and findings from the data analysis are presented in this chapter. Sample characteristics are described in the first section. Instrument reliability is reported in the second section. Descriptive statistics for study variables are reported in the third section. The fourth section contains data related to mediation testing and research questions associated with each step of the mediational analysis.

Sample Description

A convenience sample of 152 people living with T2DM was recruited from three clinics in two rural Alabama counties. Descriptive statistics of the sample are presented in Table 1. Of the 152 eligible participants, 100 (65.8%) were female and 52 (34.2%) were male. Participants ranged in age from 19 to over 81 with the majority (56.6%) being between 51 and 70. The majority of the sample was African American (58.6%) and had at least a high school education (57.9%). Concerning marital status, 33.6% were single and 36.8% were married. Most (59.3%) of the participants had been diagnosed with T2DM for 10 years or less. The Hollingshead Index was used to measure socioeconomic status. The mean Hollingshead score for the sample was low at 25.7 (SD=11.2) which is consistent with the social strata of semiskilled workers.
Table 1

Descriptive Statistics for the Sample (n=152)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
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</tr>
<tr>
<td>Male</td>
<td>52</td>
<td>34.2</td>
</tr>
<tr>
<td>Female</td>
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</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
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<tr>
<td>19-25</td>
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<td>1.3</td>
</tr>
<tr>
<td>26-30</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>31-40</td>
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<td>51-60</td>
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<td>61-70</td>
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<td>71-80</td>
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<td>7.9</td>
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<td>81 and over</td>
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</tr>
<tr>
<td>Race</td>
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<td>African American</td>
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<td>Caucasian</td>
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<td>Highest Level of Education</td>
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<td>6th grade or less</td>
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<td>9.9</td>
</tr>
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<td>7th-9th grade</td>
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<td>Some college or certification course</td>
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<td>1.3</td>
</tr>
<tr>
<td>Marital Status</td>
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<td>Single</td>
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<td>4.6</td>
</tr>
<tr>
<td>Widowed</td>
<td>24</td>
<td>15.8</td>
</tr>
<tr>
<td>Length of Time Diagnosed with Diabetes</td>
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<td></td>
</tr>
<tr>
<td>Less than one Year</td>
<td>10</td>
<td>6.6</td>
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<tr>
<td>1-5 years</td>
<td>58</td>
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<td>6-10 years</td>
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<td>7.2</td>
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Instrument Reliability

Internal consistency of the instruments used in this study was assessed using Cronbach’s alpha coefficients. As seen in Table 2, reliability of the measures was satisfactory, ranging from .72 for the Summary of Diabetes Self-care Activities (SDSCA) to .96 for the Medical Outcomes Study Social Support Survey (MOS). Two subscales on the SDSCA fell below the acceptable .70 alpha coefficient.

Table 2

*Number of Items and Cronbach’s Alpha Coefficients for Study Instruments*

<table>
<thead>
<tr>
<th>Instrument</th>
<th># of items</th>
<th>Cronbach’s alpha</th>
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</thead>
<tbody>
<tr>
<td>Diabetes Management Self-efficacy Scale (DMSES)</td>
<td>20</td>
<td>.90</td>
</tr>
<tr>
<td>Medical Outcome Study (MOS) Social Support Survey</td>
<td>19</td>
<td>.96</td>
</tr>
<tr>
<td>Emotional/Informational</td>
<td>8</td>
<td>.93</td>
</tr>
<tr>
<td>Tangible</td>
<td>4</td>
<td>.92</td>
</tr>
<tr>
<td>Affectionate</td>
<td>3</td>
<td>.91</td>
</tr>
<tr>
<td>Positive Social Interaction</td>
<td>4</td>
<td>.97</td>
</tr>
<tr>
<td>Social Problem-solving Inventory-Revised:Long</td>
<td>52</td>
<td>.87</td>
</tr>
<tr>
<td>Positive Problem Orientation (PPO)</td>
<td>5</td>
<td>.74</td>
</tr>
<tr>
<td>Negative Problem Orientation (NPO)</td>
<td>10</td>
<td>.90</td>
</tr>
<tr>
<td>Rationale Problem-solving (RPS)</td>
<td>20</td>
<td>.96</td>
</tr>
<tr>
<td>Impulsivity/Carelessness Style (ICS)</td>
<td>10</td>
<td>.87</td>
</tr>
<tr>
<td>Avoidance Style (AS)</td>
<td>7</td>
<td>.81</td>
</tr>
<tr>
<td>Summary of Diabetes Self Care Activities-Revised</td>
<td>11</td>
<td>.72</td>
</tr>
<tr>
<td>Diet</td>
<td>4</td>
<td>.79</td>
</tr>
<tr>
<td>Exercise</td>
<td>2</td>
<td>.66</td>
</tr>
<tr>
<td>Self-monitoring of blood glucose</td>
<td>2</td>
<td>.95</td>
</tr>
<tr>
<td>Monitoring for complications</td>
<td>2</td>
<td>.53</td>
</tr>
</tbody>
</table>

Descriptive Analyses of Study Variables

Descriptive statistics of study variables (means and standard deviations) are presented in Table 3. The mean score of 7.53 for self-efficacy fell within the lower range
of “certain can do” for the DMSES. The mean social support score was high at 4.18.

Total scores for social problem-solving were above the middle range with a mean of 14.38. Similarly, two social problem-solving subscales, positive problem orientation and rational problem-solving were above middle range at 12.22 and 69.95, respectively. Raw scores for the SPSI-R:L were converted to age-corrected standard scores for comparison to previous studies. Means and standard deviations for the standardized scores are reported in Table 4. The mean score for the measure of diabetes self-management was 4.59.

Table 3

<table>
<thead>
<tr>
<th>Study variable</th>
<th>Range of possible scores</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Management Self-efficacy Scale</td>
<td>0-10</td>
<td>7.53</td>
<td>1.52</td>
</tr>
<tr>
<td>MOS Social Support Survey</td>
<td>0-5</td>
<td>4.18</td>
<td>.83</td>
</tr>
<tr>
<td>Emotional/Informational</td>
<td>0-5</td>
<td>4.1</td>
<td>.99</td>
</tr>
<tr>
<td>Tangible</td>
<td>0-5</td>
<td>4.35</td>
<td>.91</td>
</tr>
<tr>
<td>Affectionate</td>
<td>0-5</td>
<td>4.37</td>
<td>.92</td>
</tr>
<tr>
<td>Positive Social Interaction</td>
<td>0-5</td>
<td>4.05</td>
<td>1.1</td>
</tr>
<tr>
<td>Social Problem-solving Inventory-Revised: Long (Total)</td>
<td>0-20</td>
<td>14.38</td>
<td>3.1</td>
</tr>
<tr>
<td>Positive Problem Orientation (PPO)</td>
<td>0-20</td>
<td>12.22</td>
<td>3.79</td>
</tr>
<tr>
<td>Negative Problem Orientation (NPO)</td>
<td>0-40</td>
<td>13.59</td>
<td>10.81</td>
</tr>
<tr>
<td>Rational Problem-solving (RPS)</td>
<td>0-80</td>
<td>69.95</td>
<td>19.06</td>
</tr>
<tr>
<td>Impulsivity/Carelessness Style (ICS)</td>
<td>0-40</td>
<td>10.57</td>
<td>8.34</td>
</tr>
<tr>
<td>Avoidance Style (AS)</td>
<td>0-28</td>
<td>8.43</td>
<td>6.14</td>
</tr>
<tr>
<td>Summary of Diabetes Self Care Activities-Revised</td>
<td>0-7</td>
<td>4.59</td>
<td>1.26</td>
</tr>
<tr>
<td>Diet</td>
<td>0-7</td>
<td>4.41</td>
<td>1.81</td>
</tr>
<tr>
<td>Exercise</td>
<td>0-7</td>
<td>3.27</td>
<td>2.38</td>
</tr>
<tr>
<td>Self-monitoring of blood glucose</td>
<td>0-7</td>
<td>4.87</td>
<td>2.74</td>
</tr>
<tr>
<td>Monitoring for complications</td>
<td>0-7</td>
<td>4.91</td>
<td>2.29</td>
</tr>
<tr>
<td>Taking medications</td>
<td>0-7</td>
<td>6.81</td>
<td>.74</td>
</tr>
</tbody>
</table>
Table 4

Descriptive Statistics for Social Problem-solving Inventory-Revised: Long Standard Scores

<table>
<thead>
<tr>
<th>SPSI-R:L</th>
<th>Standard score range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total SPSI-R:L</td>
<td>27-140</td>
<td>105.54</td>
<td>16.34</td>
</tr>
<tr>
<td>Positive Problem Orientation (PPO)</td>
<td>47-135</td>
<td>99.56</td>
<td>15.05</td>
</tr>
<tr>
<td>Negative Problem Orientation (NPO)</td>
<td>74-165</td>
<td>104.46</td>
<td>20.53</td>
</tr>
<tr>
<td>Rational Problem-solving (RPS)</td>
<td>52-141</td>
<td>122.7</td>
<td>14.8</td>
</tr>
<tr>
<td>Impulsivity/Carelessness Style (ICS)</td>
<td>71-177</td>
<td>99.57</td>
<td>19.84</td>
</tr>
<tr>
<td>Avoidance Style (AS)</td>
<td>75-156</td>
<td>101.03</td>
<td>16.61</td>
</tr>
</tbody>
</table>

Correlations among study variables were analyzed using bivariate correlations to obtain Pearson product-moment correlation coefficients (Table 5). Self-efficacy was significantly positively correlated with diabetes self-management, social support, and social problem-solving at p<.01. Of the five self-management behaviors assessed, self-efficacy was significantly correlated with diet, exercise, and foot care, but not with glucose testing or medication-taking. Diabetes self-management was not significantly correlated with social support or social problem-solving in this sample. Examination of diabetes self-management subscales revealed one significant correlation between the checking for complications subscale and total social problem-solving score (p<.05) as well as the constructive problem-solving subscale (p<.01). Social support and social problem-solving also were significantly correlated (p<.05) although the strength of the correlation was weak (r=.18). The antecedent variable educational level was significantly correlated with self-efficacy and social problem-solving.
Table 5

**Correlations among Study Variables**

<table>
<thead>
<tr>
<th>Study Variable</th>
<th>SE</th>
<th>SS</th>
<th>SPS</th>
<th>CON</th>
<th>DYS</th>
<th>DSM</th>
<th>D</th>
<th>EX</th>
<th>BG</th>
<th>COM</th>
<th>MED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy (SE)</td>
<td>-</td>
<td>.28</td>
<td>.36</td>
<td>.24</td>
<td>.32</td>
<td>.4</td>
<td>.34</td>
<td>.2</td>
<td>.12</td>
<td>.29</td>
<td>.08</td>
</tr>
<tr>
<td>Social Support (SS)</td>
<td>.28</td>
<td>-</td>
<td>.18</td>
<td>.17</td>
<td>-.13</td>
<td>.11</td>
<td>.06</td>
<td>-.02</td>
<td>.11</td>
<td>.11</td>
<td>.07</td>
</tr>
<tr>
<td>Social Problem-solving (SPS)</td>
<td>.36</td>
<td>.18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.13</td>
<td>.11</td>
<td>-.04</td>
<td>.09</td>
<td>.17</td>
<td>-.08</td>
</tr>
<tr>
<td>Constructive (CON)</td>
<td>.24</td>
<td>.17</td>
<td>-</td>
<td>-</td>
<td>.27</td>
<td>.16</td>
<td>.07</td>
<td>-.01</td>
<td>.08</td>
<td>.28</td>
<td>-.12</td>
</tr>
<tr>
<td>Dysfunctional (DYS)</td>
<td>.32</td>
<td>-.13</td>
<td>-</td>
<td>.27</td>
<td>-</td>
<td>.08</td>
<td>-.1</td>
<td>.04</td>
<td>-.07</td>
<td>-.05</td>
<td>-.01</td>
</tr>
<tr>
<td>Diabetes Self-management (DSM)</td>
<td>.4</td>
<td>.11</td>
<td>.13</td>
<td>.16</td>
<td>.08</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Diet subscale (D)</td>
<td>.34</td>
<td>.06</td>
<td>.11</td>
<td>.07</td>
<td>-.1</td>
<td>-</td>
<td>-</td>
<td>.11</td>
<td>.28</td>
<td>.2</td>
<td>.17</td>
</tr>
<tr>
<td>Exercise subscale (EX)</td>
<td>.2</td>
<td>-.02</td>
<td>-.03</td>
<td>-.01</td>
<td>.04</td>
<td>.11</td>
<td>-</td>
<td>.13</td>
<td>.18</td>
<td>-.05</td>
<td>-</td>
</tr>
<tr>
<td>Blood glucose subscale (BG)</td>
<td>.12</td>
<td>.11</td>
<td>.09</td>
<td>.08</td>
<td>-.07</td>
<td>-</td>
<td>.28</td>
<td>.13</td>
<td>-</td>
<td>.09</td>
<td>.09</td>
</tr>
<tr>
<td>Complications subscale (COM)</td>
<td>.29</td>
<td>.11</td>
<td>.17</td>
<td>.28</td>
<td>-.05</td>
<td>-</td>
<td>.2</td>
<td>.18</td>
<td>.09</td>
<td>-</td>
<td>.03</td>
</tr>
<tr>
<td>Medication subscale (MED)</td>
<td>.08</td>
<td>.07</td>
<td>-.08</td>
<td>-.12</td>
<td>-.01</td>
<td>-</td>
<td>.12</td>
<td>-.05</td>
<td>.09</td>
<td>.03</td>
<td>-</td>
</tr>
</tbody>
</table>

1Significant correlation at \( p < 0.01 \). 2Significant correlation at \( p < 0.05 \).
Findings Related to Research Questions

Research questions and results are presented in this section. Multiple regression analyses were used to answer research questions concerning mediation effects. Prior to testing research questions, statistical tests for normality and evaluation for multicollinearity among independent variables were performed. Regression diagnostic statistics including studentized residuals, DFFITS, and DFBETAS were used during the modeling process to identify outlying and influential observations. No problems requiring remediation were identified with the data set.

Correlations between antecedent variables and self-efficacy, social support, and social problem-solving were examined to obtain variables to be controlled in regression models. Educational level was significantly correlated with self-efficacy and social problem-solving and was included in the regression analysis. However, during the model-building process, a significant relationship was noted between gender and diabetes self-management, but not between educational level and any of the other study variables. Gender was therefore the only antecedent included in the final regression model.

Mediation Testing

Step 1: Examine relationship between independent variable and outcome variable. What is the relationship between self-efficacy and diabetes self-management behaviors in people living with T2DM in rural Alabama?

For the purpose of comparison, simple regression was first performed to examine the relationship between self-efficacy and diabetes self-management behaviors. As seen in Table 6, self-efficacy was significantly associated with diabetes self-management
Self-efficacy explained 15.6% of the variance of diabetes self-management.

Table 6

Diabetes Self-management Regressed on Self-efficacy

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>.334*</td>
<td>.062</td>
<td>5.37</td>
</tr>
</tbody>
</table>

$F = 28.84$. $p<.0001$. Adjusted $R^2 = .156$. *$p<.0001$

Multiple regression was used to control for gender in the regression of diabetes self-management on self-efficacy. As shown in Table 7, self-efficacy scores were significantly associated with diabetes self-management when controlling for gender ($β = .332$, $p<.0001$). The overall model explained 16.9% of the variance of diabetes self-management in this sample. With or without gender in the model, the relationship between self-efficacy and diabetes self-management remained significant, indicating that the mediation requirement for step 1 was met.

Table 7

Diabetes Self-management Regressed on Self-efficacy, Controlling for Gender

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>.332*</td>
<td>.062</td>
<td>5.39</td>
</tr>
<tr>
<td>Gender</td>
<td>.364</td>
<td>0.196</td>
<td>-1.85</td>
</tr>
</tbody>
</table>

Step 2: Examine relationship between independent variable and each potential mediator. What is the relationship between self-efficacy and social support in people living with T2DM in rural Alabama?

In a simple regression model, self-efficacy was significantly associated with social support ($\beta=.156$, $p<.001$). To examine this relationship while controlling for gender, multiple regression was performed. Social support was regressed on self-efficacy and gender simultaneously. Self-efficacy had a significant relationship with social support ($\beta=.156$, $p<.001$), controlling for gender (Table 8). The overall model explained 7.1% of the variance of social support. The significant relationship found between self-efficacy and social support with or without gender indicated that the requirement for mediation in Step 2 was met.

Table 8

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
<th>SE$\beta$</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>.156*</td>
<td>.043</td>
<td>3.61</td>
</tr>
<tr>
<td>Gender</td>
<td>.104</td>
<td>.138</td>
<td>.76</td>
</tr>
</tbody>
</table>

$F = 6.77$. $p<.05$. Adjusted $R^2=.071$. *$p<.001$

What is the relationship between self-efficacy and social problem-solving in people living with T2DM in rural Alabama?

The relationship between self-efficacy and social problem-solving was significant in a simple regression model ($\beta=3.83$, $p<.0001$). Multiple regression was performed to evaluate this relationship, controlling for gender. As seen in Table 9, self-efficacy had a significant relationship with social problem-solving, controlling for gender. The overall
model explained 12% of the variance of social problem-solving. The mediation requirement for Step 2 was met as evidenced by the significant association between self-efficacy and social problem-solving with or without gender in the model.

Table 9

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>3.84*</td>
<td>0.82</td>
<td>4.66</td>
</tr>
<tr>
<td>Gender</td>
<td>2.41</td>
<td>2.62</td>
<td>.92</td>
</tr>
</tbody>
</table>


Step 3: Examine relationship between each potential mediator and the outcome variable, controlling for the independent variable. What is the relationship between social support and diabetes self-management behaviors, controlling for self-efficacy, in people living with T2DM in rural Alabama?

The relationship between social support and diabetes self-management behaviors, controlling for self-efficacy was first evaluated without gender. Diabetes self-management was regressed on social support and self-efficacy simultaneously. The relationship between social support and diabetes self-management was not significant. When gender was included in the model, the relationship between social support and diabetes self-management remained non-significant (Table 10).
What is the relationship between social problem-solving and diabetes self-management behaviors, controlling for self-efficacy, in people living with T2DM in rural Alabama?

Using multiple regression without gender initially, diabetes self-management was regressed on social problem-solving and self-efficacy simultaneously. The relationship between social problem-solving and diabetes self-management was not significant. When gender was included in the model, the relationship between social problem-solving and diabetes self-management remained non-significant (Table 11).

Table 10

**Diabetes Self-management Regressed on Social Support, Controlling for Self-efficacy and Gender**

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Support</td>
<td>.176</td>
<td>.122</td>
<td>1.44</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>3.99*</td>
<td>.520</td>
<td>7.67</td>
</tr>
<tr>
<td>Gender</td>
<td>-.393</td>
<td>.213</td>
<td>-1.84</td>
</tr>
</tbody>
</table>

$F = 2.59. \ p=.0783. \ Adjusted \ R^2=.02. \ *p<.0001$

Table 11

**Diabetes Self-management Regressed on Social Problem-solving, Controlling for Self-efficacy and Gender**

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Problem-solving</td>
<td>.011</td>
<td>.006</td>
<td>.08</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>3.55*</td>
<td>.661</td>
<td>5.38</td>
</tr>
<tr>
<td>Gender</td>
<td>-.401</td>
<td>.213</td>
<td>-1.88</td>
</tr>
</tbody>
</table>

$F = 3.17. \ p<.05. \ Adjusted \ R^2=.028. \ *p<.0001$
The non-significant relationships between social support and social problem-solving and the dependent variable, diabetes self-management, indicated that the requirement for mediation in Step 3 was not met.

**Step 4: Examine relationship between the independent variable and the outcome variable, controlling for each potential mediator.** What is the relationship between self-efficacy and diabetes self-management behaviors, controlling for social support, in people living with T2DM in rural Alabama? Since the relationship between social support and diabetes self-management was not significant, the fourth step was not necessary for the sample as a whole.

What is the relationship between self-efficacy and diabetes self-management behaviors, controlling for social problem-solving, in people living with T2DM in rural Alabama? Since the relationship between social problem-solving and diabetes self-management was not significant, the fourth step was not necessary for the sample as a whole.

What is the relationship between self-efficacy and diabetes self-management behaviors, controlling for social support and social problem-solving, in people living with T2DM in rural Alabama? This step was not necessary for the entire sample since no significant relationships existed among variables in the regression model.

**Moderation Testing**

Although gender was not significant in any of the mediation models, $p$ values for gender were between .06 and .07. Given the evidence in the literature that supports the
existence of gender differences among study variables (Chlebowy & Garvin 2006; Misra & Lager, 2009; Tang et al., 2008), gender was evaluated as a moderator of the relationship between social support and diabetes self-management and social problem-solving and diabetes self-management. In a multiple regression model, diabetes self-management was regressed on social support, gender, and an interaction term containing social support and gender (Table 12). The relationship between diabetes self-management and social support was not significant in the model. The relationships between gender and diabetes self-management as well as the interaction term and diabetes self-management were significant. These results indicated that the effect of social support on diabetes self-management differed by gender.

Table 12

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Support</td>
<td>.004</td>
<td>.139</td>
<td>.03</td>
</tr>
<tr>
<td>Gender</td>
<td>-3.18*</td>
<td>1.17</td>
<td>-2.71</td>
</tr>
<tr>
<td>Social Support x Gender</td>
<td>.659**</td>
<td>.273</td>
<td>2.41</td>
</tr>
</tbody>
</table>

$F = 3.73$. $p<.05$. Adjusted $R^2 = .051$.  *$p<.01$, **$p<.05$

A second moderation analysis was done to evaluate potential moderating effects of gender on the relationship between social problem-solving and diabetes self-management. The multiple regression model regressed diabetes self-management on social problem-solving, gender, and an interaction term containing social problem-solving and gender (Table 13). None of the relationships in this model were significant
indicating that gender was not a moderator of the relationship between social problem-solving and diabetes self-management.

Table 13

*Diabetes Self-management Regressed on Social Problem-solving, Gender, and Social Problem-solving by Gender*

<table>
<thead>
<tr>
<th>Variable</th>
<th>( \beta )</th>
<th>SE( \beta )</th>
<th>( t ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Problem-solving</td>
<td>.005</td>
<td>.007</td>
<td>.061</td>
</tr>
<tr>
<td>Gender</td>
<td>-2.77</td>
<td>1.45</td>
<td>-1.91</td>
</tr>
<tr>
<td>Social Problem-solving x Gender</td>
<td>.022</td>
<td>.014</td>
<td>1.65</td>
</tr>
</tbody>
</table>

\( F = 3.05. \ p<.05. \) Adjusted \( R^2=.039. \)

*Mediation Testing By Gender*

Because the results of a moderation analysis indicated that the effect of social support on diabetes self-management differed by gender, the effect of social support on diabetes self-management was evaluated separately for males and females in the study. Mediation testing was conducted separately for male and female study participants.

*Social support among females.* In women, the relationship between self-efficacy and diabetes self-management was significant (\( p<.05 \)). However, the relationship between self-efficacy and social support in women was not significant. Additionally, the relationship between social support and diabetes self-management was not significant in the sample of women. Lastly, the relationship between self-efficacy and diabetes self-management remained significant when controlling for social support (\( p<.05 \)), indicating that social support was not a mediator of that relationship.
Social support among males. In the sample of men, self-efficacy was significantly related to diabetes self-management (p<.0001). Self-efficacy was also significantly related to social support (p<.0001) and social support was significantly related to diabetes self-management (Table 14).

Table 14

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Support</td>
<td>.663*</td>
<td>.264</td>
<td>2.51</td>
</tr>
</tbody>
</table>

Because of these significant relationships, a mediational analysis was conducted to evaluate the relationship between self-efficacy and diabetes self-management while controlling for social support. When diabetes self-management was regressed on self-efficacy, controlling for social support, social support became nonsignificant while the relationship between self-efficacy and diabetes self-management remained significant (p<.05). These results indicate that social support was not mediating the relationship between self-efficacy and diabetes self-management in males (Table 15).

Table 15

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>.471*</td>
<td>.137</td>
<td>3.42</td>
</tr>
<tr>
<td>Social Support</td>
<td>.036</td>
<td>.302</td>
<td>.12</td>
</tr>
</tbody>
</table>

F = 9.7. p=.0003. Adjusted R²=.254. *p<.05
Social problem-solving. The relationship between self-efficacy and social problem-solving was also significant in the sample of men (p<.05). Additionally, the relationship between social problem-solving and diabetes self-management was significant (Table 16).

Table 16

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Problem-solving</td>
<td>.027*</td>
<td>.013</td>
<td>2.08</td>
</tr>
</tbody>
</table>

\[ F = 4.34. \ p=.042. \ \text{Adjusted } R^2 = .06. \ *p<.05 \]

A regression analysis to evaluate the relationship between self-efficacy and diabetes self-management controlling for social problem-solving for the sample of men was conducted due to the presence of these significant relationships. The relationship between self-efficacy and diabetes self-management, controlling for social problem-solving, remained significant (p<.001) and social problem-solving was no longer significant indicating that social problem-solving was not a mediator of the relationship (Table 17).

Table 17

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>.445*</td>
<td>.115</td>
<td>3.86</td>
</tr>
<tr>
<td>Social Problem-solving</td>
<td>.011</td>
<td>.012</td>
<td>.89</td>
</tr>
</tbody>
</table>

\[ F = 10.24. \ p=.0002. \ \text{Adjusted } R^2 = .266. \ *p<.001 \]
Summary of Findings

Data analysis of 152 participants provided the following findings:

1. The majority of participants were female (100), African American, and between the ages of 40-70 years. Over half had at least a high school education and had been diagnosed with type 2 diabetes for 10 years or less.

2. Mean scores of study variables suggested that participants had above middle range scores of self-efficacy and high levels of social support. The total social problem-solving score was above middle range as was the positive problem orientation and rational problem-solving subscales. Mean scores on diabetes self-management were also above middle range with only the exercise subscale falling below middle range.

3. Analysis of correlations among study variables revealed significant correlations between self-efficacy and social support, social problem-solving, and diabetes self-management. However, diabetes self-management was not significantly correlated with social support or social problem-solving. The diabetes self-management subscale, checking for complications, was significantly correlated with both the total social problem-solving score and the constructive problem-solving subscale. Social support and social problem-solving also were significantly correlated.

4. In testing mediation effects of social support and social problem-solving on the relationship between self-efficacy and diabetes self-management, the requirements for mediation were not met for the entire sample.

5. Because the results of a moderation analysis indicated that the effect of social support on diabetes self-management differed by gender, the effect of social support on diabetes self-management was evaluated separately for males and females in the study.
In women, self-efficacy was not significantly related to social support. In men, significant relationships existed between self-efficacy and social support and self-efficacy and social problem-solving. Social support and social problem-solving were also significantly related to diabetes self-management. Mediational analysis using the subset of males revealed that neither social support nor social problem-solving were mediators of the relationship between social support and social problem-solving.
CHAPTER 5
DISCUSSION, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this descriptive correlational study was to examine whether social support and social problem-solving were mediators of the relationship between self-efficacy and diabetes self-management behaviors in rural Alabamians living with T2DM. Relationships among self-efficacy, social support, social problem-solving, and diabetes self-management behaviors in rural Alabamians living with T2DM also were examined in this mediational study.

A convenience sample of 152 people living with T2DM was recruited from three clinics in two rural Alabama counties. Participants responded to a set of self-report questionnaires, including the DMSES, MOS Social Support Survey, SPSI-R:L, SDSCA, and Hollingshead Four Factor Index of Social Status. Sociodemographic information also was assessed including race, age, and number of years diagnosed with diabetes.

Descriptive statistics were used to describe sample characteristics. Mean and standard deviation were reported for the Hollingshead Four Factor Index of Social Status. Means, standard deviations, and correlations were reported on study variables including self-efficacy, social support, social problem-solving, and diabetes self-management behaviors. Cronbach’s alpha was used to evaluate the internal consistency of instruments used in this study. Multiple regression tested the mediation effects of social support and social problem-solving.
This chapter presents a discussion of study findings and conclusions from the study. Implications for nursing research, education, and practice are addressed. Recommendations for future research also are proposed.

Discussion

Sample Characteristics

The majority of study participants was female (65.8%), African American (58.6%), over the age of 50 (56.6%), and had at least a high school education (57.9%). Of the sample, 33.6% were single and 36.8% were married. The remainder was either widowed (15.8%), divorced (9.2%), or separated (4.6%). Most (59.3%) of the participants were diagnosed with T2DM for 10 years or less. The mean Hollingshead Index for Social Status score for the sample was low at 25.7 (SD=11.2) which is consistent with the social strata of semiskilled workers.

African Americans comprise a large percentage of the population in rural south Alabama counties. The African American population is disproportionately affected by T2DM when compared to Caucasians (USDHHS, CDC, 2011). The larger number of African Americans in this study sample is consistent with these findings (ADPH, 2007).

Instrument Reliability

Total scale scores for all measures possessed satisfactory Cronbach’s alpha values, ranging from .72 for the SDSCA to .96 for the MOS Social Support Survey. With the exception of two subscales on the SDSCA, instrument subscales had Cronbach’s alpha values ranging from .74 to .97.
The monitoring for complications subscale of the SDSCA had a Cronbach’s alpha of .53 for the study. The subscale consists of two items; one that asks respondents to report how many days of the last week they checked their feet for complications and a second that asks them to report how many days they checked the insides of their shoes. Many respondents reported checking their feet seven days of the previous week (76.3%), but were not aware that they should be checking the insides of their shoes and thus reported “0” days for that question (38.2%).

Another SDSCA subscale, exercising, had a Cronbach’s alpha value of .66. This subscale also is composed of two items. The first asks respondents how many of the last seven days they got at least 30 minutes of physical activity. The second asks respondents how many of those seven days they participated in a specific exercise such as walking, swimming, or stretching. The majority of participants (61.8%) reported getting at least 30 minutes of physical activity at least four out of seven days per week, but only 33.5% reported participating in a specific type of exercise. Because participants answered on opposite extremes for the questions on these two subscales, a low Cronbach’s alpha value resulted.

Self-efficacy

The DMSES measures confidence in ability to manage diabetes based on a 0-10 scale. Scores of 0-3 fall within the “cannot do at all” range, scores of 4-6 within the “maybe yes, maybe no” range, and scores 7-10 within the “certain can do” range. The mean score of 7.53 for this sample indicates that participants feel relatively confident that they can manage diabetes.
Self-efficacy scores from previous studies are similar to the findings from this study. A mediational study done to examine relationships among self-care agency, self-efficacy, self-care, and glycemic control included a sample of 141 primarily Caucasian, married females from the Southeastern United States living with Type 1 DM or T2DM (Sousa et al., 2005). Participants in this study also reported moderately high levels of self-efficacy. A sample of 408 ethnically diverse participants living with T2DM in a large metropolitan city in the United States reported self-efficacy scores similar to the ones in the current study (Sarkar et al., 2006). The mean self-efficacy score in that sample was 74 out of 100 with a standard deviation of 18.

One study conducted in a rural area of the Southeastern United States measured baseline self-efficacy scores prior to implementation of an intervention to improve diabetes self-management (Utz et al., 2008). Scores on the self-efficacy measure were high for this sample with a mean of 33 out of 40 (SD=4.57) for the intervention group and 34.25 (SD=4.27) for the control group. This study employed a small sample of 21 primarily female African Americans from one rural community. High self-efficacy scores could be attributed to the fact that a more highly motivated group volunteered to participate in a study designed to improve their diabetes self-management. Participants in a second study also rated their self-efficacy for diabetes self-management high with a mean of 4 out of 5 (Gucciardi, Wang, DeMelo, Amaral, & Stewart, 2008). This study conducted in a large metropolitan area of Canada recruited participants from two diabetes education centers. Therefore, participants in the study could have higher self-efficacy scores as a result of active participation in a diabetes education program.
Participants in another study rated their self-efficacy for performing self-management activities including diet, exercise, medication, blood glucose monitoring, and general diabetes management (O’Hea et al., 2009). The sample was comprised of mainly African American females who had been living with T2DM for an average of 8 years. Self-efficacy scores in this study were lower than in the current study (M=67.29/100; SD= 21.77). One explanation for the lower self-efficacy scores among this sample could be the presence of other chronic illnesses leading to responses that may have been based on experiences with other comorbid health conditions.

**Social Support**

Total social support scores for the current study sample were high with a mean of 4.18, indicating that participants perceive themselves to be well-supported by others. Individual social support subscale scores were also high ranging from 4.05 for positive social interaction to 4.37 for affectionate support. Perception of high social support in this sample may be due to the rural location of the sample. People living in rural areas often have extended family members living nearby. They also frequently share advice and information with family and community members including facts about diabetes management (O’Brien & Denham, 2008).

The social support total score is similar to findings from a study conducted with primarily Caucasian women who had at least a high school education and had other chronic illnesses (Shigaki et al., 2011). The mean social support score as measured by the MOS Social Support Survey for this sample was 3.04. The MOS Social Support
Survey also was used in a study with Canadian men and women (Gucciardi et al., 2008). The mean social support score in that sample was high at 4.41.

Studies using other measures of social support also found high social support scores among study participants (Westaway et al., 2005). A study that compared social support satisfaction between Caucasian and African American people living with T2DM found high levels of satisfaction in both groups (Chlebowy & Garvin, 2006). The mean score for Caucasians was higher at 5.4 out of 6 compared to 4.6 for African Americans.

**Social Problem-solving**

Higher scores on the total and subscale scores of social problem-solving indicate better overall problem-solving abilities. The mean total standardized score for this sample was 105.54 suggesting that participants had relatively good problem-solving ability. Evaluation of means for each of the subscales indicates that participants generally used a more positive than negative orientation. Rational problem-solving scores were high for the sample (M=122.7). Scores on the remaining two subscales that measure dysfunctional styles of problem-solving were lower (ICS=99.57; AS=101.03). SPSI scores for this study are similar to another study of people living with T2DM (Hill-Briggs et al., 2006).

A study with 64 African American, primarily female, participants with T2DM measured problem-solving using another scale, the Diabetes Problem-Solving Scale (DPSS) (Hill-Briggs et al., 2007). Problem-solving scores for that sample were lower than in the current study with a mean of 20.7 out of 30. Evaluation of DPSS subscales
indicated that participants used more positive than negative problem-solving, consistent with current study findings (Hill-Briggs et al.).

*Diabetes Self-management*

The mean score of 4.59 for diabetes self-management indicates that participants in this sample are participating in diabetes self-management behaviors most days of the week. Evaluation of individual subscales indicated high medication compliance (M=6.81). Additionally, participants follow a healthy eating plan, monitor blood glucose, and check feet for complications most days of the week (M=4.1, 4.87, 4.91, respectively). The mean for exercise was the lowest of the subscales at 3.26.

These findings are consistent with findings from a previously mentioned study of 275 Canadian males and females (Gucciardi et al., 2008). Results from that study indicated that participants followed a healthy eating plan an average of 4.39 days per week, monitored blood glucose 4.72 days per week, and checked feet for complications 3.73 days per week. Again, exercise received the lowest rate of participation amongst study participants at a mean of 3.26 days per week (Gucciardi et al.). Current study findings also are similar to findings from a study with a large, ethnically diverse sample (Sarkar et al., 2006). These participants reported the largest percentage of adherence to taking medication (64%), while following a recommended diet plan (33%) and exercising (35%) were the lowest percentages. Similarly, a smaller study with rural African American participants found that they most often took their medication, 86% for the intervention group and 90% for the control group, but least often participated in exercise, 41% for the intervention group and 46% for the control group (Utz et al., 2008).
While the majority of participants in the current study (61.8%) reported participating in at least 30 minutes of physical activity every day, only 33.5% reported participating in a specific type of exercise. Anecdotal comments from participants revealed that reasons for the smaller percentage who participate in a specific exercise include the weather not being appropriate for outside exercise, lack of access to exercise facilities, and physical limitations.

In regards to the checking for complications subscale, more than 75% of study participants reported checking their feet seven days of the previous week (76.3%). The second item on this subscale, checking inside of shoes, scored much lower with 38.2% reporting 0 days for the previous week. Anecdotally, participants reported that they were not aware they needed to check the inside of their shoes as this had not been discussed in diabetes education classes or by their healthcare provider.

Associations Among Study Variables

Self-efficacy and diabetes self management. Self-efficacy was significantly associated with the total diabetes self-management scale as well as three of the five subscales including eating a healthy diet, exercising, and checking feet for complications. Self-efficacy was not significantly associated with monitoring blood glucose or taking medications.

These findings are supported by other studies that found significant correlations between self-efficacy and the diabetes management behaviors of glucose monitoring, exercising, and following a diabetes diet, but not taking medications (Mishali, Omer, & Heymann, 2010; Sarkar et al., 2006). Taking diabetes medications was not significantly
correlated with self-efficacy, possibly because taking medications is less dependent on feelings of self-efficacy than other behaviors that require more change, such as following a diet or exercising. A study that evaluated the correlation between self-efficacy and a total score for diabetes self-management found a significant correlation between the two variables, indicating that participants with higher self-efficacy had higher self-care behavior (Wu et al., 2007). Lastly, a study that used the DMSES and SDSCA to measure self-efficacy and diabetes self-management in a Chinese population found a significant correlation between the two variables (Xu et al., 2008).

**Self-efficacy and social support.** Self-efficacy was also significantly associated with the social support total score and subscales. In this sample, those with higher levels of social support reported higher levels of self-efficacy. Previous studies support these findings. A study with primarily Hispanic Americans found that diabetes-related tangible support was significantly negatively related to diabetes self-efficacy, indicating that those who need more support have lower levels of self-efficacy (Coffman, 2008). A study with 201 Chinese participants living with T2DM found a significant correlation between self-efficacy and social support (Xu et al., 2008). Intervention studies in which social support is provided for people living with T2DM found that self-efficacy is improved with increased social support (Heisler & Piette, 2005; Klug et al., 2008; Lorig et al., 2009).

**Self-efficacy and social problem-solving.** Self-efficacy was significantly associated with social problem-solving total and constructive and dysfunctional subscales. The significant relationship between self-efficacy and social problem-solving
contributes to the sparse amount of literature examining this relationship. Two previous studies also found relationships between self-efficacy and social problem-solving (DeCoster & George, 2005; Glasgow et al., 2004).

**Diabetes self-management and social support.** Diabetes self-management was not significantly correlated with social support in this sample. These findings are in contrast to many studies that did find a relationship between diabetes self-management and social support. A possible explanation could be the difference in how social support is measured. In this study, amount of emotional/informational, tangible, affectionate, and positive interaction social support were measured. Studies that did find significant relationships measured sources of social support, satisfaction with social support, and positive and negative support behaviors (Shaw et al., 2006; Tang et al., 2008). One study that measured satisfaction with support, positive and negative support behaviors, and amount of support found significant relationships between satisfaction, positive and negative behaviors, and diabetes self-management, but not between amount of support and diabetes self-management (Tang et al., 2008). Results from that study and the current study indicate the importance of measuring quality of social support rather than just the availability of support.

**Diabetes self-management and social problem-solving.** Diabetes self-management was not significantly correlated with social problem-solving in this sample. Examination of diabetes self-management subscales revealed one significant correlation between the checking for complications subscale and social problem-solving total score
Correlations between diabetes self-management subscales and the dysfunctional and constructive SPSI subscales also revealed only one significant relationship between the checking for complications subscale and constructive subscale (p<.05). Another study that used the short version of the Social Problem-solving Inventory in a sample of urban African Americans found an association between the total scale and medication adherence only (Hill-Briggs et al., 2006). In that study, no association was found between the total scale and exercise or self-monitoring of blood glucose. Additionally, none of the subscales were significantly correlated with any of the self-management behaviors.

The finding of no significant relationship between diabetes self-management and social problem-solving is in contrast to other studies that did find a significant relationship between the variables. In a multiethnic sample from the United States, problem-solving was significantly related to diet and exercise self-management (Glasgow et al., 2007). Another study found that higher problem-solving scores in an African American sample were significantly associated with higher medication adherence and more frequent blood glucose monitoring (Hill-Briggs et al., 2007). Differences in findings between this study and previous studies could be related to the measurement tool. The Diabetes Problem-Solving Scale was used in one study (Glasgow et al., 2007) and the Diabetes Problem-Solving Inventory was used in the other (Hill-Briggs et al., 2007). Also, differences exist in the sample for the current study and previous studies. Sample size ranged from 64 for one study (Glasgow et al.) to 506 for another (Hill-Briggs et al.). Similar to the current study, the majority of participants in these two studies were women between the ages of 51 to 70. However, participants in the Glasgow et al. (2007)
study had a higher educational level, with a mean of 14.5 years. Years diagnosed with diabetes was similar in the current study to the Glasgow et al. study, but participants in the Hill-Briggs et al. (2007) study had been diagnosed longer with an average of 11.9 years. The current study consisted of 58.6% African American participants. The Hill-Briggs et al. study was 100% African American and the Glasgow et al. study included a multiracial sample. Finally, these two studies were composed of participants from urban areas and the current study used a rural sample.

Mediation Testing

Mediation testing was conducted using four sequential steps as described by Baron and Kenny (1986).

Step 1: Relationship between independent and the outcome variable. In the regression model, self-efficacy ($\beta$=.333; $p<.0001$) had a significant association with diabetes self-management. Of the antecedent variables evaluated in the analysis, only gender had a significant association with diabetes self-management ($\beta$ = -.41; $p<.05$). The model containing self-efficacy and gender explained 16.9% of the variance in diabetes self-management. This finding indicates that people living with T2DM who have more self-efficacy also participate in more diabetes self-management behaviors.

The association between self-efficacy and diabetes self-management is similar to findings from previous studies in which people living with T2DM who reported higher self-efficacy scores were more likely to report optimal diet, exercise, self-monitoring of blood glucose, and foot care (King et al., 2010; Sarkar et al., 2006; Wang & Shiu, 2004).
This is also consistent with the finding that diabetes self-efficacy is a significant factor influencing diabetes self-management found in another study (Xu et al., 2008). In another mediational study, self-efficacy strongly affected diabetes self-care management (Sousa et al., 2005).

Step 2: Relationship between independent variable and potential mediators. The requirement for mediation testing in step two was met for both social support and social problem-solving. Self-efficacy had a significant association with social support ($\beta = .156, \ p < .001$) and social problem-solving ($\beta = 3.83, \ p < .0001$). When gender was included in the model, the relationship between self-efficacy and social support was still significant ($\beta = .156, \ p < .001$) as well as the relationship between self-efficacy and social problem-solving ($\beta = 3.84, \ p < .0001$). The variance accounted for by each model was 7.1% for social support and 12% for social problem-solving.

Both relationships between self-efficacy and social support and self-efficacy and social problem-solving are supported by previous research. Significant relationships have been found between self-efficacy and social support in other studies (Coffman, 2008; Lorig et al., 2009; Rosland, 2008; Xu et al., 2008). Although research related to self-efficacy and social problem-solving is sparse, significant associations have been identified in some studies. An intervention study found significant improvements in problem-solving following a support program and problem-solving was found to be a partial mediator of the relationship between the intervention and self-efficacy (Glasgow et al., 2004).
Step 3: Relationship between potential mediators and the outcome, controlling for independent variable. The requirement for mediation testing was not met in this step for the entire sample. Neither social support nor social problem-solving were significantly associated with diabetes self-management, controlling for self-efficacy. Although many previous studies have found significant relationships between social support and diabetes self-management, other studies have found no significant relationship between social support and self-management behaviors. One study examined number of social support persons and satisfaction with those persons, but found no association between either of these and diabetes self-management (Chlebowy & Garvin, 2006). A second study of primarily Caucasian women with a mean of 4.6 chronic medical conditions found no relationship between social support as measured by the MOS Social Support Survey and diabetes self-management as measured by the SDSCA (Shigaki et al., 2011). Both of these studies examined availability of social support and Chlebowy and Garvin also examined satisfaction with support. Absence of significant relationships between social support and diabetes self-management could be related to the need to evaluate source, type, and quality of social support.

Examination of the relationship between social support and self-management using a structural equation model in a sample of people living with T2DM in China found no direct relationship between social support and self-management, but did find that these variables were indirectly related through self-efficacy (Xu et al., 2008). This study suggests the presence of a mediating factor between the social support and self-management relationship that should be further explored.
Previous studies have found significant associations between problem-solving and self-management behaviors including following a diet, exercising, medication-taking, and blood glucose monitoring (Glasgow et al., 2007; Hill-Briggs et al., 2007; King et al., 2010). In another study, multiple regression analysis revealed a significant relationship between social problem-solving and medication adherence, but no significant relationships were identified between social problem-solving and physical activity or self-monitoring of blood glucose (Hill-Briggs et al., 2006). That study included a small sample (n=65) of urban African Americans who reported more ineffective than effective problem-solving behaviors. The non-significant relationship between social problem-solving and diabetes self-management behaviors could indicate participant’s inability to manage social situations that negatively affect diabetes care instead of their inability to manage problems associated with their diabetes.

Step 4: Relationship between independent variable and the outcome, controlling for potential mediators. Since the relationship between social support and diabetes self-management was not significant, the fourth step was not necessary for the sample as a whole. This step was evaluated for the sample of men due to the presence of a significant relationship between self-efficacy and diabetes self-management and social support and diabetes self-management in that subset. In the regression analysis, the relationship between self-efficacy and diabetes self-management remained significant (p<.05), but social support was no longer significant in the model indicating that social support was not a mediator of the relationship between self-efficacy and diabetes self-management.
Also, the relationship between self-efficacy and diabetes self-management, controlling for social problem-solving, remained significant (p<.001), but social problem-solving was no longer significant indicating that social problem-solving was not a mediator of the relationship between self-efficacy and diabetes self-management.

In a model containing self-efficacy and diabetes, controlling for social support, social problem-solving, and gender, the relationship between self-efficacy and diabetes self-management remained significant (p<.05), but neither social support nor social problem-solving were significant in the model. No previous studies were identified that evaluated social support and social problem-solving as mediators between self-efficacy and diabetes self-management to compare findings.

A study that evaluated effects of individual and environmental factors on diabetes self-management found that self-efficacy did affect diabetes self-management, and social support indirectly affected self-management through self-efficacy (Xu et al., 2008). The significant relationships between self-efficacy and social support and self-efficacy and social problem-solving, but lack of mediation by these variables between self-efficacy and self-management may indicate that the variables are indirectly affecting self-management through self-efficacy.

**Moderation Testing**

Based on p values for gender between .06 and .07 in mediation models and previous studies that found gender differences among social support, social problem-solving, and diabetes self-management, a moderation analysis was conducted to determine whether the relationship between social support and diabetes self-management
and social problem-solving and diabetes self-management was affected by gender. The results of this analysis revealed no moderation by gender for social problem-solving, but that the effect of social support on diabetes self-management differed by gender.

Following this analysis, the relationships among self-efficacy, social support, social problem-solving, and diabetes self-management were examined separately for women and men.

In the analysis with women only, social problem-solving was significantly related to self-efficacy, but not to diabetes self-management. Social support was not significantly related to self-efficacy or diabetes self-management. The analysis with men only did reveal significant associations. Social support was significantly related to self-efficacy and diabetes self-management. Social problem-solving was also significantly related to self-efficacy and diabetes self-management.

Previous studies comparing social support and social problem-solving between men and women are limited. One study found that men reported more negative support than positive (Toljamo & Hentinen, 2001). Another study examined amount of support received from three sources, family, friends, and a significant other. Men reported social support from a significant other at lower levels than women, but support from family and friends was higher for them than for women in the sample (Goz, Karaoz, Goz, Ekiz, & Cetin, 2007). A study of characteristics of men and women with diabetes found that women perceived higher levels of social support from the healthcare team than men and men reported more family support than women (Gucciardi et al., 2008). In another study with African American men and women, men reported receiving greater social support,
experiencing more satisfaction with support, and receiving more positive support compared with women (Tang et al., 2008).

A study designed to test psychometric properties of the Diabetes Problem-Solving Scale found no difference in total or subscale scores for males and females (Hill-Briggs et al., 2007). A second study measured the relationship between problem-solving and diabetes self-management and found no difference by gender for problem-solving scores (Glasgow et al., 2007). Another study that used the SPSI-R: Short form found no difference in problem-solving scores for men and women (Hill-Briggs et al., 2006). All of these studies were conducted with participants from urban areas. Differences may exist in problem-solving between males and females in rural areas that do not exist in those living in urban areas.

Conclusions

The following conclusions are made based on major study findings:

1. Self-efficacy is a strong predictor of diabetes self-management, with those having higher levels of self-efficacy participating in more self-management behaviors.

2. The effect of social support on diabetes self-management differed by gender in this sample.

3. Social support and social problem-solving were significantly associated with diabetes self-management in men living with T2DM in this sample.

4. Social support and social problem-solving were not mediators of the relationship between self-efficacy and diabetes self-management in this sample of people living with T2DM.
Implications

Implications for Nursing Research

Findings from this study support previous research that demonstrates the important relationship between self-efficacy and diabetes self-management. Correlations between self-efficacy and specific diabetes self-management skills indicate that researchers should measure self-efficacy for each specific behavior rather than as a general measure. Additionally, study findings indicate that differences in diabetes self-management exist between men and women, especially in regards to social support. Intervention studies aimed at self-efficacy, social support, social problem-solving, and diabetes self-management should consider gender differences.

Implications for Nursing Education

Nurses must understand the complexity of diabetes self-management and difficulties faced by people living with T2DM. Nursing educators provide evidence-based information about physiological and psychological aspects of diabetes care to both nursing students and people living with T2DM. This study demonstrates that educational needs may be different for men and women particularly concerning social support. Educators should communicate these differences to students and consider gender when designing educational interventions for people living with diabetes.

Implications for Nursing Practice
Improvements in self-management behaviors lead to better quality of life and improved glycemic control in people living with T2DM (Song, 2010). The goal of nursing in relation to diabetes is to enhance patients’ ability to care for themselves. Identifying factors that improve diabetes self-management is important for achievement of that goal. Interventions should focus on improving self-efficacy thereby affecting diabetes self-management.

The study finding that self-efficacy was strongly associated with diabetes self-management emphasizes self-efficacy as an important intervention target in people living with T2DM. Assessment of self-efficacy during an initial visit with new patients and periodic ongoing assessments can provide a means for assessing the degree of support each patient may need to start and maintain behavioral change (Mishali et al., 2010). Nurses can assist patients to improve self-efficacy for diabetes self-management by encouraging participation in decision-making about their care, educating them about their condition, motivating them to adopt healthy behaviors, and teaching them to know when to seek help from healthcare providers (Silva, 2011). Facilitating small, achievable goals can increase self-efficacy for managing diabetes and build confidence for achievement of larger, more complex goals (O’Hea et al., 2009).

Assessment of patients living with T2DM should include availability of social support, sources of support, and quality of the support provided. Once effective sources of social support have been identified, strategies for receiving positive support should be determined including interventions such as educational and support group meetings (Goz et al., 2007). Consideration of gender differences in social support should be given when planning interventions.
In this study, problem-solving was not related to diabetes self-management in women, but was significantly related in men. Problem-solving interventions have been shown to significantly improve participation in diabetes self-management behaviors in previous research (Tang et al., 2005). Providing problem-solving based intervention programs for people living with T2DM can be beneficial, especially for men.

Recommendations for Future Research

Recommendations for future research are proposed based on the findings, conclusions, and limitations of the present study. These recommendations include:

1. Measure not only availability of support, but sources, types, and quality of social support for people living with T2DM.

2. Future research should expand recruitment sites to increase variability among participants in demographics (e.g., more male participants) and disease severity (include those newly diagnosed through those with end-stage diabetes complications). Possible recruitment settings include clinics in both urban and rural areas, diabetes treatment centers, diabetes education centers, and hemodialysis centers.

3. A longitudinal design study should be conducted to monitor changes in self-efficacy, social support, social problem-solving, diabetes self-management over time rather than a one-time assessment as this descriptive correlational study provided.

4. A comparative study of factors contributing to effective diabetes self-management in men and women should be conducted to evaluate gender differences.

5. A study to evaluate other potential mediators of the relationship between self-efficacy and diabetes self-management would be beneficial. Previous studies have
evaluated efficacy expectations as described by Bandura (1986) and diabetes self-management and found significant relationships. Another component of self-efficacy described by Bandura is outcome expectations. This aspect of self-efficacy has not been well-studied in relation to diabetes self-management, but could be a potential mediator between efficacy expectations and diabetes self-management.

6. The strong relationship between self-efficacy and diabetes self-management emphasizes the need to determine what factors contribute to higher levels of self-efficacy in people living with T2DM so that interventions focused on those factors can be implemented. Gender differences should be included in this study.

7. A study to evaluate whether social support and social problem-solving may have indirect effects on self-management through self-efficacy in people living with T2DM is also warranted.
References


http://www.arhaonline.org/what_is_rural.htm

American Association of Diabetes Educators (2006, April). Regulatory restrictions limit people with diabetes from receiving the self-management skills they need. Retrieved from


American Diabetes Association (2007). Diabetes statistics. Available at


Hollingshead, A.B. (1975). *Four factor index of social status*. Unpublished working paper, Department of Sociology, Yale University, New Haven, CT.


APPENDIX A

IRB APPROVAL LETTER
THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Institutional Review Board for Human Use

Form 4: IRR Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

UAB’s Institutional Review Board for Human Use (IRB) has an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The Assurance number is FWA0005900 and it expires on September 29, 2011. The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56.

Principal Investigator: HUNT, CARALINE W
Co-Investigator(s): 
Protocol Number: X10109005
Protocol Title: Relationships Among Self-Efficacy, Social Support, Social Problem-Solving, and Self-Management Behaviors of People Living with Type 2 Diabetes in Rural Alabama

The IRB reviewed and approved the above named project on 12/17/10. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.
IRR Approval Date: 12/17/10
Date IRR Approval Issued: 12/17/10

Marilyn Davis, M.A.
Vice Chair of the Institutional Review Board for Human Use (IRB)

Investigators please note:
The IRB approved consent form used in the study must contain the IRB approval date and expiration date.

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one-year anniversary of the IRB approval date.

Any modification in the study methodology, protocol, and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.

410 Administration Building
701 20th Street South
Birmingham, AL 35294-0002

The University of Alabama at Birmingham
Human Research Protections Office

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APPENDIX B

IRB-APPROVED CONSENT DOCUMENT
to research, including the Office for Human Research Protections (OHRP). The results of this study will be published for scientific purposes. However, your identity will not be given out.

Refusal or Withdrawal without Penalty

Whether or not you take part in this study is your choice. There will be no penalty if you decide not to be in the study. If you decide not to be in the study, you will not lose any benefits you are otherwise owed. You are free to withdraw from this research study at any time. Your choice to leave the study will not affect your relationship with this institution.

Cost of Participation

There will be no cost to you for taking part in this study.

Payment for Participation in Research

There will be no payment for taking part in this study.

Questions

If you have any questions, concerns, or complaints about the research, please contact Caroline Hunt. She will be glad to answer any of your questions. Mrs. Hunt's number is 334-844-0763. If you decide after completing the survey that you do not want to participate in the study, call Mrs. Hunt and provide the survey number listed on the last page of this informed consent letter. Your survey will be removed from the study.

If you have any questions about your rights as a research participant, or concerns or complaints about the research, you may contact Ms. Shella Moore. Ms. Moore is the Director of the Office of the Institutional Review Board for Human Use (OIRB) at the University of Alabama at Birmingham. Ms. Moore may be reached at 205-934-3789 or 1-800-822-8816. If calling the toll-free number, press the option for “all other calls” or for an operator/attendant and ask for extension 4-3789. Regular hours for the Office of the IRB are 8:00 am to 5:00 pm CT, Monday through Friday. You may also call this number in the event the research staff cannot be reached or you wish to talk to someone else.

Additionally, if you have questions about your rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334) 844-5966 or e-mail at humaninfo@auburn.edu or IRBChat@auburn.edu.

Legal Rights

You are not waiving any of your legal rights by signing this informed consent document.

Page 3 of 3
Version Date: 12/13/19

Participant's initials: _______
**Signatures**

Your signature below indicates that you agree to participate in this study. You will receive a copy of this signed document.

<table>
<thead>
<tr>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature of Participant</td>
<td></td>
</tr>
<tr>
<td>Signature of Principal Investigator or Other Person Obtaining Consent</td>
<td></td>
</tr>
<tr>
<td>Signature of Witness</td>
<td></td>
</tr>
</tbody>
</table>

Survey 6
APPENDIX C

LETTERS OF SUPPORT
June 28, 2010

University of Alabama Birmingham Institutional Review Board
Room 470, Administration Building (A11)
701 20th Street South, Birmingham, AL 35294-0104

Please note that Mrs. Caralise Hunt, a University of Alabama Birmingham Graduate Student, has
my permission to conduct research at Notarolga Healthcare in Notarolga, Alabama for her study,
"Relationships among Self-efficacy, Social Support, Social Problem-solving, and Self-
management Behavior of People Living with Type 2 Diabetes in Rural Alabama."

Mrs. Hunt will provide guidelines for inclusion in the study to my office. Patients meeting the
criteria will be given a letter explaining the study and asked by the designated person to
participate. Those who agree to participate will be given a survey to complete in the office.
Upon completion, the survey will be placed in an envelope and returned to the office staff
member. Those who are unable to complete the survey while in the office may complete the
survey at home and return to Mrs. Hunt in the provided self-addressed, stamped envelope. Mrs.
Hunt plans to have all recruitment activities completed by May of 2011.

Mrs. Hunt will not need access to any patient charts. She will provide my office a copy of the
University of Alabama Birmingham Institutional Review Board approved and stamped document
before recruitment begins.

Sincerely,

[Signature]

Notarolga Healthcare
University of Alabama Birmingham Institutional Review Board
Room 470, Administration Building (AB)
701 20th Street South, Birmingham, AL 35294-0104

Please note that Mrs. Caroline Hunt, a University of Alabama Birmingham Graduate Student, has my permission to conduct research at Tuskegee Medical and Surgical Center in Tuskegee, Alabama for her study, "Relationships among Self-efficacy, Social Support, Social Problem-solving, and Self-care Management Behaviors of People Living with Type 2 Diabetes in Rural Alabama."

Mrs. Hunt will provide guidelines for inclusion in the study to my office. Patients meeting the criteria will be given a letter explaining the study and asked by the designated person to participate. Those who agree to participate will be given a survey to complete in the office. Upon completion the survey will be signed by the participant and returned to the office staff member. Those who are unable to return the survey to the office may complete the survey at home and return to Mrs. Hunt in the prepaid and pre-addressed stamped envelope. Mrs. Hunt plans to have all recruitment efforts completed by May 15, 2011.

Mrs. Hunt will not need access to my patient records. She will provide me a copy of the University of Alabama Birmingham Patient Assurance and Authorization Form, approved and stamped document before recruitment begins.

Signed,

[Signature]

June 28, 2010
June 28, 2010

University of Alabama Birmingham Institutional Review Board
Room 410, Administration Building (AB)
701 20th Street South, Birmingham, AL 35294-0104

Please note that Mrs. Carolina Hunt, a University of Alabama Birmingham Graduate Student, has my permission to conduct research at Lake Martin Family Medicine in Dadeville, Alabama for her study, “Relationships among Self-efficacy, Social Support, Social Problem-solving, and Self-management Behaviors of People Living with Type 2 Diabetes in Rural Alabama.”

Mrs. Hunt will provide guidelines for inclusion in the study to my office. Patients meeting the criteria will be given a letter explaining the study and asked by the designated person to participate. Those who agree to participate will be given a survey to complete in the office. Upon completion the survey will be placed in an envelope and returned to the office staff member. Those who are unable to complete the survey while in the office may complete the survey at home and return to Mrs. Hunt in the provided self-addressed, stamped envelope. Mrs. Hunt plans to have all recruitment activities completed by May of 2011.

Mrs. Hunt will not need access to any patient charts. She will provide my office a copy of the University of Alabama Birmingham Institutional Review Board approved and stamped document before recruitment begins.

Signed,
Patty Kers
Office Manager
Lake Martin Family Medicine
APPENDIX D

STUDY FACT SHEET
People Living with Type 2 Diabetes in Rural Alabama

Patients are invited to participate in the study if they:

1. have a type 2 diabetes mellitus diagnosis confirmed by a primary health provider or patient chart;
2. are age 19 years or older;
3. are able to speak English; and
4. reside in one of the following rural Alabama counties:
   Autauga, Baldwin, Barbour, Bibb, Blount, Bullock, Butler, Chambers, Cherokee,
   Chilton, Choctaw, Clarke, Clay, Cleburne, Coffee, Colbert, Conecuh, Coosa, Covington,
   Crenshaw, Cullman, Dale, Dallas, DeKalb, Elmore, Escambia, Fayette, Franklin, Geneva,
   Greene, Hale, Henry, Jackson, Lamar, Lawrence, Limestone, Lowndes, Macon,
   Marengo, Marion, Marshall, Monroe, Perry, Pickens, Pike, Randolph, Russell, St. Clair,
   Sumter, Talladega, Tallapoosa, Walker, Washington, Wilcox, or Winston

Patients should not be asked to participate if they are unable to:

1. perform their own self care behaviors.

If patients meet the above criteria:

1. refer them to the research team member visiting your office.

Questions or Concerns? Contact Caralise Hunt, RN at 334-663-0202 or 334-844-6763.
APPENDIX E

STUDY RECRUITMENT FLYER
BE PART OF IMPORTANT RESEARCH TO HELP US LEARN
HOW TO BETTER HELP YOU AND OTHERS MANAGE TYPE 2 DIABETES

The purpose of this research is to evaluate factors that may affect how you manage diabetes. As an important participant, you will be asked to complete a survey. You are eligible if you:

- are age 19 or over;
- have type 2 diabetes; speak English; and
- live in near-by counties.

Please ask your doctor or nurse how you can participate.

Contact Caralise Hunt at huntcara@uab.edu or 334-844-6763 for more information. This study is being conducted through the School of Nursing at the University of Alabama at Birmingham and has been approved by the Institutional Review Board.
APPENDIX F

STUDY INSTRUMENT
Day of the week data was collected: ______________________

Demographic Information

Please answer the following questions about yourself by circling the answer that best describes you.

1. Are you male or female?
   a. Male
   b. Female

2. What is your marital status?
   a. Single
   b. Living with someone
   c. Married
   d. Divorced
   e. Separated
   f. Widowed

3. What is your age?
   a. 19–25
   b. 26-30
   c. 31-40
   d. 41-50
   e. 51-60
   f. 61-70
   g. 71-80
   h. >/= 81

4. What is the highest level of education you have completed?
   a. 6th grade or less
   b. 7th-9th grade
   c. 10th-12th grade
   d. High school graduate
   e. Some college or certification course
   f. College graduate
   g. Graduate or Professional degree

5. What is the highest level of education your spouse has completed?
   a. 6th grade or less
   b. 7th-9th grade
   c. 10th-12th grade
   d. High school graduate
   e. Some college or certification course
   f. College graduate
   g. Graduate or Professional degree

6. What is your occupation/Job Title?
7. What is your spouse’s occupation/Job Title?

8. What is your race?
   a. African-American
   b. Hispanic/Latino(a)
   c. Asian/Middle Eastern/Pacific Islander
   d. Native American/Alaska Native
   e. Caucasian
   f. Multiracial
   g. Other

9. How long have you had type 2 diabetes?
   a. less than a year
   b. 1-5 years
   c. 6-10 years
   d. 11-15 years
   e. 16-20 years
   f. 21-25 years
   g. more than 25 years
Social Problem-Solving Inventory-Revised

Below are some ways that you might think, feel, and act when faced with PROBLEMS in everyday living. We are not talking about the ordinary hassles and pressures that you handle successfully everyday. In this questionnaire, a problem is something important in your life that bothers you a lot, but you don’t immediately know how to make it better or stop it from bothering you so much. The problems could be something about yourself (such as your thoughts, feelings, behavior, health, or appearance), your relationships with other people (such as your family, friends, teachers, or boss), or your environment and the things that you own (such as your house, car, property, money). Please read each statement carefully and choose one of the numbers below that best shows how much the statement is true of you. See yourself as you usually think, feel, and act when you are faced with important problems in your life these days. Put the number that you choose on the line before the statement.

0 = Not at all true of me
1 = Slightly true of me
2 = Moderately true of me
3 = Very true of me
4 = Extremely true of me

1. I worry too much about my problems instead of solving them.
2. I feel afraid when I have important problems.
3. When making decisions, I do not carefully check all my options.
4. When making decisions, I do not think about the effects that each option can have on others.
5. When solving problems, I think of different ideas and combine some to make a better solution.
6. I feel unsure of myself when making important decisions.
7. When my first attempt to solve a problem fails, I believe if I don’t give up, I will eventually succeed.
8. When I have a problem, I act on the first idea that comes to me.
9. I believe that my problems can be solved.
10. I wait to see if a problem goes away before trying to solve it myself.
11. I wait to see if a problem goes away before trying to solve it myself.
12. When my first efforts to solve a problem fail, I get very frustrated.
13. I doubt that I can sole difficult problems no matter how hard I try.
14. I put off solving problems for as long as possible.
0 = Not at all true of me
1 = Slightly true of me
2 = Moderately true of me
3 = Very true of me
4 = Extremely true of me

15. I do not take the time to check how well a solution worked.

16. I go out of my way to avoid dealing with problems.

17. Difficult problems make me very upset.

18. When making decisions, I try to predict the pros and cons of each option.

19. I like to deal with problems as soon as possible.

20. I try to be creative and think of original solutions to problems.

21. When solving problems, I go with the first good idea that comes to mind.

22. When solving problems, I cannot think of many ideas.

23. I avoid thinking about problems instead of trying to solve them.

24. When making decisions, I think about the short-term and long-range outcomes of each option.

25. After carrying out a solution, I check to see what went right and what went wrong.

26. After trying to solve a problem, I check to see how much I feel better.

27. I practice a solution before carrying it out to improve my chance of success.

28. I believe I can solve difficult problems on my own if I try hard.

29. When I have a problem, I get as many facts about it as possible.

30. I put off solving problems until it is too late to do anything about them.

31. I spend more time avoiding my problems than solving them.

32. When I have a problem, I get so upset that I cannot think clearly.

33. Before trying to solve a problem, I set a goal so I know exactly where I am going.

34. When making decisions, I do not take the time to think about the pros and cons of each option.
35. When I fail to solve a problem, I try to find out what went wrong and then I try again.
   0 = Not at all true of me
   1 = Slightly true of me
   2 = Moderately true of me
   3 = Very true of me
   4 = Extremely true of me

36. I hate solving problems.

37. After I carry out a solution, I check to see how much the problem has gotten better.

38. I try to see my problems as challenges.

39. When solving problems, I think of many different options.

40. When making decisions, I weigh the outcomes of each option.

41. When I have an important problem, I get depressed and don’t do anything.

42. I go to someone else for help in solving difficult problems.

43. When making decisions, I think about the effects of each option on my feelings.

44. When I have a problem, I look for those things around me that might be causing it.

45. When making decisions, I go with my “gut feeling” without thinking about what will happen.

46. When making decisions, I use a system to help me pick the best option.

47. When solving a problem, I keep my goal in mind at all times.

48. I look at problems from different angles.

49. When I don’t understand a problem, I try to find out more about it.

50. I get discouraged and depressed when my first efforts to solve a problem fail.

51. I do not take the time to check out why a solution did not work.

52. I am too quick to act when making decisions.
Diabetes Management Self-Efficacy Scale (DMSES)

**Directions**
Below is a list of activities you have to perform to manage your diabetes. Please read each one and then put a line (/) through the number which best describes how confident you usually are that you could carry out that activity. For example, if you are completely confident that you are able to check your blood sugar levels when necessary, put a line through 10. If you feel that most of the time you could not do it, put a line through 1 or 2.

*I am confident that I am able to:*

<table>
<thead>
<tr>
<th></th>
<th>Cannot do at all</th>
<th>Maybe yes Maybe no</th>
<th>Certain can do</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>check my blood sugar if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>correct my blood sugar when the sugar level is too high.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>correct my blood sugar when the sugar level is too low.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>choose foods that are best for my health.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>choose different foods and maintain a healthy eating plan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>keep my weight under control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>examine my feet (e.g. for cuts or blisters).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>do enough physical activity (e.g. walking the dog; yoga; gardening; stretching exercises).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>to maintain my eating plan when I am ill.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>follow a healthy eating plan most of the time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>do more physical activity if the doctor advises me to.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>adjust my eating plan when doing more physical activity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>follow a healthy eating plan when I am away from home.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>choose different foods and maintain my eating plan when I am away from home.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>follow a healthy eating plan during holidays.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cannot do at all</td>
<td>Maybe yes Maybe no</td>
<td>Certain can do</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>16</td>
<td>choose different foods and maintain a healthy eating plan when I am eating out or at a party.</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>maintain my eating plan when I am feeling stressed or anxious.</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>visit my doctor once a year to monitor my diabetes.</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>take my medication as prescribed.</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>maintain my medication when I am ill.</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>
Medical Outcomes Study: Social Support Survey Instrument

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it? Circle one number on each line.

<table>
<thead>
<tr>
<th>Emotional/Information Support</th>
<th>None of the time</th>
<th>A little of the time</th>
<th>Some of the time</th>
<th>Most of the time</th>
<th>All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Someone you can count on to listen to you when you need to talk</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to give you information to help you understand a situation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to give you good advice about a crisis</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to confide in or talk to about yourself or your problems</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone whose advice you really want</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to share your most private worries and fears with</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to turn to for suggestions about how to deal with a personal problem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone who understands your problems</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>None of the time</td>
<td>A little of the time</td>
<td>Some of the time</td>
<td>Most of the time</td>
<td>All of the time</td>
</tr>
<tr>
<td>--------------------------------</td>
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<td>-----------------</td>
</tr>
<tr>
<td><strong>Tangible support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someone to help you if you were confined to bed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to take you to the doctor if you needed it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to prepare your meals if you were unable to do it yourself</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to help with daily chores if you were sick</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Affectionate support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someone who shows you love and affection</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to love and make you feel wanted</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone who hugs you</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Positive social interaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someone to have a good time with</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to get together with for relaxation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Someone to do something enjoyable with</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Additional item</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someone to do things with to help you get your mind off things</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
**The Summary of Diabetes Self-Care Activities**

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

### Diet
How many of the last SEVEN DAYS have you followed a healthful eating plan?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
---|---|---|---|---|---|---|---|

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

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
---|---|---|---|---|---|---|---|

On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
---|---|---|---|---|---|---|---|

On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
---|---|---|---|---|---|---|---|

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

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
---|---|---|---|---|---|---|---|

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

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
---|---|---|---|---|---|---|---|

### Blood Sugar Testing
On how many of the last SEVEN DAYS did you test your blood sugar?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
---|---|---|---|---|---|---|---|

On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
---|---|---|---|---|---|---|---|
**Foot Care**
On how many of the last SEVEN DAYS did you check your feet?

0 1 2 3 4 5 6 7

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

0 1 2 3 4 5 6 7

**Medications**
On how many of the last SEVEN DAYS did you take your recommended diabetes medication?

0 1 2 3 4 5 6 7