DIETARY ROUTINES AND DIABETES: INSTRUMENT DEVELOPMENT

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Abstract

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DIETARY ROUTINES AND DIABETES: INSTRUMENT DEVELOPMENT (133 pp.)

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The purpose of this study was to develop and pilot test an instrument that will provide an assessment of current dietary practices and serve as a basis for understanding patterned eating behaviors of individuals with diabetes and their families. Pre-testing of the instrument was used to assess whether questions were understandable and to identify missing or unnecessary questions. After pre-testing, the survey was distributed to individuals diagnosed with diabetes in Ohio, Kentucky, and West Virginia. The Dietary Routine Scale developed in this study indicated a good level of internal consistency, with a Cronbach’s alpha level of .90. A degree of validity was established, which suggested greater levels of diabetes management or life structure to be associated with higher dietary routine scores. With further development, this assessment tool can be used in research about the dietary patterns of those with diabetes or in clinical practice to assist in planning intervention strategies.

Approved: ____________________________________________

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Chapter 1: Introduction

Overview

Diabetes mellitus is a group of metabolic diseases characterized by uncontrolled blood glucose levels. The prevalence of diabetes mellitus in the United States population is increasing in epidemic proportions (Center for Disease Control [CDC], 2005). The increasing prevalence merits concern because the disease puts those afflicted at risk for early death and complications resulting from severe damage to many of the body’s systems, in particular the blood vessels and nerves (Gerich, 2001).

Between 1980 and 2003, the prevalence of diabetes more than doubled, rising from 5.8 to 13.8 million diagnosed individuals (National Center for Health Statistics, 2005). The Center for Disease Control estimates that currently 20.8 million people in the United States have diabetes, this equates to nearly 7% of the population (CDC, 2005). In 2005, 1.5 million new cases of diabetes were diagnosed in people age 20 or older (CDC). The World Health Organization predicts that by 2030, 366 million people worldwide will have diabetes (World Health Organization [WHO], 2005).

Diabetes imposes a substantial cost burden to society and, in particular, to individuals with diabetes and their families. Reducing the potential for health problems caused by diabetes through more intensive disease management would help to decrease the national expenditure on diabetes healthcare services, while significantly improving the quality of life for people with diabetes. Estimated diabetes costs in 2002 were $132 billion, accounting for both direct and indirect costs (American Diabetes Association [ADA], 2003). Direct medical costs of diabetes were $92 billion (ADA). Indirect costs,
which include disability, work cost, and premature death, comprised the remaining $40 billion of the total diabetes costs (ADA). People with diabetes are at a greater risk of becoming disabled due to amputations, loss of vision, and other physical problems and are more likely to miss workdays due to diabetes related complications than individuals who do not have diabetes (ADA).

Type 1 diabetes accounts for 5-10% of all diagnosed cases of diabetes (CDC, 2005). Type 1 diabetes is an autoimmune disease that cannot be prevented, typically diagnosed in children and young adults. The disease results when the body’s immune system destroys pancreatic beta cells responsible for producing insulin. Insulin serves as the signal for glucose uptake into cells, so defects in insulin action or production starves the body’s cells of energy in the form of glucose (ADA, 2007a). Because the body is unable to produce insulin, the hormone must be provided through insulin injections or an insulin pump (CDC).

Type 2 diabetes is the most prevalent form of diabetes, accounting for 90-95% of all diagnosed cases (CDC, 2005). In the past, type 2 diabetes was identified as adult onset diabetes; however, this term is no longer accurate due to the increased incidence of type 2 diabetes among adolescents accompanying the national rise in adolescent obesity (Pinhas-Hamiel et al., 1996). The increasing prevalence of type 2 diabetes is also associated with the national rise in metabolic syndrome, a condition characterized by insulin resistance, which can progress to type 2 diabetes if left untreated (American Heart Association, 2007). Type 2 diabetes begins when cells fail to properly use insulin produced by the pancreas and gradually the disease progresses to where the pancreas no
longer has the ability to produce insulin (CDC). Type 2 diabetes is potentially controllable before permanent beta cell failure occurs (Wing, 1995). Elevated blood glucose concentrations, overweight, and a sedentary lifestyle are all reversible risk factors of type 2 diabetes (Knowler et al., 2002).

Regardless of the type of diabetes, self-management of the disease involves the integration of multiple self-care activities (e.g., blood glucose monitoring, carbohydrate counting, activity regimens) into daily life. Because diabetes self-management involves alterations of prominent life aspects, persons with diabetes often struggle with incorporating self-management techniques into everyday life (Nagelkerk, Reick, & Meengs, 2006). Although pharmacotherapy methods serve as treatment measures, lifestyle modifications are believed to be critical in preventing and managing type 2 diabetes (Knowler et al., 2002). While the importance of self-management of the disease is evident, many factors impede the self-management process. Things such as economic constraints (Ary, Toobert, Wilson, & Glasgow, 1986), interpersonal conflicts with family members (Cardenas, Vallbona, Baker, & Yusim, 1987), resistance to change (Vallis et al., 2003), lack of knowledge of specific diet plans, failure to understand the plan of care, feelings of helplessness and frustration from lack of glycemic control, and continued disease progression despite adherence efforts (Nagelkerk et al.) cause frustrations for those with diabetes.

Diabetes self-management education is the process of teaching individuals to manage their diabetes and has been considered an important part of the clinical management of individuals with diabetes since the 1930s (Bartlett, 1986). Education
plays a central role in improving glycemic control, enhancing quality of life, and reducing the risk of long-term complications (Visser & Snoek, 2004). Lack of motivation, lack of physician referral, and lack of health insurance prevent many individuals from attending diabetes education classes (Funnell, Donnelly, Anderson, Johnson, & Oh, 1992).

A significant portion of diabetes management takes place within the family or home setting (Fisher et al., 1998). Family support has been associated with treatment adherence, illness adaptation, and blood sugar control in studies of individuals with diabetes (Cardenas et al., 1987; Garay-Sevilla, et al., 1995; Primomo, Yates, & Woods, 1990). Alteration of family health routines, defined as behavioral patterns that impact healthcare outcomes, has the potential to change behaviors linked to diabetes care (Chesla et al., 2003). In addition, general family routines, defined as “day to day repetitive activities, which occur within the family unit in a predictable manner,” can have a negative or positive impact on disease management (Keltner, Keltner, & Farran, 1990, p. 161). Family routines can incorporate helpful patterns by providing relational support and casual reminders for the diabetic family member (Trief et al., 2003).

The progression of type 2 diabetes and the complications that accompany type 1 or 2 diabetes are greatly affected by whether an individual follows the prescribed medical regimen and successfully incorporates an appropriate dietary plan (Denham, 2003c). The family household has the potential to impact individual behaviors in areas like nutrition and dietary routines, while family support can provide a sense of acceptance of the family member’s condition (Denham, Manoogian, & Schuster, in press). Dietary routines are
daily eating habits and meal-taking behaviors that include all aspects of mealtime patterns and the conversations which surround eating activities (Denham). Attention to dietary routines can promote dietary self-management of the family member with diabetes and can impact disease progression. Assessment of current family dietary patterns should be incorporated into disease management plans and included in dietary education (Denham; Denham et al.).

Statement of the Problem

Type 1 and 2 diabetes have primarily been viewed as an individual health concern, causing diabetes self-management education to focus on the individual and failing to emphasize the complex relationships that occur in households and the associated importance of the family in disease management (Denham, 2003a). Most disease management takes place within the family context; thus, many self-care behaviors perceived to be cared for by individuals are actually carried out by the patient-family team (Coyne & Smith, 1994; Fisher et al., 1998). The structure of medical interviews needs to change in order to help patients with diabetes enhance their ability to perform appropriate self-care activities (Burke, Earley, Dixon, Wilke, & Puczynski, 2006). It is critical that health professionals learn how families help and hinder patients; therefore, development of routine instruments to use with high risk and high cost illnesses, such as diabetes, are needed (Denham, 2003c).

Dietary habits consist of a significant portion of diabetes self-management and are greatly influenced by the family context. Currently, no instrument relevant to family dietary routines for use with persons with diabetes exists. The purpose of this study was
to develop and test an instrument that will provide an assessment tool to measure current dietary practices from a family perspective. This assessment tool can be used in research about the dietary patterns of those with diabetes or in clinical practice to assist in planning family interventions. Findings from instrument completion will serve as a basis to identify current eating behaviors and suggest areas for goal setting, planning strategies, on-going assessment of individual and family dietary routines, and evaluation of dietary outcomes.

*Research Question*

1. Can a reliable and valid instrument be developed that identifies dietary routines that affect behaviors linked with diabetes self-management as assessed by Cronbach's alpha measure of internal consistency of greater than .80 and demonstrations of content, construct, and concurrent validity?

*Limitations of the Study*

1. The time required to complete the survey may have inhibited individuals from taking part in the study.

2. The distribution methods used in this study limited researchers’ ability to contact non-respondents or clearly identify the response rate.

3. Due to time constraints, this study only included an initial pilot study of the Dietary Routine Scale. Data was not collected using the revised Dietary Routine Scale.

*Delimitations of the Study*

1. Since no sampling frame can be obtained for the population, purposeful sampling strategies were used to obtain respondents.
2. Since the surveys were self-administered, completing the survey correctly and in its entirety was at the discretion of the participant.

3. Differences in participant literacy levels may have altered their understanding of the survey questions.

4. Individuals living in more structured households or those with better control of their diabetes may have been more likely to participate in the study.

Definition of Common Terms

Diabetes Mellitus: A condition characterized by hyperglycemia, or high blood glucose, resulting from the body’s inability to use blood glucose for energy (National Institute for Digestive and Kidney Diseases, 2006).

Family Health: Assessment of the health of individual family members, relationships between family members, and family themes regarding health related beliefs, knowledge, and behaviors (Denham, 1996).

Family Health Routines: Dynamic patterned behaviors relevant to individual and family health that are rather consistently adhered to by individuals, family subsystems, and families within a household niche, but are susceptible to change as members interact with larger contextual systems (Denham, 2003b).

Family Household: Persons living together in a single residence who may or may not be related.

Family Rituals: Prescribed and often repeated formal behaviors pertaining to specific events or occasions used by families to enhance their self-image or identity (Reiss, 1981).
Family Dietary Routines: Daily eating habits and meal-taking behaviors, including all aspects of mealtime and the conversations surrounding eating activities (Denham, 2003c).

Family Routines: Observable relationship patterns occurring among family members on a consistent basis that describe, explain, and predict the uniqueness of families as the members interact and respond to their environment (Denham, 1995).

Hemoglobin A1c: A blood test that provides an index of the average amount of sugar in the blood over the past two to three months (Gonen, Rachman, Rubenstein, Tanega, & Horwitz, 1977)

Statistical Reliability: Degree of consistency of a measure; the extent to which, if you were to give the same measure again to the same person under the same circumstances, you would obtain the same results (Aron, Aron, & Coups, 2005).

Statistic Validity: Degree to which results accurately reflect the concept being measured (Mueller, 1986).

Type 1 Diabetes: An autoimmune disease in which the immune system attacks and destroys the insulin-producing beta cells in the pancreas resulting in little or no insulin production within the body (National Institute for Digestive and Kidney Diseases, 2006).

Type 2 Diabetes: A condition characterized by high blood glucose levels caused by either a lack of insulin or the body's inability to use insulin efficiently (National Institute for Digestive and Kidney Diseases, 2006).
Chapter 2: Review of Literature

Diabetes Mellitus

Diabetes mellitus is a group of metabolic diseases that result when the body fails to use or produce insulin, a hormone essential for glucose uptake into body cells. The two major forms of the disease are type 1 and type 2 diabetes. Type 1 diabetes is characterized by an inability to produce insulin (ADA, 2007a). Type 2 diabetes results as cells become unresponsive to insulin and a progressive insulin secretory defect develops (ADA, 2007b). Diabetes has been deemed the 5th leading cause of death in the United States (CDC, 2005). The World Health Organization estimated that, in 2000, 171 million people worldwide had diabetes and predicts that, by 2030, 366 million people worldwide will have diabetes (WHO, 2005). For many years, diabetes has been viewed as a costly and burdensome chronic disease with increasing prevalence at epidemic proportions in the United States and throughout the world (King, Aubert, & Herman, 1998).

Type 1 diabetes. Type 1 diabetes is an autoimmune disease in which the immune system attacks and destroys the insulin-producing beta cells in the pancreas resulting in little or no insulin production within the body (National Institute for Digestive and Kidney Diseases, 2006). Insulin must be provided through injections or an insulin pump. This form of diabetes is typically diagnosed in children and young adults and is a lifelong condition that cannot be prevented (ADA, 2007a). The cause of type 1 diabetes is unknown, but risk factors are associated with autoimmune, genetic, and environmental factors. Type 1 diabetes accounts for 5-10% of all diagnosed cases of diabetes (National Institute for Digestive and Kidney Diseases).
**Type 2 diabetes.** Type 2 diabetes is the most prevalent form of diabetes, accounting for 90-95% of all diagnosed cases (CDC, 2005). The twin epidemics of diabetes and obesity are rising dramatically around the world and urgent action is needed to avoid a global public health crisis (International Obesity Task Force, 2006). Type 2 diabetes used to be termed adult onset diabetes, but recently an increasing incidence of type 2 diabetes among adolescents has accompanied the national rise in adolescent obesity (Pinhas et al., 1996; International Obesity Task Force; ADA, 2005b). It is predicted that if the obesity rates continue to rise, prevalence of type 2 diabetes will also increase rapidly. In 2000, there were an estimated 300 million obese adults worldwide, a statistic which continues to grow (WHO, 2005).

Unlike type 1 diabetes, type 2 diabetes is potentially reversible before permanent beta cell failure has occurred (Wing, 1995). Individuals with type 1 diabetes experience immediate health impacts during times of mismanagement, but individuals with type 2 diabetes may not see immediate effects of neglect and poor control, which makes adherence to a health regimen seem less compelling to those diagnosed with type 2 diabetes (Pinhas et al., 1999).

Metabolic syndrome is a public health concern associated with type 2 diabetes. It is characterized by elevated waist circumference, elevated triglycerides, reduced high-density lipoprotein cholesterol, elevated blood pressure, and elevated fasting blood glucose (“Expert panel,” 2001). Although the abnormalities of metabolic syndrome are not a direct cause of diabetes, they act as strong predictors of type 2 diabetes development (Grundy, 2004). Effective management of the components of metabolic
syndrome through lifestyle modification is required to prevent progression to type 2 diabetes (Fonseca, 2005). Table 1 provides a comparison of type 1 and type 2 diabetes.
Table 1

*Similarities and Differences of Type 1 and Type 2 Diabetes*

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<th>Type 1 diabetes</th>
<th>Type 2 diabetes</th>
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<td><strong>Cause</strong></td>
<td>• Autoimmune disease destroys beta cells.</td>
<td>• Preventable disease.</td>
</tr>
<tr>
<td></td>
<td>• Insulin is not produced within the body.</td>
<td>• Body is unresponsive to insulin being produced.</td>
</tr>
<tr>
<td></td>
<td>• Typically diagnosed before the age of 25.</td>
<td>• Onset is associated with obesity.</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>• Treatment requires insulin.</td>
<td>• Insulin is not always needed.</td>
</tr>
<tr>
<td></td>
<td>• Diet is very important to keep blood sugar levels under control.</td>
<td>• Diet modification and weight loss alone can manage the disease in the early stages.</td>
</tr>
<tr>
<td><strong>Complications</strong></td>
<td>• Complications can result due to poor management such as eye, kidney, heart, and nerve disease.</td>
<td>• Complications can result due to poor management such as eye, kidney, heart, and nerve disease.</td>
</tr>
<tr>
<td></td>
<td>• Episodes of low blood sugar are common.</td>
<td>• No episodes of low blood sugar unless taking insulin or oral diabetes medications.</td>
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Diabetes standards of medical care. Since diabetes is a disease that requires continuing medical care, the American Diabetes Association has established standards of care that include general care guidelines, treatment goals, and tools to evaluate the quality of care. According to the guidelines, screening for type 2 diabetes should be performed every 3 years in individuals older than 45 years of age, particularly those with body mass indexes greater than 25 kg/m² (ADA, 2006). Due to the acute onset of symptoms, type 1 diabetes is usually detected soon after symptoms develop (ADA, 2006). The preferred diagnostic test for diabetes is fasting blood glucose, which measures blood glucose levels after at least 8 hours of fasting, with levels higher than 126 mg/dl considered classification for diabetes (ADA, 2006). After diagnosis, a medical evaluation should be conducted to assess presence or absence of diabetes related complications.

Individuals diagnosed with diabetes should receive medical care from a physician-coordinated team, including physicians, nurses, dietitians, pharmacists, and mental health professionals (ADA, 2006). The interdisciplinary team approach promotes multidimensional diabetes care by using shared leadership with common goals, shared professional identity, and collaborative as opposed to consultative relationships among members (Funnell, 1996). To assess short-term glycemic control, it is recommended that individuals implement self-monitoring of blood glucose levels at least twice daily and strive for blood sugar levels of 90-130 mg/dl before meals and less than 180 mg/dl after meals (ADA, 2006). The hemoglobin A1c (HbA1c) test is used to assess long-term blood glucose control as it measures the patient’s average glycemic levels over the past 2 to 3
months. Every percentage point decrease in HbA1c reduces the risk of diabetes complications by 40% (CDC, 2005). The HbA1c goal for patients with diabetes is less than 7% (ADA, 2006).

*Diabetes medical nutrition therapy.* Medical nutrition therapy aims to prevent and treat diabetes as well as potential complications of the disease, such as cardiovascular problems, nephropathy and retinopathy. Goals of diabetes medical nutrition therapy include maintenance of blood glucose levels as close to normal as possible, establishment of lipid profiles and blood pressure levels that reduce the risk for developing macrovascular diseases, modification of dietary and lifestyle patterns to prevent and treat obesity, and general health improvement through incorporation of healthy food choices and physical activity (ADA, 2002). Learning how to obtain the medical nutrition therapy goals established by the American Diabetes Association is an integral component of diabetes self-management.

The focus of medical nutrition therapy varies slightly for type 1 and type 2 diabetes. Medical nutrition therapy of youth diagnosed with type 1 diabetes aims to provide adequate energy to promote optimal development and to prevent hypoglycemic episodes (ADA, 2002). Individuals diagnosed with type 2 diabetes typically require changes in eating and physical activity habits to reduce insulin resistance and improve metabolic status (ADA, 2002). Medical nutrition therapy for both types of diabetes emphasizes the need for a healthy lifestyle and the control of blood sugar levels to prevent diabetes related complications.
Medical nutrition therapy involves “a nutrition assessment to evaluate the patient’s food intake, metabolic status, lifestyle, readiness to make changes, goal setting, dietary instruction, and evaluation” (ADA, 2006, p. S12). The plan developed by the medical team should be individualized and take into account the diabetic patient’s culture, lifestyle, and financial situation. Moderate weight loss is typically recommended for individuals with type 2 diabetes to help improve glycemic control and reduce risks of developing cardiovascular disease (ADA, 2006; Klein et al., 2004). Weight loss is promoted through moderate physical activity and energy reductions of 500-1000 calories per day, resulting in a gradual weight loss of 1-2 pounds per week. Since the primary goal of medical nutrition therapy is to regulate blood glucose levels, dietary self-management techniques aim to moderate blood glucose levels before, during, and after meals.

Recommendations for medical nutrition therapy established by the American Diabetes Association are a fat intake of 25%-35% of total calories with saturated fat less than 7% of total energy and minimal trans fat consumption, carbohydrate intake between 45%-65% of total calories, and protein intake of less than 10% of total energy consumption (ADA, 2006). Because the amount and type of carbohydrates consumed can have a significant influence on overall blood glucose control, it is recommended that the exchange system or carbohydrate counting be used to monitor total grams of carbohydrate consumed (ADA, 2006). Another technique that can be used to monitor total carbohydrate consumption, is the glycemic index, which is a ranking of foods based on their effect on blood sugar levels.
Although carbohydrate ingestion raises blood glucose levels, it is not recommended that diabetic individuals follow a low-carbohydrate diet because carbohydrates are an important source of energy, vitamins, minerals, and fiber (ADA, 2006). Use of nonnutritive sweeteners approved by the Food and Drug Administration is acceptable if consumed within established daily limits. General recommendations for individuals with diabetes include a fiber rich diet and moderate alcohol consumption (ADA, 2006).

Medical nutrition therapy has proven to be beneficial for individuals with diabetes in managing blood glucose levels. A study conducted by the Institute of Medicine of the National Academy of Sciences found that medical nutrition therapy improved clinical outcomes while decreasing overall Medicare costs for managing diabetes (Pastors, Warshaw, Daly, Franz, & Kulkarni, 2002). As a result, the Institute of Medicine recommended that working with a registered dietitian be included as part of the Medicare diabetes care plan (Pastors et al.). Dietitians work with diabetic individuals to create an individualized meal plan that offers variety and flexibility, determine appropriate insulin to carbohydrate ratio, and provide information about preventing diabetes related complications. Working with a dietitian has shown to have a positive impact on weight loss, self-monitoring of blood glucose, incorporation of exercise, and overall glycemic control (Brown, 1990).

_Diabetes self-management._ Diabetes self-management is a cost effective method that helps optimize metabolic control, prevent and manage complications, and maximize quality of life (ADA, 2006). Individuals diagnosed with diabetes are expected to quickly
integrate major lifestyle changes, primarily related to diet and physical activity, in order to control and prevent complications of the disease (ADA, 2004). Diabetes self-management involves the integration of self-care activities into daily life, such as blood glucose monitoring, carbohydrate counting, and exercise regimens. Individuals with diabetes make multiple daily decisions regarding management of their diabetes based on knowledge, beliefs, attitudes, resources and support systems (Nagelkerk et al., 2006). A study conducted by a Finnish Diabetes Prevention Group, found that the risk of developing type 2 diabetes was reduced by 58% in an intervention group implementing self-management techniques (Tuomilehto et al., 2001). The reduction in risk was directly associated with lifestyle changes promoted in the intervention group through individualized counseling aimed to reduce weight and total fat intake, while increasing fiber consumption and physical activity (Tuomilehto et al., 2001). Appropriate diabetes self-management is associated with lower HbA1c levels, which signify better metabolic control and leave individuals at a lesser risk of microvascular or macrovascular complications, such as heart disease, stroke, blindness, or kidney failure (The Diabetes Control and Complications Trial Research Group, 1993).

Barriers to appropriate diabetes self-management include lack of knowledge about specific diet plans, lack of understanding of the plan of care, feelings of helplessness and frustration from lack of glycemic control, and continued disease progression despite adherence efforts (Nagelkerk et al., 2006). One study of individuals with type 2 diabetes discovered four main challenges to self-management: (a) avoiding “favorite foods” and selecting healthy alternatives, (b) managing weight, (c) departing
from their typical meal schedule, and (d) implementing eating restraints (Savoca & Miller, 2001). Self-management is also impeded by economic factors and interpersonal problems with spouses and family members (Ary et al., 1986).

Although the importance of self-management of the disease is evident, many patients with type 2 diabetes are not prone to making changes and are in the early stages of the Transtheoretical Model of Change (Vallis et al., 2003). The Transtheoretical Model of Change is a leading theory of health behavior change, which can be used to assess emotional readiness to make change after being diagnosed with diabetes. The model is based on a series of five stages of behavior modification (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992; Prochaska, Velicer, Fava, Rossi, & Tsok, 2001).

The first stage, precontemplation, is characterized by failure to recognize a problem and lack of intention to change behavior in the foreseeable future. Individuals in precontemplation are typically uninformed or under-informed about the importance of specific actions, such as the importance of changing dietary habits to help prevent complications of diabetes. In the next stage, contemplation, a problem has been identified, but a lack of commitment to take action prevails. Individuals that move into the preparation stage have made a decision that change is necessary and are developing plans to take steps toward the desired goal, such as developing strategies for making dietary change. During the action stage, individuals modify their behaviors and acquire new behaviors. The final stage, maintenance, works towards preventing relapse and is achieved after sustaining change for at least six months (Prochaska & DiClemente, 1983).
Many individuals with type 2 diabetes are in either the precontemplation or contemplation stage of change, which makes it difficult for them to move into the preparation or action phase (Vallis et al., 2003). Stage matched interventions, as opposed to one size fits all interventions, take into consideration that patients are at different steps of the change process and use intervention strategies geared towards progressing into the next stage of change. Stage-matched interventions have proven to be more successful than one size fits all interventions for exercise acquisition (Marcus et al., 1998) and modification of dietary behavior (Campbell et al., 1994), which are two behavior changes vital to diabetes self-management.

Diabetes education. Education is a key component of diabetes self-management because it teaches individuals to manage their diabetes. Healthy People 2010 sets a diabetes related goal to increase the 1998 proportion of individuals with diabetes who receive formal diabetes education from 40% to 60% (U.S. Department of Health and Human Services, 2000). Knowledge about disease management is critical for diabetic patients as well as family members in order to fully understand the disease. Individuals typically attend formal diabetes education programs through physician referral and consider the programs to be the single source of diabetes information (Sprague, Shultz, Branen, Lambeth, & Hillers, 1999).

Certified diabetes educators are primarily responsible for providing diabetes education because they possess distinct and specialized knowledge needed to promote quality care for persons with diabetes (National Certification Board for Diabetes Educators, 2007). A certified diabetes educator can be any member of the healthcare
team who has received appropriate training in diabetes education. To sit for the diabetes certification exam, healthcare professionals must complete a minimum of 2 years of professional practice experience in diabetes self-management education, have at least 1,000 hours of diabetes self-management education experience, and work currently for a minimum of 4 hours in a defined diabetes educator role (National Certification Board for Diabetes Educators).

In the past, certified diabetes educators generally used lecture formats to increase knowledge levels and promote behavioral change. In recent years, the structure of educational programs has changed to be more focused on the empowerment model (Funnell et al., 1991). The empowerment model is a patient centered approach geared to provide patients with the knowledge, skills, and responsibility to effect change. The empowerment model stresses that the individual with diabetes needs to be the one who decides to change and although healthcare professionals should work with patients to establish goals for change, they should refrain from making assumptions of what the patient may or may not want (Skinner & Cradock, 2000). Many certified diabetes educators think that involving patients in the decision making process is critical to successful self-management (Funnell et al., 2006). Studies have shown educational environments that emphasize provision of choice, lack pressure to behave in particular ways, and acknowledge patient’s emotions are more conducive to behavioral change (Williams, Freedman, & Deci, 1998).

Diabetes self-management education includes individual counseling, goal setting, and group instruction (Sprague et al., 1999). Information provided at education sessions
is intended to enable newly diagnosed individuals to understand their disease and better manage their blood glucose. Education sessions can refresh knowledge for individuals who have lived with the disease for multiple years. In education classes, persons with diabetes learn about sources of dietary carbohydrates, portion control, appropriate timing of meals and snacks, and stress-reduction skills (Savoca & Miller, 2001). They also learn how to develop an exercise plan, administer insulin, use oral medication, and monitor blood glucose (Sprague et al.).

Barriers to attending education programs include lack of health insurance and failure of physicians to promote diabetes education (Sprague et al., 1999). Physician referral is required for diabetes education to be covered by health insurance. Over the last few years, insurance companies have begun to recognize diabetes education as a cost-effective method to prevent diabetes-related complications (Pastors et al., 2002). Eligible Medicare beneficiaries are now covered for an initial 10 hours of outpatient diabetes self-management training after diagnosis with diabetes and an additional two hours of education annually in years following (Pastors et al.). To be reimbursed for services provided, facilities must be an American Diabetes Association Recognized Education Program (Pastors et al.).

Patients tend to lack motivation to attend continuing education classes, a feeling which arises from a false perception that diabetes education is simply a one-time event and failure to recognize that as one’s life situation changes new learning needs arise (Sprague et al., 1999). Unfortunately, the number of educational sessions an individual is allowed to attend is frequently determined by insurance coverage as opposed to the
patient’s actual need (Funnell et al., 2006). Studies have shown a gradual decrease in self-care behaviors after completion of education programs (Norris, Engelgau, & Narayan, 2001; Rubin, Peyrot, & Saudek, 1991; Wing, Epstein, Nowalk, Koeske, & Hagg, 1985), which stresses the need for continuing education. Ongoing education can help promote effective self-management techniques for individuals with diabetes and their family members as they are presented with new challenges and treatment advances (ADA, 2006). The majority of certified diabetes educators claim they would like to maintain ongoing contact with patients in order to provide continuing education (Funnell et al., 2006).

Diabetes education should include individuals at high risk for developing the disease, such as first-degree relatives of type 2 diabetic patients, in order to prevent the continuation of the disease (ADA, 2004). Unfortunately, since referral from a physician is required for diabetes education to be covered by health insurance, non-diabetic at risk family members are not eligible for coverage until they develop the disease (Sprague et al., 1999).

Since type 1 diabetes is typically diagnosed early in the life of children and adolescents, much of the education process is geared toward the care-giving adult (ADA, 2005a). In contrast, type 2 diabetes is generally diagnosed in the later stages of life, leading to the assumption that the patient is old enough to care for him/herself. Studies have shown diabetic family members benefit from having non-diabetic family members being actively involved in diabetes education and are willing to attend classes, take notes, and learn how to maintain the same nutritional habits as the diabetic family member.
(Nagelkerk et al., 2006). Although family members are welcome to attend education sessions and are included in the programs when they wish to participate, a specific curriculum to teach family members how to assist in the diabetes self-management process or support the family member diagnosed with diabetes does not exist.

Diabetes education has primarily focused on the individual and failed to emphasize the complex relationships that occur in households. Education for those with diabetes is blinded to the impact of the family household and the routines that currently exist when a person is newly diagnosed with diabetes. Given that it was the existing routine behaviors that have likely resulted in the diagnosis of type 2 diabetes, modification of these behaviors and adherence to a therapeutic regimen can be a daunting task. Diabetes education needs to address barriers persons with diabetes and their family members encounter as they attempt to balance individual and family needs associated with diabetes management (Schuster, 2005). Education programs for those with diabetes should include factors such as awareness of eating history, spousal support, and time management practices (Savoca & Miller, 2001). Prior research about families dealing with diabetes suggests that diabetes education needs to address: (a) confronting the diet, (b) changing the diet, and (c) living with the diet (Schuster).

Although recommended standards have been established, providing uniformly effective diabetes care has proven to be a challenge (ADA, 2006). A complaint of diabetes education participants is that the information needs to more individualized (Savoca & Miller, 2001). The structure of group educational classes is inadequate because each patient has a unique case and home environment. Ideally, educational
sessions should be interactive and allow patient discussion about successes and failures encountered while working towards integrating diabetes into their lifestyle (Nagelkerk et al., 2006). Physicians often lack clear understandings about the experience of the illness in the context of the patient’s lives with respect to relationships and involvement in family, community, and work settings (Roter et al., 1997). Individuals involved in social relationships that potentially support persons with diabetes (e.g., immediate family members, friends, extended family members) have fundamental roles in the decisions made relevant to diabetes and their inclusion in the education process could improve diabetes self-management.

*Family Rituals and Family Routines*

The terms family routines and family rituals are often used interchangeably, with some research distinguishing the terms and other combining them. Researchers have a difficult time agreeing on one term because everyone has their own opinion on what constitutes a family routine or ritual (Fiese et al., 2002). Both family rituals and routines involve multiple family members and highlight the intersection between individual and family level factors (Denham, 2003c). Studies of family routines and rituals focus on family life and how it may affect adaptation and adjustment of an individual. Family routines and rituals can be resources for healthcare professionals working with families because they provide a means to view family processes and facilitate transfer of necessary information.

Family rituals are defined as ceremonial or customary practices within families that have symbolic meaning and range from stylized religious observances, such as first
communion, to daily interaction patterns, such as dinnertime (Denham, 1995). Researchers believe “ritual in the family is a relatively reliable index of family integration, which includes effective ways of meeting common problems and the ability to handle major crises” (McCubbin & McCubbin, 1988, p. 249). The symbolic meaning typically arises from expectations for attendance, expressed affect, and commitment to continue the activity in the future (Markson & Fiese, 2000). Family rituals can “shape and express family relationships, articulate the boundaries of who is in and who is out, heal losses, reconcile conflicts, manifest identify, give voice to deeply held beliefs, and celebrate” (Imber-Black, 2002, p. 445). During times of stress and/or transition, rituals serve as organizers of family life and help to provide a sense of stability (Bossard & Boll, 1950). Families often view rituals as fundamental in providing togetherness, strengthening member relationships, engaging in affective interaction, and maintaining family contact (Meske, Sanders, Meredith, & Abbott, 1994).

Family routines are defined as “day to day repetitive activities that occur within the family unit in a predictable manner” (Keltner et al., 1990, p 161). Children are exposed to routines from an early age and are given greater levels of responsibility once they can actively participate in the routines (Fiese et al., 2002). Family routines provide structure and constancy through patterned interactions such as meal time, bed time, and coming and going activities (Denham, 1995). Families that engage in regular routines raise children in a more regulated environment. Family routines have been associated with psychological health and well-being of family members (Steinglass, Bennett, Wolin, & Reiss, 1987) and can serve as therapeutic tools that help minimize the burden of
households dealing with grief, alcoholism, divorce, remarriage, or chronic disease (Fiese et al., 2002). Routines have the potential to change throughout the course of the lifecycle and can turn into rituals when the repetitive behavior becomes a meaningful act.

Assessment of current family routines provides a basis for understanding baseline routines and identifying potential ways to alter family practices to promote optimal family health (Denham, 1995). For example, the Asthma Routine Questionnaire was developed to serve as a measurement of family based asthma management routines and addresses factors such as role assignment, burden of care, household cleaning, taking medications, timing of medications, medical visits, filling prescriptions, and personal family growth as a result of the disease (Fiese, Wamboldt, & Anbar, 2005). Similarly to asthma management, diabetes requires families to adopt predictable routines involving daily care to ensure a better overall quality of life for the diabetic family member. Overall, incorporating the assessment of family routines in clinical practice may help members of the medical team to identify current practices as well as needed household changes related to a variety of chronic conditions (Denham, 2003c).

Family routines can be distinguished from family rituals by the amount of significance associated with the activity, with family rituals being held with greater levels of significant meaning than family routines, which are merely patterned activities (Denham, 2002). Assessment of communication, commitment, and continuity can also help to contrast routines from rituals. Routines have an instrumental level of communication relaying tasks that need to be completed, entail a momentary time commitment with little afterthought, and are continually repeated over time (Fiese et al.,
On the other hand, rituals involve symbolic communication, have an emotional residue, which causes the individual to recapture the activity after completion, and are repeated across many generations (Fiese et al., 2002). Disruption of routines is merely a hassle, whereas disruption of rituals has potential to threaten family cohesiveness (Fiese et al., 2002).

*Development of Family Health Routines*

Researchers have utilized concepts associated with an ecological model of health, which implies that personal, family, and provider characteristics impact long-term health and chronic diseases, such as diabetes (Fisher et al., 1998). Review of literature on family health reveals that the term family health is poorly understood (Denham, 1997). Family health has been defined as a dynamic and complex concept involving multidimensional household variables, which affect family member’s ability to obtain, sustain, and regain maximum health (Denham, 1997).

Family health routines can have a significant influence on family health (Denham, 2002). Family health routines are dynamic patterned behaviors relevant to individual and family health; these routines are rather consistently adhered to by individuals, family subsystems, and families within a household niche (Denham, 2003b). As opposed to basic family routines, which were discussed in the previous section and can be defined as pattern interactions that do not affect the health of individual family members, such as kissing a spouse good-bye before work, family health routines have an impact on the health and well being of family members. Family health routines can be divided into six categories; self care, safety and precautions, mental health behaviors, family care, illness
care, and taking care of family members (Denham, 2003b). Examples of family health routines include dietary practices, sleep/rest patterns, activity levels, self-care routines, and medical consultation (Denham, 1997). Family health routines that occur daily as opposed to occasionally have a greater potential to influence patterns related to health (Denham, 1995). Although family members typically follow family health routines on a regular basis, they can be changed due to demands of the ecological context (Denham, 2003b). Because concepts of routines and rituals are generally understood by families, the adaptation of beneficial family health routines has the potential to act as a medical intervention strategy that makes sense to families (Markson & Fiese, 2000).

*Family Health Routines and Diabetes*

Individuals diagnosed with diabetes are required to make fundamental and complex changes to life habits and day to day behaviors with respect to diet, exercise, smoking, medication, foot care, and self-monitoring of blood glucose (ADA, 2006). The self-management techniques critical to diabetes management and prevention are sensitive to family households and contexts. Families that have organized lives to include daily routines may be better equipped to integrate aspects of disease management into their lives, while families that are less organized and lack routine structures may find the implementation of daily routines as a stabilizer to a previously chaotic environment (Markson & Fiese, 2000). A framework of effective disease management requires roles to be assigned as part of routine practices with different family members responsible for different aspects of care (Fiese, 2000). Families that are unable to adopt routines view self-management practices as a daily struggle, which involve continuous decisions about
whether to perform various diabetes related tasks (O’Connor, Crabtree, & Yanoshik, 1997). Presence of consistent family health routines may reflect abilities to integrate diabetes care into daily diabetes routines.

A significant amount of literature focuses on the influence of family routines on management of type 1 diabetes with many studies concluding that adherence to the diabetic treatment regimen requires the cooperation and contribution of the whole family (Maharaj, Rodin, Olmsted, & Daneman, 1998; Marteau, Bloch, & Baum, 1987; Schafer, McCaul, & Glasgow, 1986; Wysocki, 1993). Families characterized by cohesion, emotional expressiveness, and lack of conflict have been associated with greater levels of diabetic control in children with type 1 diabetes (Marteau et al.). Routines provide necessary structure, order, and control needed to ensure consistency in the timing, quantity, and types of foods eaten by the diabetic child (Maharaj et al.).

Family members of adolescents with type 1 diabetes provide support through daily management routines, such as insulin administration, monitoring blood glucose, and meal planning (La Greca et al., 1995). A 17 item questionnaire was developed to examine the sharing of diabetes responsibilities between mothers and their diabetic child (Anderson, Auslander, Jung, Miller, & Santiago, 1990). The questionnaire was divided into three dimensions of diabetes management: general health, regimen tasks, and social presentation. Results indicated higher levels of mother-child “no one takes responsibility” scores indicated poorer levels of metabolic control (Anderson et al., 1990). These findings emphasize the importance of family communication regarding responsibilities for various diabetes related management tasks (Anderson et al., 1990) because adaptation
to the family member’s diagnosis with type 1 diabetes will likely affect family structure and role functions (Wysocki).

While much attention has been given to the importance of family routines in type 1 diabetes, far less investigation has occurred regarding family routines of those with type 2 diabetes. Strong evidence exists that health is learned within the family context (Harkness & Super, 1994; Keltner, 1992). In childhood, family health information is absorbed, attitudes related to health are formed, and practices based on the attitudes are initiated (Denham, 2003c). Researchers have investigated physical, behavioral, and environmental features of families that may contribute to the development of type 2 diabetes. A study of 11 families that contained adolescents with type 2 diabetes were examined using anthropometric measurements, food frequency questionnaires, and eating disorder questionnaires (Pinhas et al., 1999). The results showed that adolescents with type 2 diabetes came from families in which parents and siblings were either diagnosed with type 2 diabetes or had lifestyle habits that put them at high risk of developing the disease (Pinhas et al.). Poor eating habits consisting of high fat and low fiber diets characterized each family unit as well as limited exercise routines (Pinhas et al.).

Family organization can aid in dietary management, with more highly organized families better equipped to purchase proper foods for the diabetic diet and to follow predictable meal schedules (Chesla et al., 2003). Families rely on routines to assure that medications are taken on a regular basis, medical visits are scheduled, and plans are in place for emergency situations, such as hypoglycemic episodes (Bush & Pargament, 1997). Researchers have concluded that effective treatment programs for individuals with
diabetes need to consider the lifestyle and health habits of the whole family (Pinhas et al., 1999). Routine assessment devices can be used as screening tools to identify problem areas related to diabetes management that need to be addressed.

**Family support and involvement in diabetes care.** Family support involves interactions between people that are positive, nurturing, and encouraging (Kane, 1988). Studies of chronic illnesses show that family members provide more effective support than friends or other acquaintances (Primomo et al., 1990). Lack of family support is a key barrier to behavioral change for persons with diabetes (Albarran, Ballesteros, Morales, & Ortega, 2006). The strongest and most consistent predictor of type 2 diabetes management is whether family members behave in ways that show support and promote the diabetes care regimen (Glasgow & Toobert, 1988).

Links have been found between family cohesion, family functioning and diabetic control, with poor glycemic control associated with poor family cohesion and functioning (Cardenas et al., 1987). When family members act in supportive ways, the family member with diabetes tends to be more satisfied with personal adaptations to the disease and reports lower levels of emotional problems (Trief, Grant, Elbert, & Weinstock, 1998). On the other hand, adverse family reactions and lack of acceptance of the family member’s diabetic condition can result in perceptions of loneliness (Albarran et al., 2006), which can limit the patient’s efforts to reach self control and cause a constant state of anxiety regarding the potential risk of future complications (Polonsky et al., 1995).

Social support involves verbal and non-verbal information, advice, or action that is offered by others and has beneficial emotional or behavioral effects on the recipients
Social support has been associated with higher levels of adherence to diet and is a critical factor for individuals who share meals with those living with diabetes (Garay-Sevilla et al., 1995). Support for the diabetic dietary regimen is challenged within families when members feel that dietary change recommendations are only of concern for the person with diabetes, causing non-diabetic family member’s dietary and food preparation preferences to hinder dietary change (Albarran et al., 2006). It is suggested that the best self-management results are seen when the family makes the decision to adjust overall dietary patterns, rather than solely focusing on altering eating patterns for the diabetic family member (Nagelkerk et al., 2006).

Family adaptation. The family serves as the key social influence in sustaining disease management in chronic diseases. Family adaptation occurs when family routines are changed by drawing on the perceptions of individual family members, on the family's existing resources, and by relying on new resources (Gallo, 1991). While family support can provide a sense of acceptance of the family member’s condition, family adaptation actually changes the social network and context in which disease management takes place in an attempt to promote optimal health for all family members (Fisher et al., 1998). Family accommodation is another key family response that involves the “enactment of social concerns and practices to balance quality of life for individuals and families with quality of diabetes care” (Chesla & Chun, 2005, p. 240).

Health behavior changes that support successful self-management of diabetes need to be made within the social context of the diagnosed individual’s family (Trief et al., 1998). A study using semi-structured interviews with 74 individuals, who were either
type 2 diabetes patients or spouses, identified helpful versus non-helpful behaviors in disease management (Trief et al., 2003). Helpful behaviors were divided into three categories: (a) dietary control and regimen specific support, (b) general relational support, and (c) reminders. Non-helpful behaviors were also divided into three categories: (a) nagging, (b) problems with diet management arising from negative impact of the spouse’s eating habits, and (c) poor communication (Trief et al., 2003). The study found a high potential for conflict when spouses cross the line from reminding to nagging or when a spouse becomes over involved in care due to fears of consequences linked with poor disease management (Trief et al., 2003). The majority of the couples used teamwork and shared responsibilities in areas such as diet, grocery shopping, blood glucose testing, formation of plans to help prevent hypoglycemic episodes, and other medical issues to help manage diabetes (Trief et al., 2003). Overall, the study highlighted the need to assess patient and family involvement in care, given the potential for family members to significantly hinder or promote diabetes management.

Another study conducted with five New York suburban families containing female heads of households recently diagnosed with type 2 diabetes challenged the traditional model of diabetes self-management, which neglects to include a family component (Gerstle, Varenne, & Contento, 2001). Family adaptations of routines, such as meal planning, grocery shopping, and transportation to the grocery store and the doctor following nutrition education were examined to identify whether adaptations aided management of type 2 diabetes. Results showed that family members, other than the individual with diabetes, completed diabetes related tasks to help keep the diabetic family
member’s blood glucose levels within normal limits (Gerstle et al.). After a family member was diagnosed with diabetes, family members assumed roles of dietitians, nurses, and doctors by providing dietary, patient care, and medical advice (Gerstle et al.). Failure of family members to assume these roles resulted in no change in glycemic control following nutritional education (Gerstle et al.).

*Dietary routines and diabetes management.* People with type 2 diabetes have reported being more resistant to dietary change than individuals with other chronic conditions (Groop & Tuomi, 1997). Following dietary recommendations is the most critical and challenging aspect of type 2 diabetes care because many patients struggle with reframing their eating habits to promote a healthy body and lifestyle (Whittemore, Chase, Mandle, & Roy, 2002). Dietary change requires adoption of new food habits while modifying old eating behaviors. Studies have shown a strong correlation between the ability to stop the progression of type 2 diabetes with the patient’s ability to lose weight, reduce overall fat intake, reduce saturated fat intake, reduce simple carbohydrate intake, increase complex carbohydrate intake, and increase fiber intake (Tuomilehto et al., 2001).

In many cases, after a family member is diagnosed with diabetes, family dietary routines need to be altered. Dietary routines are daily eating habits and meal-taking behaviors, including all aspects of mealtime and the conversations surrounding eating activities. Dietary routines act as organizers of family life as they impact physical care, connection, and sociability for household members (Denham, 2003c). The process of routinization of dietary practices makes the work of feeding the family more manageable.
Marjorie DeVault interviewed 30 households regarding the work of feeding the family (DeVault, 1991). She found that feeding is an ongoing task that takes a significant amount of time and consideration and involves the invisible work of planning, shopping, cooking, and serving meals (DeVault). The gender perspective that caring for others is women’s work conveys the message that women are primarily responsible for providing food for the family. Female participants disclosed feelings of obligation that if they did not feed the family no one else would and ideas that the food provided cannot simply be any food, but must be food that satisfies each family member’s taste preferences (DeVault). Few families now eat two meals together each day, which makes it essential to keep the household supplied with products used by each family member in their day-to-day dietary routines (DeVault).

Challenges to adhering to dietary recommendations include personal factors such as a desire to eat favorite foods under emotional stress and a history of eating beyond the point of satisfaction (Savoca & Miller, 2001). Altering eating habits requires routine meal times, changes in the amount and types of food, loss of spontaneity in eating, and changes in relational behaviors (Nagelkerk et al., 2006). In addition, those with diabetes are greatly impacted by the daily dietary routines of those who share their household.

A study designed to investigate the food habits of people with type 2 diabetes found that dietary habits were related to differences in glycemic control (Savoca, Miller, & Ludwig, 2004). Overall, the study identified 15 food habits in four factor categories. Factor 1 or basic eating practices involves the minimal set of behaviors needed to address the dietary needs of individuals with diabetes. Factor 2 or challenges of dining out
represents the difficulties in controlling dietary intake while eating meals away from home, as the preparation and ingredient content of foods is often unknown. Factor 3 or meal planning is considered vital to the success of diabetes management and requires individuals with diabetes to anticipate the need for healthy foods at meal times. Factor 4 or carbohydrate/vegetable strategies is comprised of the need to shift from consuming simple to more complex carbohydrates and to learn how to incorporate more vegetables into the diet. Since basic eating practices are resistant to change, researchers believe the factors discovered in this study can be used as a guide during the intervention process and can help target behaviors for change (Savoca et al., 2004).

Families have the potential to help or hinder efforts to eat appropriately. Supportive family members that motivate and maintain the same nutritional habits as the family member with diabetes are beneficial to the self-management process (Nagelkerk et al., 2006). Females with diabetes report struggles with family member’s meal preferences interfering with personal needs (Burke et al., 2006). A woman with diabetes, who serves as the primary cook of the household, often prepares meals with less concern for her needs than for those of other family members (Schuster, 2005). Women with diabetes also report making two meals, one meal for themselves and another meal for the rest of the family, in order to accommodate the families desire to continue eating high fat meals (Savoca & Miller, 2001). Males with diabetes on the other hand report that their wives’ efforts ensured that food choices and cooking practices supported healthful eating strategies at home and that their families typically ate the same meals prepared by their wives in adherence to the diabetic diet (Savoca & Miller; Schuster).
A study which assessed familial eating patterns affect on self-management of diabetes found barriers to making dietary change to be deep-rooted individual dietary routines, food preferences, lack of family support, family traditions, economic concerns, and societal influences (Schuster, 2005). Disruption of family routines through travel, holidays, and dining out create challenges for persons with diabetes to continue to follow the recommended meal plan (Savoca & Miller, 2001). The perception that a healthy diet is expensive is another barrier for appropriate diet pursuit (Sherman et al., 2000), with constant advertisements of special diabetes products contributing to misunderstandings and erroneous perceptions.

Depending on the type of food emphasis within a given culture and the social context in which food is typically consumed, individuals may differ in their experience and attempts to modify dietary habits after being diagnosed with diabetes. Latinos as opposed to European Americans expressed more difficulty in adapting their diet to the requirements of the disease in a family context because adapting required them to eat differently than the rest of the family and forfeit consumption of traditional heavy foods (Anderson, Goddard, Garcia, Guzman, & Vazquez, 1998). Similarly, Mexican cultural context represents a challenge for diabetic dietary decisions because food selection and preparation methods are determined by the family as opposed to the needs of the individual with diabetes (Albarran et al., 2006).

Description of the Appalachian Region

The Appalachian region includes 410 counties in 13 different states. Appalachian counties are found in the states of Alabama, Georgia, Kentucky, Maryland, Mississippi,
New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia. Appalachia is characterized by lower socioeconomic status, lower levels of income, and lower education levels (Appalachian Regional Commission, 2006). Eating preferences and patterns associated with the Appalachian area include consuming foods high in fat and sodium on a regular basis and preparing foods by frying, baking, or roasting (Ohio State University Extension, 2004). Residents of Appalachian counties in southeast Ohio appear to experience higher diabetes rates than non-Appalachian counties (Appalachian Rural Health Institute, 2004). Since family life in Appalachia typically involves close-knit family connections, it is extremely important for Appalachian healthcare providers to consider the family network while providing diabetes care (Purnell & Paulanka, 2005).

Summary

Diabetes is a chronic disease that can cause many debilitating complications. As the obesity epidemic becomes more pervasive, the prevalence of type 2 diabetes is increasing rapidly (CDC, 2005). Of the multiple self-management behaviors, dietary patterns and dietary change represent a major challenge for individuals with type 2 diabetes (Whittemore et al., 2002). Research supports the idea that greater emphasis needs to be placed on the influence family households impart to diabetes self-management (Pinhas et al., 1999). More needs to be known about the impact of family context on dietary management. Greater levels of knowledge about family roles in the adaptation to the dietary self-management needs linked to diabetes could provide important ways to help family members of those diagnosed with diabetes adopt dietary
routines that result in more optimal glycemic control. Researchers agree that dietary practices are an important part of diabetes management; however, assessment of dietary routines is rarely part of the dietary evaluation conducted (Denham, 2003a). Ways to assess and measure family dietary routines would provide better understandings about familial eating patterns and ways they affect diabetes self-management and could suggest ways to empower individuals to make needed dietary changes.
Chapter 3: Methodology

Overview

This research project was a pilot study to test the reliability and validity of a newly developed survey instrument intended to evaluate dietary routines of persons with diabetes from a family perspective. No known instrument is currently available to measure family dietary routines related to diabetes. The diabetes dietary routine survey will provide understandings about patterned eating behaviors of individuals with diabetes. Findings will enhance understandings about usual family dietary routines and identify goals and strategies that promote diabetes self-management. This research project was approved by the Institutional Review Board (IRB) in the Office of Research Compliance at Ohio University.

Development of a Validated Instrument

The first step in developing the dietary routine survey was to identify the objective and purpose of the instrument (Kitchenham & Pfleeger, 2002a). The objective of the diabetes dietary routine instrument is to provide an assessment of current dietary practices, serve as a basis for understanding patterned eating behaviors and identify potential ways to alter family dietary routines to promote optimal family health. The purpose of the diabetes dietary routine instrument is to serve as a reliable and valid instrument that measures current family dietary routines with potential to affect behaviors linked with self-management of diabetes.

After the objective and purpose were clearly defined, the literature was reviewed to see if an existing instrument fit the specifications. Because no acceptable instrument
was found to measure dietary routines from a family perspective, the Dietary Routine Scale was developed. The ideas included in the instrument were related to diabetes management, routines and rituals of diabetics, and family involvement in diabetic care. Questions were formulated to address the different dimensions of diabetes dietary management discussed in the literature; food preparation, foods consumed, and patterns of family involvement linked with dietary routines. The table in Appendix A summarizes the way questions were divided into three factors and states whether questions were negatively or positively worded towards healthy dietary routines. A Likert scale was used for response selection for each of the questions, a reliable technique that tallies affirmation towards various statements (Mueller, 1986). Respondents were asked about the presence of family dietary routines and answered using a frequency scale ranging from 1 (never) to 5 (always). High scores on positively phrased items indicated a healthy routine and low scores indicated an unhealthy routine. On the other hand, high scores on negatively phrased items indicated an unhealthy routine and low scores indicated a healthy routine.

Questions from the general family functioning subscale of the Family Assessment Device were included with the newly developed dietary routine survey for comparison purposes. Permission to use the Family Assessment Device was obtained through purchasing the book “Evaluating and Treating Families: The McMaster Approach” (Ryan, Epstein, Keitner, Miller, & Bishop, 2005). The Family Assessment Device was designed to evaluate family functioning on seven different dimensions: problem solving, communication, roles, affective responsiveness, affective involvement, behavior control,
and general family functioning (Epstein, Baldwin, & Bishop, 1983). Researchers hypothesized a higher functioning family would be associated with the presence of healthier dietary routines than families who scored lower in family functioning. The general family functioning subscale includes twelve questions, which can be found in Appendix B.

Structure. The survey included 66 close-ended questions, as opposed to open-ended questions, because open-ended questions in self-administered questionnaires can cause misinterpretation during data analysis (Kitchenham & Pfleeger, 2002a). Issues of literacy and health literacy were addressed during the development process by ensuring questions were simple and clear. Literacy is defined as using printed and written information to function in society, achieve goals, and develop knowledge (U.S. Department of Education, 2006). Healthy People 2010 defines health literacy as the degree to which individuals can obtain, process, and understand basic health information needed to make appropriate health decisions (U.S. Department of Health and Human Services, 2000). The survey used conventional language and avoided jargon or technical terms. Given that the instrument was designed to be used with persons residing in the Appalachian region, knowledge about populations in the region was included in the instrument development to assure it was sensitive to cultural concerns. Ultimately, questions were formulated to be unbiased, purposeful, concrete, and to express a single concept (Kitchenham & Pfleeger, 2002a).

Content validity. Once the instrument was constructed, 14 experts in nutrition and diabetes reviewed the survey. Since the new survey instrument focused on a topic that
has not been addressed previously, professionals were asked to review the instrument for content and face validity. Content and face validity assesses whether a tool adequately measures the property the investigator wishes to measure and completely and comprehensively covers the construct addressed in the survey (Mueller, 1986). In this study, dietary routines related to diabetes self-management were the properties to be measured. Each expert was instructed to look over the survey to determine if questions dealt with appropriate issues related to diabetes dietary management and to express any suggestions or comments regarding inclusion or exclusion of items, survey format, or question wording. Experts were instructed to write any comments or suggestions on the copy of the survey they were provided. Expert feedback was transcribed into a word document and evaluated by researchers based on the purpose of the recommendation and potential outcomes of the suggested change. Refinements in wording, design, and subject matter were made that improved the overall content of the Dietary Routine Scale.

**Pre-testing**

Pre-testing of the instrument was used to assess whether questions were understandable and to identify missing or unnecessary questions and ambiguous questions or instructions (Kitchenham & Pfleeger, 2002b). Cognitive processing was utilized during the pre-testing period by asking five individuals to “think aloud” and express their thought processes used to formulate responses to survey questions (Bickart & Felcher, 1996). Researchers were present and made notes regarding whether the questions were being interpreted as expected.
After making necessary revisions, the instrument was pilot tested with 12 persons with diabetes to identify ease and length of time for completion. Potential participants were identified through researcher acquaintances and at diabetes education classes held at O’Bleness Hospital in Athens, OH. Participants were informed that the information they provided would only be used to see if survey questions were working together properly. In most cases, survey completion time was measured directly by researchers; however, if participants preferred to fill out the survey at a later time, they were asked to write on the survey a start time and an end time. Data collected during the small pilot test was analyzed to see if the survey appeared to be working properly. Items negatively affecting the reliability of the scale with low corrected item correlations or items identified by respondents as being difficult to answer were reworded or eliminated from the final Dietary Routine Scale used for the remainder of the study. Table 2 summarizes the stages of instrument development used in this study.
Table 2

*Steps of Dietary Routine Scale Development*

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<th>Step 1</th>
<th>Instrument development based on literature related to dietary routines and diabetes.</th>
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<td>Step 2</td>
<td>14 diabetes experts reviewed the instrument for content validity.</td>
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<tr>
<td>Step 3</td>
<td>Revisions were made based on expert feedback.</td>
</tr>
<tr>
<td>Step 4</td>
<td>5 individuals completed a “think out loud” process.</td>
</tr>
<tr>
<td>Step 5</td>
<td>Revisions were made based on misinterpretation of survey questions.</td>
</tr>
<tr>
<td>Step 6</td>
<td>12 individuals completed a survey in a small pilot study.</td>
</tr>
<tr>
<td>Step 7</td>
<td>Revisions were made based on questions with inter-item correlations less than .20.</td>
</tr>
</tbody>
</table>
Sample

A convenience sample of individuals currently receiving care for diabetes in the tri-state region of Ohio, Kentucky, and West Virginia was used in this study. Subjects were males and females, 18 years or older, diagnosed with type 1 or type 2 diabetes. Attempts were made to obtain a sample of an equal number of male and female participants by directly mailing surveys to men and women diagnosed with diabetes and by asking healthcare professionals to distribute surveys to male and female diabetic patients. The participant’s levels of glycemic control or the presence or absence of comorbidities were not considered as criteria for eligibility. The survey asks about family dietary routines; thus, single member households were exempt from the study. Reading ability was assessed in the demographic section by highest level of education completed.

Distribution of the Instrument

In December of 2006, diabetes educators, physicians, and healthcare providers were contacted and asked to distribute the newly developed dietary routines instrument, provided in Appendix C, to potential participants (n = 400). The investigator worked with staff members and diabetes educators of local physician offices providing diabetes care and diabetes educators that participate in the Diabetes Coalition associated with the Ohio University Diabetes Center. Healthcare professionals were provided with a copy of the letter found in Appendix D that explained the purpose of the instrument and instructed them on ways to inform potential participants about the study and provide those interested with a survey packet. Fifteen healthcare professional present at the Diabetes Coalition conference held in December were provided with survey packets that contained
15 copies of the Dietary Routine Scale to distribute. The healthcare professionals who had received packets were periodically contacted through e-mail to assess whether they were able to distribute packets and/or if they would be willing to distribute more. Throughout the data collection period, survey packets were distributed as necessary to local physician’s offices based on the rate of survey distribution. Snowball techniques were employed to assure the distribution and completion of the desired number of surveys.

The survey packets were also distributed using previously compiled lists of individuals with diabetes who had given consent to be included in further diabetes research (n = 200). The packets provided to potential participants by a healthcare professional or via direct mailings contained a cover letter, a portion of a family functioning assessment tool with established reliability and validity (Epstein et al., 1983), and a self-addressed, stamped return envelope. It is difficult to motivate potential participants to complete an unsolicited survey (Kitchenham & Pfleeger, 2002b). Research has found that individuals are more motivated to provide complete and accurate responses if they think the study results will be beneficial to them (Kitchenham & Pfleeger). To enhance participant motivation, the following components were described in a cover letter provided to potential participants (a) purpose of the study, (b) relevance of the study to the participant, (c) importance of participation, and (d) assurance of confidentiality (Kitchenham & Pfleeger). Appendix E contains a copy of the cover letter given to potential participants.
Participants completed the surveys individually and mailed the completed survey back to researchers using the prepaid self-addressed return envelope. Return of the survey signified agreement to participate in the study. Three months were spent in the data collection process.

Statistical Analysis

Data were coded after the surveys were returned and entered into SPSS version 14 for data analysis. Levels of reliability and validity were assessed.

Reliability. Reliability is related to the internal consistency of the questionnaire. Reliability is necessary, but not sufficient for validity (Mueller, 1986). Before data analysis began, Cronbach’s alpha of greater than .80 was established as an acceptable level of reliability. An alpha of .80 signifies at least 80% of observed score variation in dietary routines is attributed to actual differences between respondents. An item analysis was also performed to see how questions were affecting the reliability of the scale by measuring the correlation between single item scores and the respondent’s total score on the scale.

Validity. The validity of the newly developed dietary routine survey assessed whether the instrument measured what it was intended to measure. As opposed to reliability, which lies within the data, validity lies within the interpretations made from the data (Mueller, 1986). Multiple validity methods were used in this study.

Concurrent validity determines the extent to which a scale correlates with other measures (Mueller, 1986). Researchers hypothesized that respondents with a greater level of family functioning would also have healthy dietary routines. Respondents score on the
general family functioning subscale of the Family Assessment Device was compared to their overall score on the dietary routine survey. It was also measured whether the dietary routine score correlated with self-reported diabetes management and diabetes related laboratory values, such as blood glucose levels and HbA1c.

Factor analysis uses a complex set of formulas to identify factors that statistically explain variation in measures (Aron et al., 2005). Factors emerged from the data based on correlations among the variables. A factor analysis was used to assess the construct validity related to the dimensionality of the newly developed Dietary Routine Scale. Prior to survey development, researchers conducted a review of the literature to establish different dimensions of diabetes dietary management. These dimensions, which can be found in Appendix A, were compared to the actual correlation seen among the variables.
Chapter 4: Results

Pre-testing

*Expert opinion.* On October 18th, 2006, 14 experts, who attended the West Virginia Diabetes Conference, reviewed the newly developed dietary routine survey for content validity. The experts were from a variety of diabetes related professional backgrounds, including diabetes educators, dietitians, registered nurses, nurse practitioners, extension agents, and nutrition professors. In general, experts concluded the survey covered the relevant areas of dietary routines related to dietary management. A common concern expressed was the use of the term “diet” and the wording “foods I should eat” and “foods I should not eat.” Experts believed this phrasing promoted a negative attitude and failed to emphasize that all foods can be worked into a diabetic meal plan.

A few suggestions made by experts regarding items to include in the survey were disregarded because they were not relevant to the construct being addressed. Diabetes management is a complex task and various surveys could be developed to address different aspects of care. The dietary routine survey developed in this research is solely intended to assess dietary management associated with dietary routines.

Minor format and wording changes were made to the survey based on expert suggestions, especially in the demographic section. The survey was pilot tested in the Appalachian region and many diabetic patients within this region have extremely low levels of education, with only 76.8% of Appalachian adults aged 25 years or older having a high school diploma, which is 3.6% lower than the national average (Appalachian
Regional Commission, 2006). In general though, it is beneficial to lower the literacy level to make sure the survey is understandable to as many people as possible. To lower the literacy level of the survey, questions were reworded to use primarily one or two syllable words and the most basic language possible. In addition, the format of the survey was adjusted to include more spacing, making it easier to read.

*Think out loud.* Two males and three females participated in the “think out loud” stage of the survey development process. Each participant came from a demographic background that provided a different insight into the dietary diabetes survey. The first participate was diagnosed with type 2 diabetes, the second participant was a mother responsible for feeding a family of four, the third participant had a wife who was diagnosed with type 2 diabetes, the fourth participant was a nurse who treats diabetic patients, and the final participant was a dietetic student. Each participant has lived in Appalachia most of their life and was familiar with cultural contexts distinctive to the Appalachia area.

The “think out loud” process identified questions, which were interpreted differently by different participants. As a result of the “think out loud” sessions, non-specific wording such as “special things,” “convenience foods,” “good choices,” “stressed” and “too much food” were replaced with more concrete terms. Questions that did not fit appropriately with the Likert scale used in the survey, which ranged from 1 (*never*) to 5 (*always*), were reworded to make more sense to participants. Questions that addressed other family members eating patterns were eliminated because respondents appeared to have a difficult time accurately assessing other family members’ food intake.
Small pilot study. Twelve individuals diagnosed with type 1 or type 2 diabetes completed the newly developed diabetes dietary routine survey. Average survey completion time was approximately 8 minutes and ranged from 4 to 13 minutes, which complies with the suggestion to keep survey length at an average of less than 13 minutes to complete (Asiu, Antons, & Fultz, 1998).

Answers provided in the demographic section were assessed to make sure respondents felt comfortable answering the questions and that appropriate selection categories were included. Additional categories were added for the question related to frequency of blood sugar testing because respondents who failed to check their blood sugar at least once a day did not have an accurate answer to choose. Although many respondents failed to answer the question related to household income, researchers assumed the more anonymous format of the larger pilot study would alleviate this problem.

An item analysis was performed on the 37 items hypothesized to assess dietary routines related to diabetes management. The analysis revealed ten items with corrected item total correlations scores less than .30. Based on these results, seven items were reworded to try to eliminate future problems, two items were left the same because researchers believed the small sample of the pilot study was the problem as opposed to the wording of the questions, and one item was dropped from the survey. Each question had a standard deviation of greater than .50, which signified participants were using the whole scale to answer questions and the questions were adequately identifying differences between participants.
Mailed Pilot Study Response Rate

During the mailed pilot study, multiple methods were used for survey distribution. Of the 200 surveys distributed through direct mailings and 400 distributed by healthcare professionals, 114 surveys were returned and used for data analysis. An additional 12 surveys were returned in which participants identified themselves as a single member household in the demographic portion of the survey and thus were excluded from the sample. An accurate response rate is difficult to calculate because it is unknown if healthcare professionals distributed all of the surveys they were provided. An underestimated return rate of 21% can be calculated by assuming all 600 surveys were distributed and 126 were mailed back to researchers. Of the 126 returned, 114 were used for data analysis, which represents a 19% response rate for valid surveys. Since non-respondents could not be identified and contacted in this study, data is subject to non-response bias.

Of the 114 surveys used for data analysis, 71 were female participants and 43 were male participants. The survey population did not consist of a diverse ethnic background and was 97% Caucasian. Participants ranged in age from 18 years to 89 years, with a mean age of 58 (SD = 13.92). Household sizes ranged from 2 to 8 family members. The average household size was 2.7 (SD = 1.13) family members, with approximately 62% of participants living in a two-person household. Since 95 of the participants were married, 64% of the two person households consisted of a married couple. The majority of participants were over the age of 50. Over half of the participants
had not earned a college degree and 49.5% of the households surveyed had incomes of less than $40,000.

Most participants reported having type 2 diabetes (n = 92), as compared to type 1 diabetes (n = 16). Five people were unsure of which type of diabetes they had. The amount of time diagnosed with diabetes ranged from 1 month to 50 years and had a mean of approximately 10 years (SD = 9.56). Eighty percent of participants attended at least one diabetes education class since their diagnosis with diabetes. Approximately 20% of participants reported checking their blood sugar less than once a day, 24% checked their blood sugar only once a day, 42% checked their blood sugar between two and three times a day, and 14% checked their blood sugar four or more times a day. The most common category of diabetes management reported was good and the least common category reported was excellent. HbA1c values provided by participants ranged from 4.9% to 16.0%, with an average HbA1c level of 6.9% (SD = 1.68). Table 3 provides a breakdown of the demographic data provided by participants.
Table 3

*Participant Demographics*

<table>
<thead>
<tr>
<th>Demographic Category</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household Size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>71</td>
<td>62.3</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>20.2</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>12.3</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>2.6</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>.9</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>114</td>
<td>100.1</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 40 years</td>
<td>14</td>
<td>12.3</td>
</tr>
<tr>
<td>40-49 years</td>
<td>13</td>
<td>11.4</td>
</tr>
<tr>
<td>50-59 years</td>
<td>32</td>
<td>28.0</td>
</tr>
<tr>
<td>60-69 years</td>
<td>29</td>
<td>25.4</td>
</tr>
<tr>
<td>70+</td>
<td>25</td>
<td>21.9</td>
</tr>
<tr>
<td>Not provided</td>
<td>1</td>
<td>.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>114</td>
<td>99.8</td>
</tr>
<tr>
<td>Length of Diagnosis with Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>-------</td>
<td>---</td>
</tr>
<tr>
<td>A year or less</td>
<td>13</td>
<td>9.4</td>
</tr>
<tr>
<td>More than a year to 5 years</td>
<td>28</td>
<td>27.2</td>
</tr>
<tr>
<td>More than 5 years to 10 years</td>
<td>30</td>
<td>26.3</td>
</tr>
<tr>
<td>More than 10 years to 15 years</td>
<td>12</td>
<td>10.5</td>
</tr>
<tr>
<td>More than 15 years to 20 years</td>
<td>10</td>
<td>8.8</td>
</tr>
<tr>
<td>More than 20 years</td>
<td>13</td>
<td>11.4</td>
</tr>
<tr>
<td>Not provided</td>
<td>8</td>
<td>7.0</td>
</tr>
<tr>
<td>Total</td>
<td>114</td>
<td>100.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reported Self-Management</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>6</td>
<td>5.3</td>
</tr>
<tr>
<td>Fair</td>
<td>31</td>
<td>27.2</td>
</tr>
<tr>
<td>Good</td>
<td>47</td>
<td>41.2</td>
</tr>
<tr>
<td>Very good</td>
<td>26</td>
<td>22.8</td>
</tr>
<tr>
<td>Excellent</td>
<td>2</td>
<td>1.8</td>
</tr>
<tr>
<td>Not Provided</td>
<td>2</td>
<td>1.8</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100.1</td>
</tr>
</tbody>
</table>
Reliability of Dietary Routine Scale

An item analysis was performed on the 36 items hypothesized to assess dietary routines related to diabetes management. The Dietary Routine Scale indicated a satisfactory level of reliability with a Cronbach’s Alpha level of .90. Each question had a standard deviation of greater than .60, which signified questions were adequately identifying differences between participants. A corrected item total correlation of greater than .20 was used for inclusion in the scale. All the item-total correlations were greater than .20 except for four items: “I get worried over making healthy food choices” \((r = .142)\), “I feel rushed when I eat meals” \((r = .167)\), “I eat more food when I eat with family members” \((r = .148)\), and “When I eat with family members, I think more about my food choices than when I eat alone” \((r = -.175)\). When an item analysis was run on the scale with these four problem items eliminated, Cronbach’s Alpha increased to .91 and item-total correlations between the remaining 32 items were all greater than .20.

Factor Analysis of Dietary Routine Scale

The dimensionality of the 36-item Dietary Routine Scale, minus the four problem items discovered during the reliability analysis, was analyzed using maximum likelihood factor analysis. Three criteria were used to determine the number of factors to rotate: the a priori hypothesis that the measure contained three factors, a scree test, and a parallel analysis. The scree plot and parallel analysis both indicated that the initial hypothesis of the scale containing three factors was incorrect. The scree plot, depicted in Figure 1, identified four eigenvalues in the sharp descent part of the plot before the eigenvalues began to level off. Parallel analysis is a relatively new statistical procedure used to
identify the number of components to retain by comparing eigenvalues from the research
data prior to rotation to those from a random matrix of identical dimensionality (Wood,
Tataryn, & Gorsuch, 1996). Table 4 shows that four eigenvalues from the research data
were greater than their respective component eigenvalues from the random data. Based
on the scree plot and parallel analysis, four factors were retained and rotated using a
Varimax rotation procedure.

Figure 1. Factor analysis scree plot.
The rotated solution, as shown in Appendix F, yielded four interpretable factors. Twenty-eight of the 32 items analyzed loaded heavily in one factor and four items loaded on multiple factors. Table 5 provides the eigenvalue, percent of variance, and cronbach’s alpha of the factors. A comparison between anticipated grouping of variables and actual grouping shown during factor analysis is summarized in Table 5 and provided in detail in Appendix G.
Table 5

*Dietary Routine Scale Factor Descriptions*

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>% of Variance</th>
<th>Number of items expected to group together</th>
<th>Total number of items</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>9.59</td>
<td>8</td>
<td>11</td>
<td>.902</td>
</tr>
<tr>
<td>Factor 2</td>
<td>3.50</td>
<td>8</td>
<td>9</td>
<td>.853</td>
</tr>
<tr>
<td>Factor 3</td>
<td>2.63</td>
<td>5</td>
<td>5</td>
<td>.875</td>
</tr>
<tr>
<td>Factor 4</td>
<td>2.06</td>
<td>0</td>
<td>3</td>
<td>.612</td>
</tr>
<tr>
<td>Total</td>
<td>__</td>
<td>21</td>
<td>28</td>
<td>__</td>
</tr>
</tbody>
</table>

Each factor indicated a reasonable level of reliability. The lowest alpha level of .612 was associated with the fourth factor. Researchers had anticipated only three factors; however, three items grouped strongly together to comprise a fourth factor. Correlation coefficients were computed among the four factors of the Dietary Routine Scale. The results of the correlational analyses presented in Table 6 show that all of the correlations among the subscales were statistically significant and were greater than or equal to .192. The correlations between Situational Eating and Family Support or Meal Structure tended to be lower and less significant than the other correlations. In general, the results suggest
if individuals have healthier routines in one area of diabetes dietary management they also have healthier routines in other areas of diabetes dietary management.

Table 6

*Pearson Product Moment Correlations among the Four Dietary Routine Subscales*

<table>
<thead>
<tr>
<th></th>
<th>Pre-Planning</th>
<th>Situational Eating</th>
<th>Family Support</th>
<th>Meal Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Planning</td>
<td>0.373*</td>
<td>0.470*</td>
<td>0.340*</td>
<td>0.340*</td>
</tr>
<tr>
<td>Situational</td>
<td>0.373*</td>
<td>0.197*</td>
<td>0.192*</td>
<td>0.192*</td>
</tr>
<tr>
<td>Eating</td>
<td>0.197*</td>
<td>0.229*</td>
<td></td>
<td>0.229*</td>
</tr>
<tr>
<td>Family Support</td>
<td>0.470*</td>
<td>0.197*</td>
<td>0.229*</td>
<td></td>
</tr>
<tr>
<td>Meal Structure</td>
<td>0.340*</td>
<td>0.192*</td>
<td>0.229*</td>
<td></td>
</tr>
</tbody>
</table>

*Correlation is significant at the .05 level (2-tailed)*

Once factors were established, an internal reliability analysis was rerun minus the four problem items discovered during the original internal reliability analysis and minus the additional four problem items that loaded on multiple factors during the factor analysis. Cronbach’s alpha measured .90 for the remaining 28 non-problem items. Table 7 summarizes the change in scale reliability based on data analysis procedures.
Table 7

*Cronbach’s Alpha Values of the Dietary Routine Scale*

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.90</td>
<td>36 - Mailed version of the Dietary Routine Scale</td>
</tr>
<tr>
<td>.91</td>
<td>32 - 4 reliability problem items removed</td>
</tr>
<tr>
<td>.90</td>
<td>28 - 4 additional factor analysis problem items removed</td>
</tr>
</tbody>
</table>

Using the 28 non-problem items, dietary routine scores were summed and ranged from 49 to 127 out of a maximum possible score of 140. Average participant scores ranged from 1.75 to 4.78, shown in Figure 2. Higher average dietary routine scores or higher summed scores represent reporting healthier dietary routines. The greatest percentage of participants had average dietary routine scores between 3.01 and 3.50.
Validity of the Dietary Routine Scale

As discussed earlier, content validity was evaluated by a group of diabetes experts during the pre-testing phase of development. Experts concluded the newly developed survey instrument was a comprehensive measure of dietary routines related to diabetes management. The dietary routine survey also demonstrated a degree of construct and concurrent validity. A \( p \) value of less than .05 was required for significance.

Family functioning. Scores on the general family functioning subscale ranged from 15 to the maximum possible score of 48. The mean score was 38.9 ± .57. Average family functioning scores are shown in Figure 3 and ranged from 1.25 to 4.00. The creators of the Family Assessment Device suggest average scores of greater than 2.00 to indicate problematic family functioning; however, the original scale was reversed in this study; therefore, lower scores indicated the family member perceived the family’s overall functioning as more problematic. A maximum average score of 4.00 represents a high
functioning family. The greatest percentage of participants had average family functioning scores between 3.01 and 3.50.

![Bar chart showing family functioning average scores]

**Figure 3.** Average family functioning scores of participants.

Figure 4 shows average dietary routine scores of participants categorized as having low, medium, or high family functioning scores. An independent *t*-test was conducted to evaluate the hypothesis that more functional families would have higher dietary routine scores. As researchers had hypothesized, participants who scored higher on the Dietary Routine Scale tended to have higher scores on the general family functioning subscale. The *t*-test comparing participants categorized as having low family functioning scores to participants with medium family functioning scores was significant, *t*(80) = 2.53, *p* = .01. A *t*-test comparing participants with medium family functioning scores to participants with high family functioning scores was also significant, *t*(74) =
2.36, \( p = .02 \). Results indicate average dietary routine scores increased as level of family functioning increased (\( M = 3.15, SD = .41 \), \( M = 3.40, SD = .43 \), \( M = 3.67, SD = .53 \)).

*Figure 4.* Dietary routine score based on family functioning.

*Level of blood sugar control.* The Dietary Routine Scale seemed to distinguish between individuals with good control of their diabetes from those with poor control of their diabetes. Self-reported HbA1c and blood sugar values were divided into good control and poor control of blood glucose levels. HbA1c values of less than 7.0% were considered to be relatively good control of blood glucose and values greater than 7.0% were considered as poor control of blood glucose. Reported blood glucose values of 70 mg/dl-125 mg/dl were considered good control of blood glucose, whereas values less than 70 mg/dl or greater than 125 mg/dl were considered poor control of blood glucose. An independent *t* test was conducted to evaluate whether individuals with poor control of
their blood sugar scored worse on the Dietary Routine Scale than individuals with good control of their blood sugar. The independent $t$ test using blood sugar levels to group participants based on poor and good control was significant, $t(100) = 2.58, p = .011$. Individuals grouped as having good blood sugar control had average dietary routine scores of 3.49 ($SD = .46$) and individuals grouped as having poor blood sugar control had average dietary routine scores of 3.24 ($SD = .52$). A comparison of the means is shown in Figure 5. There were only eight individuals who reported they did not know their last blood sugar reading. The average dietary routine score of these individuals was even lower than those grouped as having poor blood sugar control ($M = 2.81, SD = .64$). The independent $t$ test using HbA1c values to distinguish poor and good control was not significant, $t(74) = 1.79, p = .077$, with individuals grouped as having good HbA1c values having an average dietary routine score of 3.43 ($SD = .49$) and individuals grouped as having poor HbA1c values having an average dietary routine score of 3.20 ($SD = .54$). Thirty-three individuals who did not know their last HbA1c average had an average dietary routine score of 3.29 ($SD = .56$), which was lower than individuals grouped as reporting good HbA1c values, but higher than individuals grouped as reporting poor HbA1c values. Even though only an independent $t$-test comparing reported blood sugar was significant, in both cases the mean dietary routine score of individuals reporting overall better control of blood glucose was higher than the mean dietary routine score of individuals who reported worse control of blood glucose.
Figure 5. Dietary routine score based on reported blood sugar values.

Reported life and family structure. Eighty one percent of participants reported their family and life at the same level of organization. On the other hand, 19% or participants reported their family and life in different organizational categories, with either their family or life considered as more organized than the other. One-way analyses of variance were conducted to evaluate the relationship between self-reported family and life structure to level of dietary routines. Boxplots of the results are shown in Figure 6 and Figure 7. The independent variables, the level of reported family or life structure, included three levels: unorganized, semi-organized, and very organized. The dependent variable was the average dietary routine score. The ANOVA of reported family structure was significant $F(2) = 24.14, p = .01$, with average scores of 2.69 ($SD = .49$), 3.37 ($SD = .42$) and 3.79 ($SD = .51$), respectively for unorganized, semi-organized, and very organized families. An ANOVA of reported life structure $F(2) = 29.99, p = .01$ was also
significant, with average scores of 2.86 \((SD = .65)\), 3.21 \((SD = .45)\) and 3.50 \((SD = .40)\), respectively for unorganized, semi-organized, and very organized families. Follow up tests were conducted to evaluate pairwise differences among the means. A significant difference \((p = .001)\) was seen in the means between the groups based on level of family or life organization.

![Figure 6. Dietary routine score based on reported life structure.](image-url)
One-way analyses of variance were also conducted to evaluate the relationship between self-reported life structure and self-reported family structure to level of family functioning. The independent variables were the level of reported family or life structure. The dependent variable was the average family functioning score. The ANOVA of reported family structure, $F(2) = 14.9, p = .01$ and reported life structure $F(2) = 6.84, p = .01$ were significant. Follow up tests were conducted to evaluate pairwise differences among the means. There was a significant difference seen in the means between reported
life structures, with the comparison between unorganized and semi-organized reports having a significance of .02 and the comparison between semi-organized and very organized having a significance of .01. Mean family functioning differences were also significant comparing reported family structures of unorganized to semi-organized ($p = .01$), but was no significant difference between individuals who described their family as very organized and those who described their family as semi-organized ($p = .06$).

The family structure reported by most participants was married, with 82% of females married and 86% of males married. The remaining participants were either widowed, divorced, single, or living with a partner. Dietary routine scores varied by gender with males having a higher average dietary routine score than females ($M = 3.42, SD = .58, M = 3.30, SD = .50$); however, an independent t-test comparing the mean difference was not significant ($p = .22$).

**Level of diabetes education.** An independent t-test was conducted to evaluate if individuals who attended diabetes education classes tended to have healthier dietary routines. The test was significant, $t(111) = 2.185, p = .03$ and implied individuals who attended diabetes education classes had healthier dietary routines ($M = 3.40, SD = .50$) than those who did not attend diabetes education classes ($M = 3.13, SD = .60$). Figure 8 provides a comparison of the average dietary routine scores based diabetes education attendance.
Figure 8. Dietary routine score based on diabetes education attendance.

Length of time since diagnosis with diabetes did not appear to be related to dietary routine score with scores increasing as well as decreasing as time with diabetes progressed. Figure 9 shows average dietary routines scores categorized by length of diagnosis with diabetes. Individuals diagnosed with diabetes for 15 to 20 years had the highest dietary routine scores while individuals diagnosed with diabetes for 5 to 15 years had the lowest dietary routine scores.
Figure 9. Dietary routine scores based on length of diagnosis with diabetes.
Chapter 5: Discussion

Conclusions

The purpose of this study was to develop and test an instrument that will provide an assessment tool to measure current dietary practices related to diabetes from a family perspective. The instrument is intended for use as a screening tool to identify problem areas in diabetes management as well as good diabetes management practices. This chapter provides a discussion of the data, conclusions, and recommendations for further development of the Dietary Routine Scale.

The Dietary Routine Scale developed in this study demonstrated adequate levels of reliability and validity. The 28 non-problem items of the Dietary Routine Scale had a Cronbach’s alpha level of .90, which indicated a good level of internal consistency and showed that questions were working well together. By using an inter-item total correlation, four problem items were identified that negatively affected the internal consistency of the questionnaire. Four strong subscales emerged during a factor analysis of the questionnaire. A degree of validity was established by comparing self-reported lab values and self-assessment of diabetes management to dietary routine score. In general, factors that indicated a greater level of diabetes management or life structure were associated with a higher dietary routine score. In addition, participants with a higher dietary routine score were more likely to have a higher general family functioning score.

Appalachian demographics. The survey population used in this study reported higher education and income levels than often associated with persons residing in the Appalachian area. Based on 2000 census data, 76.8% of individuals living in the
Appalachian region receive a high school degree (Appalachian Regional Commission, 2006). In this study, 93.8% of participants had received at least a high school degree. The average per capita income estimate for the Appalachian region is $25,470 (Appalachian Regional Commission). Over half of the individuals who filled out a dietary routine survey reported an income category of $30,000 or higher. The higher income and education level are most likely associated with the distribution methods used in this study. Individuals were given a dietary routine survey by a healthcare professional. Appalachians with a lower level of education and an associated lower level of income have been shown to be unable to afford to go to the doctor (Pheley, Holben, Graham, & Simpson, 2002) and would have been less likely to have the opportunity to receive a Dietary Routine Scale. In addition, distribution of survey packets by diabetes educator to clients receiving education or to individuals participating in a support group may have reached a sample population with characteristics slightly different from the general population of persons with diabetes residing in the Appalachian region.

*Dietary routine scale dimensions.* The Dietary Routine Scale identifies four dimensions of dietary management of diabetes. It was hypothesized the Dietary Routine Scale would divide into three dimensions: Preparing, Eating, and Family. After reviewing the grouping of items, the initial subscale labels were revised to be: Pre-Planning for Diabetes Management, Situational Eating, Family Support, and Meal Structure. The Pre-Planning subscale includes questions related to choosing and preparing healthy food items. Studies have shown success of diabetes management requires individuals with diabetes to anticipate the need for healthy foods at meal times (Savoca et al., 2004). The
Situational Eating subscale deals with various circumstances that can impact an individual’s ability to choose foods that will promote optimal diabetes management. Disruption of family routines through travel, holidays, and other situations create a challenge for the diabetic family member to continue to follow the recommended meal plan (Savoca & Miller, 2001). The third dimension, Family Support, focuses on family involvement in diabetes dietary care. Family support has been associated with higher levels of adherence to diet and is critical factor for individuals who share meals with the diabetic patient (Garay-Sevilla et al., 1995). The fourth subscale, Meal Structure, includes questions related to the organization and timing of meals consumed. Additional questions need to be added to this subscale to increase the level of reliability. Research has shown diabetes management requires routine meal times and loss of spontaneity of eating (Nagelkerk et al., 2006).

With the four dimensions of the Dietary Routine Scale established, possible explanations of why four items loaded on multiple factors can be provided. “Meals I eat are prepared from diabetes recipes” should have fit within the Pre-Planning subscale. A potential cause for respondents answering this question differently than the other Pre-Planning questions is that many individuals with diabetes do not cook using diabetes recipes; therefore, this question can likely be dropped without losing any valuable information. “The person who grocery shops for the food I eat reads food labels” was anticipated to fit within the Pre-Planning subscale; however, it fell within the Family and Pre-Planning subscales. This is most likely due to the fact that the question was worded to include a family member, as opposed to the other Pre-Planning subscale questions,
which solely addressed the individual with diabetes pre-planning of diabetes care. This question can also be dropped because the routine of reading food labels is addressed in two other questions on the scale. “I stop eating when I feel full” was intended to fit within a general eating subscale; however, the eating subscale collapsed during factor analysis to include only circumstantial eating. Therefore, this question no longer fits appropriately within this dimension. Although the tendency to overeat is a relevant issue of diabetes management, this question does not fit properly within the four established factors and should be eliminated to uphold the internal consistency of the scale. “Family members give me a hard time over my food choices” should have fit within the Family Support subscale, but it had a relatively low reliability, which implies it may be worded poorly. The low reliability level of this question is most likely attributed to the potential to interpret it in a variety of ways. The question was designed to assess if the diabetic family member’s food choices caused conflict with other family members or if family members had the tendency to police the diabetic family members eating habits; however, it is suspected the question was not as clear as researchers had intended. To make the question clearer in the future and to fit within the Family Support subscale, it could be worded as “Family members are supportive of my food choices.”

The four subscales which make up the Dietary Routine Scale proved to be intercorrelated. These intercorrelations conflict with traditional survey practices which suggest that subscales should be independent of each other. When subscales are highly intercorrelated, a single scale can be more efficient and provide as much information as multiple subscales used together (Clark & Watson, 1995). The subscales of the Dietary
Routine Scale are sufficiently independent to be distinguishable and researchers feel the division is useful to identify areas of healthy and/or unhealthy dietary routines. In general, it is unreasonable to assume different aspects of diabetes management would be totally independent of each other. It is realistic to assume problems in one area of dietary diabetes management can impact other areas. For example, some individuals may have problems only with situational eating, while others only lack family support, and some might have problems with situational eating associated with a lack of family support; therefore, total independence of the dietary management subscales is an illogical demand to place on the Dietary Routine Scale.

**Internal reliability of the dietary routine scale.** Four items were identified by the reliability analysis to not work well with the rest of the scale. These four items included: “I get worried over making healthy food choices,” “I feel rushed when I eat meals,” “I eat more food when I eat with family members,” and “When I eat with family members, I think more about my food choices than when I eat alone.” The first two problem items listed deal with feelings as opposed to the rest of the scale, which deals with actions. Participant’s response to feeling questions can vary significantly from their response to action questions, which could explain why these two questions are not working well with the rest of the scale. Beliefs and behavioral tendencies are not necessarily directly related. For example, an individual may think it is important to eat five servings of fruits and vegetables everyday; however, he/she may not be able to incorporate that many fruits or vegetables into the daily diet. The second set of problem items listed deal with changing patterns in the presence of family members. A similar question, which was not shown to
be a problem item, was “When other family members choose unhealthy foods, I am more likely to eat them too.” This question deals with family member’s food choices having an impact on dietary habits of the family member who has diabetes. Although the problem questions and non-problem question are similar, a distinction can be made that the problem questions deal with changes simply by being around family members and the non-problem question addresses dietary changes based on the actions of family members.

Researchers anticipated that during the survey development process various questions would prove to be troublesome and would need to be eliminated from the scale. It is recommended to eliminate the two questions which address changing dietary patterns in the presence of family members. Participant’s response to the question “When other family members choose unhealthy foods, I am more likely to eat them too” provides adequate information on the impact family members have on food choices. Problem items on the scale that fit within established dimensions of diabetes management and cannot be eliminated without losing pertinent information should be reworded instead of dropped. It is recommended to reword the problem items dealing with feelings to be more action oriented. Instead of asking if individuals “get worried” over making healthy food choices it would be better to evaluate if individuals “think ahead of time about making healthy food choices.” This revised item should fit nicely within the Pre-Planning for Diabetes Management subscale. Similarly, rather than asking if individuals “feel rushed” when eating meals, it is more appropriate to ask if individuals “eat meals in a hurry” an item which should group within the meal structure dimension of the Dietary Routine Scale.
Summary of changes. Table 8 summarizes the suggested changes for the Dietary Routine Scale based on an internal reliability and factor analysis procedures. To increase the reliability of the Meal Structure subscale, suggestions of possible questions to include are provided. For future reliability and validity studies of the Dietary Routine Scale, it is recommended to eliminate headings and put questions in a random order. It is also suggested to use the first letter of the scale response categories, which range from never to always, instead of the numbers 1-5 to clarify the meanings of the scale points (Krosnick & Berent, 1993).
### Table 8

**Summary of Suggested Dietary Routine Scale Changes**

<table>
<thead>
<tr>
<th>Original Item</th>
<th>Potential Problem</th>
<th>Suggestions for Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>I get worried over making healthy food choices.</td>
<td>Assesses feelings.</td>
<td>Fix and include in pre-planning subscale - I think ahead of time about making healthy food choices</td>
</tr>
<tr>
<td>I feel rushed when I eat meals.</td>
<td>Assesses feelings.</td>
<td>Fix and include in meal structure subscale - I eat meals in a hurry.</td>
</tr>
<tr>
<td>I eat more food when I eat with family members.</td>
<td>Deals with changing</td>
<td>Eliminate - Other questions</td>
</tr>
<tr>
<td>When I eat with family members, I think more about my food choices than when I eat alone.</td>
<td>Deals with changing</td>
<td>Eliminate - Other questions</td>
</tr>
<tr>
<td>Factor Analysis Problem Items</td>
<td></td>
<td></td>
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<tr>
<td>---------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Meals I eat are prepared from diabetes recipes.</td>
<td>Failure to use diabetes recipes.</td>
<td>Eliminate - Using recipes does not necessarily assess level of healthy routines.</td>
</tr>
<tr>
<td>The person who grocery shops for the food I eat reads food labels.</td>
<td>Wording includes a family member.</td>
<td>Eliminate - Other questions ask about the tendency to read food labels.</td>
</tr>
<tr>
<td>I stop eating when I feel full.</td>
<td>Not relevant to circumstantial eating.</td>
<td>Eliminate - No longer fits with any of the subscales.</td>
</tr>
<tr>
<td>Family members give me a hard time over my food choices.</td>
<td>Worded poorly.</td>
<td>Fix and include in family subscale- Family members are supportive of my food choices.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Meal Structure Subscale Additions</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>I eat meals in a hurry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I eat my meals around the same time everyday.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I skip meals.</td>
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</tbody>
</table>
Validity of the dietary routine scale. The Dietary Routine Scale’s correlation to the general family functioning subscale of the Family Assessment Device is consistent with previous studies, which highlight the importance of family in diabetes management (Cardenas et al., 1987; Garay-Sevilla, et al., 1995; Primomo et al., 1990), as well as the importance of family structure for the establishment of healthy routines (Denham, 2002). Families characterized by cohesion, emotional expressiveness, and lack of conflict have been associated with greater levels of diabetic control (Marteau et al., 1987). Because family functioning is associated with the establishment of family health routines and the presence of family health routines improves diabetes management, it should be expected that individuals who scored higher on the general family functioning measurement would also have healthier dietary routines, represented by higher scores on the Dietary Routine Scale.

Blood sugar and HbA1c values reported by participants provided an estimate of their overall diabetes management. A comparison between self-report of diabetes management and score on the Dietary Routine Scale showed individuals grouped as having better control of their diabetes had a healthier level of dietary routines than individuals grouped as having poor control of their diabetes. The mean difference in groups was significant for reported blood sugar, but not for reported HbA1c values. The average HbA1c groupings were likely distorted by the fact that 33 individuals could not remember their last HbA1c test value. The average dietary routine score of the individuals who could not recall their last HbA1c value was higher than the average score of individuals who reported poor HbA1c values. It can be suspected that individuals who
could not remember their last HbA1c value included two distinct types of participants: those with unhealthy dietary routines, who neglect to manage their diabetes and those with healthy dietary routines, who simply couldn’t remember the value of their last HbA1c test. Routines have been shown to provide necessary structure, order, and control needed to ensure consistency in the timing, quantity, and types of foods eaten by a diabetic individual (Maharaj et al., 1998). Ultimately, healthier dietary routines lead to better diabetes management, which results in better controlled blood sugar and HbA1c laboratory values.

The association of the Dietary Routine Scale with self-reported life and family structure supports that dietary routines act as organizers of family life (Denham, 2003c). Family organization can aid in dietary management, with more highly organized families better equipped to purchase proper foods for the diabetic diet and to follow predictable meal schedules (Chesla et al., 2003). Participants who indicated their lives and families to be more organized are likely better equipped to integrate aspects of disease management into their lives, while participants that identified their family and life as less organized are likely to lack routine structure and may find the implementation of daily routines to be more of a challenge (Markson & Fiese, 2000).

Males scoring higher on the dietary routine scale than females can be attributed to past research which has shown females with diabetes often overlook their diabetes management and focus on pleasing other family members (Schuster, 2005). On the other hand, males with diabetes report that their wives’ efforts ensure food choices and cooking
practices support healthy eating (Savoca & Miller, 2001; Schuster), which leads to the development of healthy routines.

Participants who attended diabetes education classes had significantly higher mean dietary routine scores than participants who have never attended diabetes education classes. These results support *Healthy People 2010* diabetes related goal to increase the proportion of individuals with diabetes who receive formal diabetes education from 40% to 60% (U.S. Department of Health and Human Services, 2000). Diabetes self-management education is considered by many diabetic patients to be the single source of diabetes information (Sprague et al., 1999) and is critical to fully understand the disease (CDC, 2005).

The fluctuation in dietary routine scores based on length of diagnosis with diabetes represents that many patients with type 2 diabetes are not prone to making life long changes (Vallis et al., 2003) and that following dietary recommendations is the most critical and challenging aspect of diabetes care (Whittemore et al., 2002). Studies have shown a gradual decrease in self-care behaviors after completion of education programs (Norris et al., 2001; Rubin et al., 1991; Wing et al., 1985), which could explain why newly diagnosed diabetic individuals have higher average dietary routine score than those diagnosed for a longer period of time. Patients tend to lack motivation to attend continuing education classes because they feel diabetes education is a one-time event even though when life situations change, new learning needs arise (Sprague et al., 1999).
**Recommendations**

To the best of our knowledge, this is the first study to develop a Dietary Routine Scale related to diabetes management. Future studies are needed to further explore the reliability, validity, and usefulness of the Dietary Routine Scale in both research and clinical practice. This study has reported the results of the development and first pilot of the Dietary Routine Scale. Scale development is a continuous process, which involves multiple piloting trials; therefore, new data needs to be collected using the revised Dietary Routine Scale to be reassessed for reliability and validity. Cross validation is the process in which the reliability coefficient is verified across other sample groups. This study refined the Dietary Routine Scale based on a single set of item responses, which takes advantage of a small amount of inter-item correlation that has occurred by chance (Mueller, 1986). It is likely that in a new sample of respondents, the revised Dietary Routine Scale will suffer a slight decrease in reliability.

Some of the instrument validity established in this study was based on participant’s self-report of diabetes related laboratory values and self-assessment of their diabetes management. Self-reported data is subject to participant error and/or bias; therefore, more accurate data should be collected directly by researchers and used for future validity purposes. The general functioning subscale of the Family Assessment Device was used for validity purposes and does not need to be included with the Dietary Routine Scale in the future; however, to establish further validity, it is recommended to compare the Dietary Routine Scale to other measures of similar construct.
The Dietary Routine Scale needs to be tested with different populations. The survey population used in this study was primarily Caucasian; therefore, the survey needs to be tested with different ethnic groups. Although the only age criteria required to participate in this study was to be over the age of 18, a younger population was not equally represented with most participants being older than 50. It would be beneficial to administer the instrument to a younger population, which may have different levels of dietary routines. Many of the participants were also from a lower educational and economic background, which requires further studies to test the validity of the newly developed instrument within populations with higher education and income levels.

Ultimately, this study established a preliminary Dietary Routine Scale with adequate levels of reliability and validity. The results of this study suggests further exploration regarding the importance of family structure and diabetes education to diabetes care with more structured families and more educated participants scoring higher on the Dietary Routine Scale. The Dietary Routine Scale serves as a simple and efficient method to identify patient’s current dietary routines. Appendix H provides the changes made to the Dietary Routine Scale and Appendix I provides a revised draft of the Dietary Routine Scale based on the results of this study, which can be used for further development processes. Once the development process has been completed, the Dietary Routine Scale can be used in research about the dietary patterns of those with diabetes or in clinical practice to assist in planning intervention strategies.
References


Klein, S., Sheard, N.F, Pi-Sunyer, X., Daly, A., Wylie-Rosett, J., Kulkarni, K., et al. (2004). Weight management through lifestyle modification for the prevention and


## Appendix A: Anticipated Factor Analysis of Items

<table>
<thead>
<tr>
<th>Items</th>
<th>Direction of statement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eating (E) Items</strong></td>
<td></td>
</tr>
<tr>
<td>I eat foods that are healthy.</td>
<td>Positive</td>
</tr>
<tr>
<td>I eat 3 or more meals a day.</td>
<td>Positive</td>
</tr>
<tr>
<td>I feel rushed when I eat meals.</td>
<td>Negative</td>
</tr>
<tr>
<td>On the weekends, my meal schedule is different than the rest of the week.</td>
<td>Negative</td>
</tr>
<tr>
<td>I stop eating when I feel full.</td>
<td>Positive</td>
</tr>
<tr>
<td>I eat more food when I eat alone.</td>
<td>Negative</td>
</tr>
<tr>
<td>I eat 5 or more servings of fruits or vegetables everyday.</td>
<td>Positive</td>
</tr>
<tr>
<td>When I eat alone, I am more likely to make unhealthy food choices.</td>
<td>Negative</td>
</tr>
<tr>
<td>During holidays and other times of celebration (for example anniversaries, birthdays), it is hard for me to eat the right kinds of foods to help control my blood sugar.</td>
<td>Negative</td>
</tr>
<tr>
<td>On holidays when special or different foods are available (for example Thanksgiving), I eat more than I normally would.</td>
<td>Negative</td>
</tr>
<tr>
<td>I consider holidays and other days of celebrations “free days” when I can eat whatever I want.</td>
<td>Negative</td>
</tr>
<tr>
<td>When I travel, it is harder for me to eat the right kinds of foods to help control my blood sugar.</td>
<td>Negative</td>
</tr>
<tr>
<td>On days I am sick, it is hard for me to eat foods that will help control my blood sugar.</td>
<td>Negative</td>
</tr>
<tr>
<td>When I feel stressed, it is difficult for me to make healthy food choices.</td>
<td>Negative</td>
</tr>
<tr>
<td>Items</td>
<td>Direction of statement</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>I follow a routine to take care of my diabetes.</td>
<td>Positive</td>
</tr>
<tr>
<td>I choose foods to eat based on what affect they will have on my blood sugar.</td>
<td>Positive</td>
</tr>
<tr>
<td>I read food labels to see how different foods will change my blood sugar.</td>
<td>Positive</td>
</tr>
<tr>
<td>I get worried over making healthy food choices.</td>
<td>Negative</td>
</tr>
<tr>
<td>The meals I eat are planned ahead.</td>
<td>Positive</td>
</tr>
<tr>
<td>The person who grocery shops for the food I eat reads food labels.</td>
<td>Positive</td>
</tr>
<tr>
<td>The right type of food is available in my house to help me manage my diabetes.</td>
<td>Positive</td>
</tr>
<tr>
<td>The meals I eat are prepared in ways that help control my diabetes.</td>
<td>Positive</td>
</tr>
<tr>
<td>I eat homemade meals.</td>
<td>Positive</td>
</tr>
<tr>
<td>Meals I eat are prepared from diabetes recipes.</td>
<td>Positive</td>
</tr>
<tr>
<td>When I eat at a restaurant, I make menu choices that will help control my blood sugar.</td>
<td>Positive</td>
</tr>
<tr>
<td>I make healthy choices when ordering take out foods to eat at home.</td>
<td>Positive</td>
</tr>
<tr>
<td>Items</td>
<td>Direction of statement</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td><strong>Family (F) Items</strong></td>
<td></td>
</tr>
<tr>
<td>At least one other family member offers me support in managing my diabetes.</td>
<td>Positive</td>
</tr>
<tr>
<td>At least one other family member helps me choose healthy foods to eat.</td>
<td>Positive</td>
</tr>
<tr>
<td>At least one other family member helps me choose foods that are good for my blood sugar.</td>
<td>Positive</td>
</tr>
<tr>
<td>At least one other family member helps me read food labels to see how different foods will change my blood sugar.</td>
<td>Positive</td>
</tr>
<tr>
<td>Family members give me a hard time over my food choices.</td>
<td>Negative</td>
</tr>
<tr>
<td>When other family members choose unhealthy foods, I am more likely to eat them too.</td>
<td>Negative</td>
</tr>
<tr>
<td>Other family members’ eating habits are a good influence on my food choices.</td>
<td>Positive</td>
</tr>
<tr>
<td>Members of my family eat an evening meal at home together.</td>
<td>Positive</td>
</tr>
<tr>
<td>I eat more food when I eat with family members.</td>
<td>Negative</td>
</tr>
<tr>
<td>When I eat with family members, I think more about my food choices than when I eat alone.</td>
<td>Positive</td>
</tr>
</tbody>
</table>
Appendix B: Family Assessment Device General Family Functioning Subscale

<table>
<thead>
<tr>
<th>Items</th>
<th>Direction of statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning family activities is difficult because we misunderstand each other.</td>
<td>Negative</td>
</tr>
<tr>
<td>In times of crisis, we can turn to each other for support.</td>
<td>Positive</td>
</tr>
<tr>
<td>We cannot talk to each other about the sadness we feel.</td>
<td>Negative</td>
</tr>
<tr>
<td>Individuals are accepted for what they are.</td>
<td>Positive</td>
</tr>
<tr>
<td>We avoid discussing our fears and concerns.</td>
<td>Negative</td>
</tr>
<tr>
<td>We can express feelings to each other.</td>
<td>Positive</td>
</tr>
<tr>
<td>There are lots of bad feelings in the family.</td>
<td>Negative</td>
</tr>
<tr>
<td>We feel accepted for what we are.</td>
<td>Positive</td>
</tr>
<tr>
<td>Making decisions is a problem for our family.</td>
<td>Negative</td>
</tr>
<tr>
<td>We are able to make decisions about how to solve problems.</td>
<td>Positive</td>
</tr>
<tr>
<td>We don’t get along well together.</td>
<td>Negative</td>
</tr>
<tr>
<td>We confide in each other.</td>
<td>Positive</td>
</tr>
</tbody>
</table>
Appendix C: Mailed Version of the Dietary Routine Scale

This survey is going to ask about eating and diabetes. Eating patterns change from day to day. Read each statement carefully, but do not spend too much time thinking about each statement. Answer with your first reaction and pick the answer you think fits the best. The survey is two pages front and back.

1. Circle the meals you eat at regular times:
   Breakfast/Morning Meal    Lunch/Noon Meal    Supper/Evening Meal
   Morning Snack     Afternoon Snack   Evening Snack

2. Circle on average how many days a week you eat out for each meal: (include take out and meals not eaten at home)
   Morning meal:     Less than one    1      2     3     4     5    6    7
   Afternoon meal:        Less than one    1      2     3     4     5    6           7
   Evening meal:     Less than one    1      2     3     4     5    6    7

Please answer each question using the following scale:  (Circle response)
   1=Never          2=Rarely          3=Occasionally          4=Usually          5=Always

GENERAL DIABETES INFORMATION

3. I follow a routine to take care of my diabetes.  

4. At least one other family member offers me support in managing my diabetes.  

5. I eat foods that are healthy.  

6. I choose foods to eat based on what affect they will have on my blood sugar.  

7. At least one other family member helps me choose healthy foods to eat.  

8. At least one other family member helps me choose foods that are good for my blood sugar.  

9. I read food labels to see how different foods will change my blood sugar.  

10. At least one other family member helps me read food labels to see how different foods will change my blood sugar.  

11. Family members give me a hard time over my food choices.  

12. I get worried over making healthy food choices.  

13. When other family members choose unhealthy foods, I am more likely to eat them too.  

14. Other family members’ eating habits are a good influence on my food choices.
Please answer each question using the following scale: (Circle response)

1 = Never   2 = Rarely   3 = Occasionally   4 = Usually   5 = Always

PLANNING, SHOPPING, AND PREPARING MEALS

15. The meals I eat are planned ahead.  

16. The person who grocery shops for the food I eat reads food labels.  

17. The right type of food is available in my house to help me manage my diabetes.  

18. The meals I eat are prepared in ways that help control my diabetes.  

19. I eat homemade meals.  

20. Meals I eat are prepared from diabetes recipes.  

EATING MEALS

21. I eat 3 or more meals a day.  

22. Members of my family eat an evening meal at home together.  

23. I feel rushed when I eat meals.  

24. On the weekends, my meal schedule is different than the rest of the week.  

25. When I eat at a restaurant, I make menu choices that will help control my blood sugar.  

26. I make healthy choices when ordering take out foods to eat at home.  

27. I stop eating when I feel full.  

28. I eat more food when I eat alone.  

29. I eat more food when I eat with family members.  

30. I eat 5 or more servings of fruits or vegetables everyday.  

31. When I eat alone, I am more likely to make unhealthy food choices.  

32. When I eat with family members, I think more about my food choices than when I eat alone.
Please answer each question using the following scale:  (Circle response)
1=Never          2=Rarely          3=Occasionally          4=Usually          5=Always

SPECIAL DAYS
33. During holidays and other times of celebration (for example anniversaries, birthdays), it is hard for me to eat the right kinds of foods to help control my blood sugar.  1 2 3 4 5
34. On holidays when special or different foods are available (for example Thanksgiving), I eat more than I normally would.  1 2 3 4 5
35. I consider holidays and other days of celebrations “free days” when I can eat whatever I want.  1 2 3 4 5
36. When I travel, it is harder for me to eat the right kinds of foods to help control my blood sugar.  1 2 3 4 5
37. On days I am sick, it is hard for me to eat foods that will help control my blood sugar.  1 2 3 4 5
38. When I feel stressed, it is difficult for me to make healthy food choices.  1 2 3 4 5

FAMILY*  The family section of the survey is from the Family Assessment Device
Developed by:  Nathan B. Epstein, MD  Lawrence M. Baldwin, PhD  Duane S. Bishop, MD

Instructions: This section contains statements about families. Read each statement carefully and answer according to how you see your family.
Circle Strongly Disagree (SD) if you feel the statement does not describe your family at all.
Circle Disagree (D) if you feel the statement does not describe your family for the most part.
Circle Agree (A) if you feel the statement describes your family for the most part.
Circle Strongly Agree (SA) if you feel the statement describes your family very accurately.
39. Planning family activities is difficult because we misunderstand each other.  SD D A SA
40. In times of crisis, we can turn to each other for support.  SD D A SA
41. We cannot talk to each other about the sadness we feel.  SD D A SA
42. Individuals are accepted for what they are.  SD D A SA
43. We avoid discussing our fears and concerns.  SD D A SA
44. We can express feelings to each other.  SD D A SA
45. There are lots of bad feelings in the family.  SD D A SA
46. We feel accepted for what we are.  SD D A SA
47. Making decisions is a problem for our family.  SD D A SA
48. We are able to make decisions about how to solve problems.  SD D A SA
49. We don’t get along well together.  SD D A SA
50. We confide in each other.  SD D A SA
DEMOGRAPHICS

51. Sex: _____ Female _____ Male  Age: _____ years old

52. Race/ethnic background:
    _____ White  _____ Black or African American
    _____ American Indian or Alaska Native  _____ Asian
    _____ Native Hawaiian or Other Pacific Islander  _____ Hispanic
    _____ Other (Please specify): __________________________

53. Current marital status
    _____ Single  _____ Separated
    _____ Married  _____ Widowed
    _____ Divorced  _____ Living with partner/not married

54. Education (check highest grade completed):
    _____ 8th grade or less  _____ Associate Degree
    _____ Some high school, but not completed  _____ Bachelors Degree
    _____ High school graduate  _____ Masters Degree
    _____ GED  _____ Doctoral Degree
    _____ Some college, no degree  _____ Completed post-doctorate work

55. What is your household income? (Pick one)
    _____ Less than $10,000  _____ $40,000 - $49,999
    _____ $10,000 - $19,999  _____ $50,000 - $59,999
    _____ $20,000 - $29,999  _____ $60,000 - $69,999
    _____ $30,000 - $39,999  _____ More than $70,000

56. Including you, how many family members live in your home?  (Write in the exact #)

57. What type of diabetes do you have?  _____ Type 1 diabetes  _____ Type 2 diabetes  _____ Not sure

58. How long have you had diabetes?  _____ Years  _____ Months

59. Have you been to any diabetes education classes?  _____ Yes  _____ No

60. What was your last hemoglobin A1C?  _____ %
    _____ I don’t remember  _____ I don’t have my HbA1C checked

61. On average how often do you check your blood sugar?  _____ Less than once a week
    _____ At least once a week  _____ 1 time per day  _____ 2-3 times per day  _____ 4+ times per day

62. If you check your blood sugar what was your last reading?  _____  _____ I don’t remember

63. How well do you think you manage your diabetes with your eating habits?
    _____ Poor  _____ Fair  _____ Good  _____ Very good  _____ Excellent

64. Would you consider your life to be:  _____ Very organized  _____ Semi-organized  _____ Unorganized

65. Would you describe your family as:  _____ Very organized  _____ Semi-organized  _____ Unorganized
Appendix D: Distribution Instructions for Healthcare Professionals

Dear Health-Care Professional:

My name is Tamara Collier. I am a nutrition graduate student at Ohio University. For my thesis, I am working with Dr. Sharon Denham, a Professor in the School of Nursing at Ohio University, on developing a family dietary routine scale. The survey addresses daily patterns and activities surrounding food choices, meal planning, and meal preparation that regularly occur within the family household of diabetic individuals. Our intent is to construct a tool that health-care professionals can use to assess current dietary habits. It is believed that this information will be beneficial to diabetes educators as they teach patients and families, identify goals, and evaluate outcomes.

Each packet you have been given contains a cover letter, the newly developed family dietary routine survey, and a business return envelope. If you are willing, please hand out the packets to patients eighteen years or older diagnosed with type 1 or type 2 diabetes. Since the survey asks general questions about family, only give packets to potential participants that live with at least one other family member.

Directions for distribution:
1. Ask potential participants if they live with at least one other family member.
2. Inform the participant that the survey is an Ohio University research project to study eating patterns of people with diabetes.
3. Tell the participant that it will take about fifteen minutes to complete the survey.
4. Ask the potential participant to fill out the survey and mail it back using the pre-paid, self-addressed return envelope provided.
5. If they are willing to complete the survey, please encourage them to fill it out as soon as possible to avoid forgetting.

We greatly appreciate your help in distributing the packets. If you have any questions about the research study or about handing out the surveys, please contact my advisor, Dr. Sharon Denham, at denham@ohio.edu or 740-593-4499. You can contact me at tc194803@ohio.edu or 315-521-6527.

Sincerely,

Tamara Collier
Graduate Student
Ohio University, Food and Nutrition
Appendix E: Cover Letter to Potential Participants

Hello,

My name is Tamara Collier. I am a graduate student at Ohio University. For my thesis project, I have created a diabetes dietary survey. The survey asks questions about general eating habits and how the family can affect eating habits. I need your help to complete my research. You must be 18 years or older, have diabetes, and live with at least one other family member to take part in this study. If you live alone, please do not fill out the survey.

The survey will take about 15 minutes to complete. You do not need to put your name on the survey. After you finish, please put the survey in the envelope that was given to you. The envelope is already addressed. You do not need a stamp to mail the envelope back. When you fill out and mail back the survey, it means that it is okay to use your survey answers in this research study. You will not get any gifts for taking part. Nothing bad will happen if you choose not to fill out the survey. But, if you choose to fill out the survey you will help us learn more about what it is like to live with diabetes.

If you have any questions about this research, please call my advisor Dr. Sharon Denham at 740-593-4499 or e-mail her at denham@ohio.edu. You can also call me at 315-521-6527 or e-mail me at tc194803@ohio.edu. Call Jo Ellen Sherow at (740)-593-0664 if you have questions about being part of a research study.

I hope you will agree to help with my research and complete the survey. If you do, please fill it out and mail it back as soon as you can.

Thank you very much for your time and help!

Tamara Collier
### Appendix F: Rotated Factor Analysis

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I eat at a restaurant, I make menu choices that will help control my blood sugar.</td>
<td>0.867</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I choose foods to eat based on what affect they will have on my blood sugar.</td>
<td>0.764</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I make healthy choices when ordering take out foods to eat at home.</td>
<td>0.750</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I follow a routine to take care of my diabetes.</td>
<td>0.704</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The meals I eat are prepared in ways that help control my diabetes.</td>
<td>0.700</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I eat foods that are healthy.</td>
<td>0.692</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The right type of food is available in my house to help me manage my diabetes.</td>
<td>0.636</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I eat 5 or more servings of fruits or vegetables everyday.</td>
<td>0.603</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I eat 3 or more meals a day.</td>
<td>0.553</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The meals I eat are planned ahead.</td>
<td>0.535</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I read food labels to see how different foods will change my blood sugar.</td>
<td>0.523</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Factor Eigenvalue**: 0.958  
**% of Variance**: 29.9  
**Cronbach’s Alpha**: 0.902
<table>
<thead>
<tr>
<th>Items</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>On holidays when special or different foods are available (for example Thanksgiving), I eat more than I normally would.</td>
<td>.740</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I eat alone, I am more likely to make unhealthy food choices.</td>
<td></td>
<td>.715</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When other family members choose unhealthy foods, I am more likely to eat them too.</td>
<td></td>
<td></td>
<td>.699</td>
<td></td>
</tr>
<tr>
<td>During holidays and other times of celebration (for example anniversaries, birthdays), it is hard for me to eat the right kinds of foods to help control my blood sugar.</td>
<td></td>
<td></td>
<td></td>
<td>.659</td>
</tr>
<tr>
<td>I eat more food when I eat alone.</td>
<td></td>
<td></td>
<td></td>
<td>.651</td>
</tr>
<tr>
<td>I consider holidays and other days of celebrations “free days” when I can eat whatever I want.</td>
<td></td>
<td></td>
<td></td>
<td>.651</td>
</tr>
<tr>
<td>When I travel, it is harder for me to eat the right kinds of foods to help control my blood sugar.</td>
<td></td>
<td></td>
<td></td>
<td>.650</td>
</tr>
<tr>
<td>When I feel stressed, it is difficult for me to make healthy food choices.</td>
<td></td>
<td></td>
<td></td>
<td>.627</td>
</tr>
<tr>
<td>On days I am sick, it is hard for me to eat foods that will help control my blood sugar.</td>
<td></td>
<td></td>
<td></td>
<td>.565</td>
</tr>
</tbody>
</table>

**Factor Eigenvalue**

| .350 |

**% of Variance**

| 10.9 |

**Cronbach’s Alpha**

<p>| .853 |</p>
<table>
<thead>
<tr>
<th>Items</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least one other family member helps me choose healthy foods to eat.</td>
<td></td>
<td></td>
<td></td>
<td>.905</td>
</tr>
<tr>
<td>At least one other family member helps me choose foods that are good for my blood sugar.</td>
<td></td>
<td></td>
<td></td>
<td>.902</td>
</tr>
<tr>
<td>At least one other family member helps me read food labels to see how different foods will change my blood sugar.</td>
<td></td>
<td></td>
<td></td>
<td>.822</td>
</tr>
<tr>
<td>At least one other family member offers me support in managing my diabetes.</td>
<td></td>
<td></td>
<td></td>
<td>.762</td>
</tr>
<tr>
<td>Other family members’ eating habits are a good influence on my food choices.</td>
<td></td>
<td></td>
<td></td>
<td>.478</td>
</tr>
<tr>
<td><strong>Factor Eigenvalue</strong></td>
<td></td>
<td></td>
<td></td>
<td>.263</td>
</tr>
<tr>
<td><strong>% of Variance</strong></td>
<td></td>
<td></td>
<td></td>
<td>8.2</td>
</tr>
<tr>
<td><strong>Cronbach’s Alpha</strong></td>
<td></td>
<td></td>
<td></td>
<td>.875</td>
</tr>
<tr>
<td>I eat homemade meals.</td>
<td></td>
<td></td>
<td></td>
<td>.846</td>
</tr>
<tr>
<td>Members of my family eat an evening meal at home together.</td>
<td></td>
<td></td>
<td></td>
<td>.648</td>
</tr>
<tr>
<td>On the weekends, my meal schedule is different than the rest of the week.</td>
<td></td>
<td></td>
<td></td>
<td>.642</td>
</tr>
<tr>
<td><strong>Factor Eigenvalue</strong></td>
<td></td>
<td></td>
<td></td>
<td>2.06</td>
</tr>
<tr>
<td><strong>% of Variance</strong></td>
<td></td>
<td></td>
<td></td>
<td>6.4</td>
</tr>
<tr>
<td><strong>Cronbach’s Alpha</strong></td>
<td></td>
<td></td>
<td></td>
<td>.612</td>
</tr>
<tr>
<td>Meals I eat are prepared from diabetes recipes.</td>
<td>.448</td>
<td>.429</td>
<td>.266</td>
<td></td>
</tr>
<tr>
<td>The person who grocery shops for the food I eat reads food labels.</td>
<td>.405</td>
<td>.483</td>
<td>.251</td>
<td></td>
</tr>
<tr>
<td>I stop eating when I feel full.</td>
<td>.351</td>
<td>.223</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family members give me a hard time over my food choices.</td>
<td>.324</td>
<td>.335</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix G: Factor Comparison

<table>
<thead>
<tr>
<th>Items</th>
<th>Anticipated Factor</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I eat foods that are healthy.</td>
<td>Eating</td>
<td>1</td>
</tr>
<tr>
<td>I eat 3 or more meals a day.</td>
<td>Eating</td>
<td>1</td>
</tr>
<tr>
<td>I eat 5 or more servings of fruits or vegetables everyday.</td>
<td>Eating</td>
<td>1</td>
</tr>
<tr>
<td>I follow a routine to take care of my diabetes.</td>
<td>Preparing</td>
<td>1</td>
</tr>
<tr>
<td>I choose foods to eat based on what affect they will have on my</td>
<td>Preparing</td>
<td>1</td>
</tr>
<tr>
<td>blood sugar.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I read food labels to see how different foods will change my blood</td>
<td>Preparing</td>
<td>1</td>
</tr>
<tr>
<td>sugar.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The meals I eat are planned ahead.</td>
<td>Preparing</td>
<td>1</td>
</tr>
<tr>
<td>The right type of food is available in my house to help me manage</td>
<td>Preparing</td>
<td>1</td>
</tr>
<tr>
<td>my diabetes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The meals I eat are prepared in ways that help control my diabetes.</td>
<td>Preparing</td>
<td>1</td>
</tr>
<tr>
<td>When I eat at a restaurant, I make menu choices that will help</td>
<td>Preparing</td>
<td>1</td>
</tr>
<tr>
<td>control my blood sugar.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I make healthy choices when ordering take out foods to eat at home.</td>
<td>Preparing</td>
<td>1</td>
</tr>
<tr>
<td><strong>Factor 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When other family members choose unhealthy foods, I am more likely</td>
<td>Family</td>
<td>2</td>
</tr>
<tr>
<td>to eat them too.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I eat more food when I eat alone.</td>
<td>Eating</td>
<td>2</td>
</tr>
<tr>
<td>When I eat alone, I am more likely to make unhealthy food choices.</td>
<td>Eating</td>
<td>2</td>
</tr>
<tr>
<td>During holidays and other times of celebration (for example</td>
<td>Eating</td>
<td>2</td>
</tr>
<tr>
<td>anniversaries, birthdays), it is hard for me to eat the right kinds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of foods to help control my blood sugar.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On holidays when special or different foods are available (for</td>
<td>Eating</td>
<td>2</td>
</tr>
<tr>
<td>example Thanksgiving), I eat more than I normally would.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I consider holidays and other days of celebrations “free days” when I can eat whatever I want.</td>
<td><strong>Eating</strong></td>
<td>2</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>When I travel, it is harder for me to eat the right kinds of foods to help control my blood sugar.</td>
<td><strong>Eating</strong></td>
<td>2</td>
</tr>
<tr>
<td>On days I am sick, it is hard for me to eat foods that will help control my blood sugar.</td>
<td><strong>Eating</strong></td>
<td>2</td>
</tr>
<tr>
<td>When I feel stressed, it is difficult for me to make healthy food choices.</td>
<td><strong>Eating</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Factor 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At least one other family member offers me support in managing my diabetes.</td>
<td><strong>Family</strong></td>
<td>3</td>
</tr>
<tr>
<td>At least one other family member helps me choose healthy foods to eat.</td>
<td><strong>Family</strong></td>
<td>3</td>
</tr>
<tr>
<td>At least one other family member helps me choose foods that are good for my blood sugar.</td>
<td><strong>Family</strong></td>
<td>3</td>
</tr>
<tr>
<td>At least one other family member helps me read food labels to see how different foods will change my blood sugar.</td>
<td><strong>Family</strong></td>
<td>3</td>
</tr>
<tr>
<td>Other family members’ eating habits are a good influence on my food choices.</td>
<td><strong>Family</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Factor 4</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I eat homemade meals.</td>
<td><strong>Eating</strong></td>
<td>4</td>
</tr>
<tr>
<td>On the weekends, my meal schedule is different than the rest of the week.</td>
<td><strong>Eating</strong></td>
<td>4</td>
</tr>
<tr>
<td>Members of my family eat an evening meal at home together.</td>
<td><strong>Family</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Multiple Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meals I eat are prepared from diabetes recipes.</td>
<td><strong>Preparing</strong></td>
<td>Multiple</td>
</tr>
<tr>
<td>The person who grocery shops for the food I eat reads food labels.</td>
<td><strong>Preparing</strong></td>
<td>Multiple</td>
</tr>
<tr>
<td>I stop eating when I feel full.</td>
<td><strong>Eating</strong></td>
<td>Multiple</td>
</tr>
<tr>
<td>Family members give me a hard time over my food choices.</td>
<td><strong>Family</strong></td>
<td>Multiple</td>
</tr>
</tbody>
</table>
Appendix H: Dietary Routine Scale Changes

This survey is going to ask about eating and diabetes. Eating patterns change from day to day. Read each statement carefully, but do not spend too much time thinking about each statement. Answer with your first reaction and pick the answer you think fits the best. The survey is two pages front and back.

1. Circle the meals you eat at regular times:
   Breakfast/Morning Meal   Lunch/Noon Meal   Supper/Evening Meal
   Morning Snack           Afternoon Snack    Evening Snack

2. Circle on average how many days a week you eat out for each meal: (include take out and meals not eaten at home)
   Morning meal: Less than one 1 2 3 4 5 6 7
   Afternoon meal: Less than one 1 2 3 4 5 6 7
   Evening meal: Less than one 1 2 3 4 5 6 7

Please answer each question using the following scale: (Circle response)

1N=Never  2R=Rarely  3O=Occasionally  4U=Usually  5A=Always

3. I follow a routine to take care of my diabetes.
4. At least one other family member offers me support in managing my diabetes.
5. I eat foods that are healthy.
6. I choose foods to eat based on what affect they will have on my blood sugar.
7. At least one other family member helps me choose healthy foods to eat.
8. At least one other family member helps me choose foods that are good for my blood sugar.
9. I read food labels to see how different foods will change my blood sugar.
10. At least one other family member helps me read food labels to see how different foods will change my blood sugar.
11. Family members give me a hard time over are supportive of my food choices.
12. I get worried over think ahead of time about making healthy food choices.
13. When other family members choose unhealthy foods, I am more likely to eat them too.
14. Other family members’ eating habits are a good influence on my food choices.
Please answer each question using the following scale: (Circle response)

- **Never** (4N)
- **Rarely** (2R)
- **Occasionally** (3O)
- **Usually** (4U)
- **Always** (5A)

### Planning, Shopping, and Preparing Meals

15. The meals I eat are planned ahead.  
16. The person who grocery shops for the food I eat reads food labels.  
17. The right type of food is available in my house to help me manage my diabetes.  
18. The meals I eat are prepared in ways that help control my diabetes.  
19. I eat homemade meals.  
20. Meals I eat are prepared from diabetes recipes.

### Eating Meals

21. I eat 3 or more meals a day.  
22. Members of my family eat an evening meal at home together.  
23. I feel rushed when I eat meals *in a hurry*.  
24. On the weekends, my meal schedule is different than the rest of the week.  
25. When I eat at a restaurant, I make menu choices that will help control my blood sugar.  
26. I make healthy choices when ordering take out foods to eat at home.  
27. I stop eating when I feel full.  
28. I eat more food when I eat alone.  
29. I eat more food when I eat with family members.  
30. I eat 5 or more servings of fruits or vegetables everyday.  
31. When I eat alone, I am more likely to make unhealthy food choices.  
32. When I eat with family members, I think more about my food choices than when I eat alone.
Please answer each question using the following scale:  (Circle response)  
1N=Never  2R=Rarely  3O=Occasionally  4U=Usually  5A=Always  

**SPECIAL DAYS**

33. During holidays and other times of celebration (for example anniversaries, birthdays), it is hard for me to eat the right kinds of foods to help control my blood sugar.  
34. On holidays when special or different foods are available (for example Thanksgiving), I eat more than I normally would.  
35. I consider holidays and other days of celebrations “free days” when I can eat whatever I want.  
36. When I travel, it is harder for me to eat the right kinds of foods to help control my blood sugar.  
37. On days I am sick, it is hard for me to eat foods that will help control my blood sugar.  
38. When I feel stressed, it is difficult for me to make healthy food choices.  

**FAMILY** The family section of the survey is from the Family Assessment Device Developed by: Nathan B. Epstein, MD Lawrence M. Baldwin, PhD Duane S. Bishop, MD

*Instructions:* This section contains statements about families. Read each statement carefully and answer according to how you see your family.

Circle Strongly Disagree (SD) if you feel the statement does not describe your family at all.
Circle Disagree (D) if you feel the statement does not describe your family for the most part.
Circle Agree (A) if you feel the statement describes your family for the most part.
Circle Strongly Agree (SA) if you feel the statement describes your family very accurately.

39. Planning family activities is difficult because we misunderstand each other.  
40. In times of crisis, we can turn to each other for support.  
41. We cannot talk to each other about the sadness we feel.  
42. Individuals are accepted for what they are.  
43. We avoid discussing our fears and concerns.  
44. We can express feelings to each other.  
45. There are lots of bad feelings in the family.  
46. We feel accepted for what we are.  
47. Making decisions is a problem for our family.  
48. We are able to make decisions about how to solve problems.  
49. We don’t get along well together.  
50. We confide in each other.
DEMOGRAPHICS

39. Sex: ____Female ____Male  Age: ____years old

40. Race/ethnic background:
   ____White  ____Black or African American
   ____American Indian or Alaska Native  ____Asian
   ____Native Hawaiian or Other Pacific Islander  ____Hispanic
   ____Other (Please specify):_______________________

41. Current marital status
   ____Single  ____Separated
   ____Married  ____Widowed
   ____Divorced  ____Living with partner/not married

42. Education (check highest grade completed):
   ____8th grade or less  ____Associate Degree
   ____Some high school, but not completed  ____Bachelors Degree
   ____High school graduate  ____Masters Degree
   ____GED  ____Doctoral Degree
   ____Some college, no degree  ____Completed post-doctorate work

43. What is your household income? (Pick one)
   ____Less than $10,000  ____$40,000 - $49,999
   ____$10,000 - $19,999  ____$50,000 - $59,999
   ____$20,000 - $29,999  ____$60,000 - $69,999
   ____$30,000 - $39,999  ____More than $70,000

44. Including you, how many family members live in your home? ____(Write in the exact #)

45. What type of diabetes do you have? ___Type 1 diabetes  ___Type 2 diabetes  ___Not sure

46. How long have you had diabetes?  ____Years  ____Months

47. Have you been to any diabetes education classes?  ____Yes  ____No

48. What was your last hemoglobin A1C?  ____%
   ____I don’t remember  ____I don’t have my HbA1C checked

49. On average how often do you check your blood sugar?  ____Less than once a week
   ____At least once a week  ____1 time per day  ____2-3 times per day  ____4+ times per day

50. If you check your blood sugar what was your last reading?  ____I don’t remember

51. How well do you think you manage your diabetes with your eating habits?
   _____Poor    _____Fair    _____Good    _____Very good    _____Excellent

52. Would you consider your life to be:  ____Very organized  ____Semi-organized  ____Unorganized

53. Would you describe your family as:  ____Very organized  ____Semi-organized  ____Unorganized
Appendix I: Revised Dietary Routine Scale

This survey is going to ask about eating and diabetes. Eating patterns change from day to day. Read each statement carefully, but do not spend too much time thinking about each statement. Answer with your first reaction and pick the answer you think fits the best. The survey is two pages front and back.

1. Circle the meals you eat at regular times:
   - Breakfast/Morning Meal
   - Lunch/Noon Meal
   - Supper/Evening Meal
   - Morning Snack
   - Afternoon Snack
   - Evening Snack

2. Circle on average how many days a week you eat out for each meal: (include take out and meals not eaten at home)
   - Morning meal: Less than one 1 2 3 4 5 6 7
   - Afternoon meal: Less than one 1 2 3 4 5 6 7
   - Evening meal: Less than one 1 2 3 4 5 6 7

Please answer each question using the following scale: (Circle response)

N=Never  R=Rarely  O=Occasionally  U=Usually  A=Always

3. At least one other family member offers me support in managing my diabetes.

4. I eat foods that are healthy.

5. When I feel stressed, it is difficult for me to make healthy food choices.

6. I choose foods to eat based on what affect they will have on my blood sugar.

7. At least one other family member helps me choose healthy foods to eat.

8. I think ahead of time about making healthy food choices.

9. On holidays when special or different foods are available (for example Thanksgiving), I eat more than I normally would.

10. I make healthy choices when ordering take out foods to eat at home.

11. I eat 3 or more meals a day.

12. The meals I eat are prepared in ways that help control my diabetes.

13. On days I am sick, it is hard for me to eat foods that will help control my blood sugar.

14. Members of my family eat an evening meal at home together.
15. I read food labels to see how different foods will change my blood sugar.

16. Family members are supportive of my food choices.

17. On the weekends, my meal schedule is different than the rest of the week.

18. When other family members choose unhealthy foods, I am more likely to eat them too.

19. The meals I eat are planned ahead.

20. The right type of food is available in my house to help me manage my diabetes.


22. At least one other family member helps me choose foods that are good for my blood sugar.

23. I consider holidays and other days of celebrations “free days” when I can eat whatever I want.

24. I eat meals in a hurry.

25. Other family members’ eating habits are a good influence on my food choices.

26. When I eat at a restaurant, I make menu choices that will help control my blood sugar.

27. I eat more food when I eat alone.

28. I eat 5 or more servings of fruits or vegetables everyday.

29. During holidays and other times of celebration (for example anniversaries, birthdays), it is hard for me to eat the right kinds of foods to help control my blood sugar.

30. At least one other family member helps me read food labels to see how different foods will change my blood sugar.

31. When I eat alone, I am more likely to make unhealthy food choices.

32. When I travel, it is harder for me to eat the right kinds of foods to help control my blood sugar.

33. I follow a routine to take care of my diabetes.
DEMOGRAPHICS

34. Sex: ____Female ____Male Age: ____years old

35. Race/ethnic background:
   ____White ____Black or African American
   ____American Indian or Alaska Native ____Asian
   ____Native Hawaiian or Other Pacific Islander ____Hispanic
   ____Other (Please specify):_______________________

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48. Would you describe your family as: __Very organized __Semi-organized __Unorganized