

## Food Selection and Eating Patterns: Themes Found among People with Type 2 Diabetes Mellitus\*

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### **Abstract:**

**Objective:** The objective of this study was to examine the beliefs and perspectives among people with type 2 diabetes mellitus about dietary requirements, food selection and eating patterns, and attitudes about self-management practices.

**Design:** Semistructured, in-depth interviews explored participants' experiences with diabetes prior to their diagnosis, participants' understanding of the guidelines for the nutritional management of diabetes, how participants applied their understanding of dietary guidelines to daily food selection and eating patterns, and the social and personal themes influencing participants' food selection and eating patterns.

**Subjects:** Interviews were conducted with members of a convenience sample of 45 men and women diagnosed with type 2 diabetes for at least 1 year.

**Analyses Performed:** Interviews were coded using a conceptual matrix derived from participants' statements. Common characteristics were grouped, and broad themes were identified.

**Results:** Eating patterns were influenced by participants' knowledge of diabetes management. Challenges that participants encountered when applying nutrition recommendations were linked to their prior eating practices. Dietary self-efficacy, social support, and time management were identified as mediating variables that can influence dietary behaviors.

**Implications:** Diabetes nutrition education programs should increase awareness of eating history, spousal support, and time management practices. Future research should include the refinement and validation of a nutritional management model of diabetes.

**KEY WORDS:** eating patterns, nutrition education, qualitative, self-efficacy, Social Cognitive Theory, social support, type 2 diabetes

### **Article:**

#### **INTRODUCTION**

Type 2 diabetes mellitus requires the adoption and maintenance of multiple self-care behaviors to achieve and sustain glycemic control.<sup>1,2</sup> These behaviors include monitoring blood glucose, exercising regularly, and adhering to a recommended eating regimen. Eating is a major aspect of daily living, one that may influence the development of diabetes and its subsequent progression.<sup>3</sup> Previous research showed that people with diabetes found the most difficult component of their self-care regimen to be adhering to a healthful diet.<sup>4</sup> In addition, people with diabetes were reported to be resistant to dietary change when compared to people with other chronic diseases.<sup>3</sup> The goals of nutrition education for individuals with diabetes are to achieve and maintain a desirable body weight and optimal glycemic control to reduce the morbidity and mortality associated with the disease.<sup>1,2</sup> To achieve these goals, nutrition educators need to appreciate the issues faced by those with diabetes as they strive to change and improve their eating patterns.<sup>5</sup>

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Food selection and eating patterns are influenced by psychosocial, behavioral, and environmental elements.<sup>6,7</sup> To effectively modify dietary patterns among people with diabetes, it is important to identify the elements that influence their food choices and eating behaviors. Prior quantitative research among people with type 2 diabetes measured psychosocial variables affecting dietary adherence and identified the variables that influenced diabetes self-care.<sup>8</sup> However, there is limited information about the specific food selection and eating behaviors of those with type 2 diabetes published in the literature. Exploratory research is needed to identify the unique personal dimensions, behavioral requirements, and environmental characteristics of those with type 2 diabetes and how these characteristics affect the food selection and eating patterns of this group.

The purpose of this research was to examine the beliefs and experiences of people with type 2 diabetes regarding dietary recommendations, food selection and eating patterns, and the aspects of daily living that influenced their diabetes self-management practices. Individual narratives were obtained using qualitative research methods to capture the complexity and diversity of individuals and to identify important concepts in the participants' own words.<sup>9</sup> The results of these narratives offered a preliminary view of how these beliefs and experiences affected participants' reported food selection and eating patterns. This formative research can be used to tailor nutrition education programs to better meet the needs of people with diabetes.

## METHODS

These data were collected as part of a larger study that explored the themes that influenced three key diabetes self-management behaviors: monitoring blood glucose, exercising regularly, and following a recommended meal plan. Only the results from the in-depth interviews about participants' dietary self-management practices are presented here.

**Subject recruitment.** Selection criteria for the study included people 40 to 65 years of age with type 2 diabetes for at least 1 year. The criteria of Welborn et al.<sup>10</sup> were used to distinguish between those with type 1 and type 2 diabetes. The participants' current level of glycemic control was not included as a selection criteria. Subjects were recruited through advertisements in local newspapers, health fairs, endocrinology practices, and diabetes education classes at an outpatient nutrition and diabetes education center. Sixty-two subjects completed a telephone screening interview to determine study eligibility. Twelve were ineligible because they either had type 1 diabetes, had been diagnosed with diabetes for < 1 year, or were > 65 years of age. Five subjects were unable to complete the study. Therefore, 45 people completed the interview.

The study was approved by the Institutional Review Board at the University of North Carolina at Greensboro. All participants provided informed consent and received a \$20 honorarium on completion of the study.

**Data collection.** An interview guide was developed to elicit information from participants about their experiences with diabetes prior to diagnosis, views of diabetes self-management recommendations, current lifestyle practices, and the social and institutional conditions that influenced their diabetes care. The interview guide included an introduction that explained the purpose of the interview and requested permission to audiotape the interview. Then, participants were asked a series of open-ended questions that reviewed all topics systematically and encouraged participants to share their perspectives. The interview topics are listed in Table 1. The interview guide was pilot tested prior to implementing the study with four individuals who met the study criteria to assess the clarity and appropriateness of questions. Minor changes were made to the interview guide to ensure that questions were worded in an open-ended format and used

**Table 1.** Common themes and major subthemes about participants' self-care practices.

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Diabetes history
Family history of diabetes
Expectations about developing diabetes
Participant's understanding of diabetes management at the time of diagnosis
Emotional reaction to the diagnosis of diabetes
Knowledge of food selection and eating patterns recommended in the management of diabetes
Beliefs about the relationship among diabetes, food selection, and eating patterns
Understanding of the guidelines for a "recommended diet" for diabetes management
Eating patterns and attitudes prior to diagnosis of diabetes
Strategies used by the participant to apply dietary guidelines
Challenges faced in dietary adherence
Institutional aspects of diabetes self-care practices
Participant's interaction with their physician regarding eating patterns
Sources of educational information for diabetes management
Impressions of formal diabetes education received
Financial costs of diabetes self-care management
Participant's view regarding additional education and support needed
Social support
Support and involvement of family members in managing diabetes
Interactions with friends and others who have diabetes
Impact of the work environment on diabetes self-care
Individual perspectives on diabetes self-care practices
Attitudes about how diabetes self-care practices are integrated into the participant's daily routine
Behaviors that promote successful self-care practices
Physical changes (e.g., perceived energy levels, hypoglycemia, and diabetes complications associated with diabetes)

lay terminology rather than medical terms. All interviews were conducted by the same investigator (MS) and averaged 75 minutes in length. Interviews were conducted face to face in an informal manner and audiotaped. The interviewer probed participants to obtain additional information on interesting topics that emerged and to clarify ambiguous comments. The interview tapes were audited by the principle investigator (CM) to monitor the quality of the interview process.

A glycated hemoglobin measure was obtained from each participant from an outpatient clinical laboratory prior to the interview as an independent measure of glycemic control during the previous 3 months.<sup>1</sup> Glycated hemoglobin was measured with a high-pressure liquid chromatography ion exchange assay of HbA<sub>1c</sub>. Each participant received the results of the glycated hemoglobin test on completion of the interview.

**Data analyses.** Data analysis included a variable-based approach. This approach involved identifying emerging themes across subjects rather than focusing on individual cases.<sup>11</sup> The key element of the analysis was the development of a conceptually clustered matrix,<sup>9</sup> which included three steps. First, the audiotapes from the interviews were transcribed verbatim. Then, approximately half of the transcripts were reviewed, and labels were assigned to each statement made by participants. For example, a friend was referred to as "supportive and offering advice about diabetes" during the interview. Within the context provided by this participant, "friend" would be labeled an "information source" and a "source of support outside the family." Third, each unique label was listed, and these were classified according to the broad themes and subthemes in Table 1. Based on this preliminary conceptual structure of broad themes, subthemes, and associated labels, a coding matrix was designed. The investigators recorded all relevant statements from each person's transcript on the coding matrix under the

corresponding theme and subtheme. Participant quotations that were representative of a particular theme were also recorded on the coding matrix under the corresponding subtheme. Six of the transcripts were randomly selected and independently coded by both investigators. All relevant themes and subthemes were coded on the coding matrix. The inter-rater reliability of the coding procedure between the investigators was 0.92.

The completed coding matrices were reviewed, and all statements related to food, eating, or dietary practices (e.g., preparation methods) were identified. A data display was constructed by listing the identified statements from the coding matrices by subcategories. This data display allowed common statements to be clustered. In this form, patterns within a cluster were identified, and relationships among clusters were inferred within each broad theme.

The data summaries were reviewed in detail by the investigators. The credibility of the results was established by regular reviews between the investigators of the coding forms across all participants for each theme and subcategory as the analysis progressed. The summarized data were reviewed in the same manner so that emerging concepts and patterns were isolated and refined. Based on these discussions, the elements related to food selection and eating patterns were identified.

## RESULTS

**Participant characteristics.** The demographic characteristics of the sample are provided in Table 2. The majority of the participants were Caucasian. Participants represented male (42%), female (58%), and African-American (36%) perspectives. There was one Hispanic-American and one Native American participant. Most participants (69%) had annual household incomes greater than \$30,000; 71% had some college education. Participants represented excellent (42%), good (25%), and poor (33%) glycemic control. Most participants (67%) took an oral hypoglycemic agent as part of their diabetes management. Sixty-three percent of the participants

**Table 2.** Selected characteristics of participants with type 2 diabetes (N = 45).

<i>Characteristics</i>	<i>n</i>	<i>%</i>
<b>Gender</b>		
Female	26	58
<b>Ethnicity</b>		
Caucasian	27	60
African American	16	36
Other	2	4
<b>Medication status</b>		
None	8	18
Oral medication only	30	67
Insulin	7	15
<b>Glycemic control (% HbA<sub>1c</sub>)</b>		
Excellent ( $\leq 7\%$ )	19	42
Good ( $> 7\%$ and $\leq 8\%$ )	11	25
Poor ( $> 8\%$ )	15	33
<b>Annual household income</b>		
< \$30,000	14	31
\$30,000–\$50,000	13	29
>\$50,000	18	40
<b>Education level</b>		
$\leq$ High school graduate	13	29
Some college	23	51
$\geq$ College graduate	9	20
	<i>Mean</i>	<i>SD</i>
Age (yr)	52.6	5.5
Body Mass Index (kg/m <sup>2</sup> ) <sup>a</sup>	34.40	7.4
Duration of diabetes (yr)	4.83	3.8

<sup>a</sup>BMI calculated using self-reported height and weight measures.

reported attending formal diabetes training programs prior to participating in this study.

**Key themes from participant narratives.** The purpose of the interview was to capture the individual's viewpoint about elements affecting dietary self-management behaviors, not to define a participant's level of dietary adherence. Five central components affecting dietary behaviors emerged from the data analysis. First, the participants' eating history provided a foundation for food selection and eating patterns. Second, participants' self-reported knowledge of a recommended diet reflected their understanding of dietary guidelines. Third, strategies were expressed by participants that represented how they translated dietary guidelines into day-to-day problem-solving techniques. Fourth, challenges were identified by participants that they described as obstacles to developing and maintaining recommended dietary practices. Fifth, several mediating variables emerged that either impeded participants' efforts to maintain new dietary practices or facilitated the adoption of healthful eating habits. A description of the participants' views of each of these themes is provided below.

**History of eating patterns and weight management efforts.** Although many people had a family history of type 2 diabetes, there was little awareness among participants of the three-way relationship among dietary intake, body weight, and the risk of developing diabetes. Most participants reported being overweight all of their adult lives or since middle age. Participants reported extensive histories of unsuccessful fad dieting and weight cycling. Participants reported that when they were not restricting their intake to lose weight, their food selections included high-fat foods, red meats, "starches," desserts, and few fruits and vegetables. Meals, especially breakfast, were commonly omitted, and meal times were erratic. Several participants discussed eating in response to emotional situations, such as stress or depression, since food was described as a source of

comfort. Participants also reported consuming large quantities of food at one time. As one participant said, “Put something in front of me, I’m going to sit and eat it all until it’s gone.” Eating beyond the point of satisfying hunger was reportedly common. As stated by another participant, “I used to eat until I was miserably full.”

**Knowledge of recommended foods and eating patterns.** Participants’ knowledge of a “recommended diet” consisted of two components: (1) food selection and (2) eating patterns. Food selection meant limiting carbohydrate intake and avoiding high-fat foods. Participants knew that eating foods high in carbohydrates increased blood glucose levels. Therefore, limited carbohydrate consumption was reported to be the highest priority for most individuals. Eliminating sugar was considered mandatory by most. As one participant stated, “I always watched fat, but now I watch sugar because that is more important to us than anything else.” Concepts about carbohydrates such as eating simple versus complex carbohydrates received little attention from participants.

The relationship between high-fat foods and heart disease was recognized, but most participants did not understand the relationship between diabetes and heart disease. The quantity of fat, rather than the type of fat, was the key component in managing dietary fat intake. Preparation practices, such as grilling, baking, and eliminating red meat, were considered dietary requirements. Participants did not express the importance of combining dietary carbohydrate, protein, and fat into a balanced meal. The use of plant-based protein sources as a means of reducing dietary fat intake while maintaining adequate protein intake was not mentioned.

Participants considered eating patterns important in diabetes management. Portion control and the need to eat regularly and frequently were considered part of the dietary guidelines for diabetes management. However, participants discussed these aspects of dietary management far less frequently than they discussed the types of foods to include in a balanced meal plan.

The majority of participants reported attending formal diabetes education programs and were referred to these programs by physicians. Most considered these programs the single source of diabetes information. Participants learned about sources of dietary carbohydrates, portion control, and appropriate timing of meals and snacks during the programs.

Participants offered numerous ideas about how diabetes support and education programs could be improved. The most common request by participants was for more information about individualized meal plans. This was followed by the need for support groups and “coaching” to provide reinforcement for lifestyle changes. The importance of ongoing support was emphasized by this participant: “Any change in life that anybody undertakes or tries to make, whether in health, education, or spirituality, needs coaching—better than having a good doctor.”

**Strategies used for healthful eating.** Strategies were those practices that helped participants adhere to recommended dietary guidelines. These were divided into three types: (1) food selection and preparation strategies, (2) meal planning strategies, and (3) dining out strategies. As previously discussed, the most frequently mentioned dietary strategies were strategies that helped participants reduce their dietary fat intake (e.g., grilling, baking, and broiling meat). Fish and chicken were considered low-fat alternatives to red meat. Food selection also consisted of finding low-fat or sugar-free foods, such as desserts and salad dressings. Participants were asked to describe a typical breakfast during the interview. The majority of participants reported eating dry cereal with low-fat or skim milk. When fruit was included for breakfast, it was often a banana. Another common breakfast menu consisted of toast, muffins, or bagels.

Meal planning strategies ensured that food would be available at the right time. This meant establishing food preparation routines, such as preparing a sack lunch, planning several meals at one time, eating the same breakfast each day, and timing meals with anticipated schedule changes. Social occasions that involved eating high-fat foods were anticipated so that meals could be adjusted to accommodate the occasion.

Dietary strategies also included some specific to dining in restaurants. Participants mentioned three types of strategies. These included carefully selecting the restaurant, making sensible food choices, and controlling portions of food. Cafeterias were praised by many for offering portion control and variety in food selection. Cafeterias also offered consistency and quality food at an affordable price. Sensible menu choices were considered to be chicken, fish, salads, baked potatoes, and a variety of vegetable side dishes. Participants reported ordering half-portions of food and splitting portions of food, leaving food on their plate, and eliminating condiments to control the quantity of food consumed.

**Challenges to dietary adherence.** Participants saw challenges as those situations and behaviors that impeded the establishment and maintenance of effective dietary self-management practices. Participants described four types of challenges: (1) avoiding “favorite foods” and selecting healthful alternatives, (2) managing their weight, (3) departing from their typical meal schedule, and (4) eating restraint.

Participants were tempted to eat many foods that were part of their prediabetes diet. These included high-fat foods, red meat, candy, desserts, starches, and regular soft drinks. Participants reported that it was difficult for them to incorporate fruits and vegetables into their current eating practices. They reported that they did not enjoy a wide variety of vegetables, and some participants stated that they were reluctant to consume a lot of fruit owing to the sugar content.

Weight loss was the most frequently cited goal of participants. For those who had succeeded, weight loss became a major life achievement. The following statement illustrated this: “I had a brighter outcome. I accomplished something that I had tried to accomplish for many years.” However, for most participants, the failure to lose weight after trying to follow a recommended eating regimen for diabetes became a continual source of frustration. As one participant stated, “I’m tired of starving myself and gaining weight.”

Travel, holidays, family events, and dining out challenged participants’ efforts to follow a recommended meal plan. These occurrences involved a change in participants’ routine and the need to avoid tempting foods. Dining out was difficult because restaurants lacked variety in menu choices and offered large portions of food, and preparation practices were unknown to the customer.

The ability to manage emotional swings without the comfort of food created frustrations for many. In addition to these situations, feeling hungry and deprived were obstacles to proper dietary adherence. A common concern among participants was the inability to stop eating when hunger was satisfied. Participants reported a preoccupation with food and a continual need to be conscious of the food they ate. As one participant stated, “I try not to think about it, but every bite of food that goes into my mouth, I ask, should I be eating this?”

**Mediating variables.** Mediating variables are defined as intermediate factors that occur between the acquisition of knowledge and the behavior based on this knowledge.<sup>12</sup> These variables indirectly influence participant’s willingness or ability to adopt or maintain new behaviors. Based on participant narratives, several mediating variables emerged in this study that influenced food selection and eating patterns among participants.

Social support emerged as a mediating variable. The key source of social support for participants was spousal support. Participants’ relationships with their spouses had a major impact on food selection and meal planning. Most of the women in the present study prepared meals for themselves and their spouse. Fourteen of the 26 women (54%) either made two meals (one meal for themselves and another meal for their husband) or accommodated their spouse’s food preferences by continuing to prepare high-fat meals for both themselves and their husband. Most of these women acknowledged that their husband wanted them to eat a healthful diet as long as it did not interfere with his eating habits. As stated by one woman, “He encourages me, but then he turns around and makes it hard on me.” In contrast, several women reported developing healthful cooking practices for the entire family and were convinced that their spouse was the beneficiary.

Male participants reported different experiences from the female participants. Twelve of the 19 men (63%) had healthful meals prepared for them by their wives. These wives also engaged in regular physical activity with their husbands. These men considered their wives to be the key element to their diabetes treatment success. One man described his wife's role this way: "My wife, thank goodness, she really manages the diet. She does it because it helps her maintain her weight."

Time management was a common problem among participants. It was described by one participant this way: "Just having to plan and knowing ahead of time what you're going to eat, that's a bother." Many individuals were accustomed to "eating on the run"; therefore, skipping meals was common. Participants said that they struggled with planning and following a meal schedule and with timing insulin or administering oral medication to food intake. Participants cited numerous obligations to their jobs, families, and volunteer activities as obstacles to a consistent eating schedule. "It takes a lot of time and energy to be a good diabetic," said one person.

Self-efficacy is an individual's confidence in his or her ability to perform a specific behavior in a particular circumstance or situation.<sup>13</sup> Many participants reported establishing specific healthful dietary practices that they used to support their self-management efforts. In the present study, examples of self-efficacy in specific situations included bringing lunch to work when eating with coworkers who were enjoying fast-food lunches, resisting baked goods while enjoying traditional family holiday gatherings, and preparing an appropriate evening meal after working overtime. It was the cumulative effect of small changes in their eating habits that made a difference for many participants. One participant summed it up as, "I try not to look upon it as a diet. It is our healthy way of eating for life. I got that grounded into me now—not to look at it as a diet."

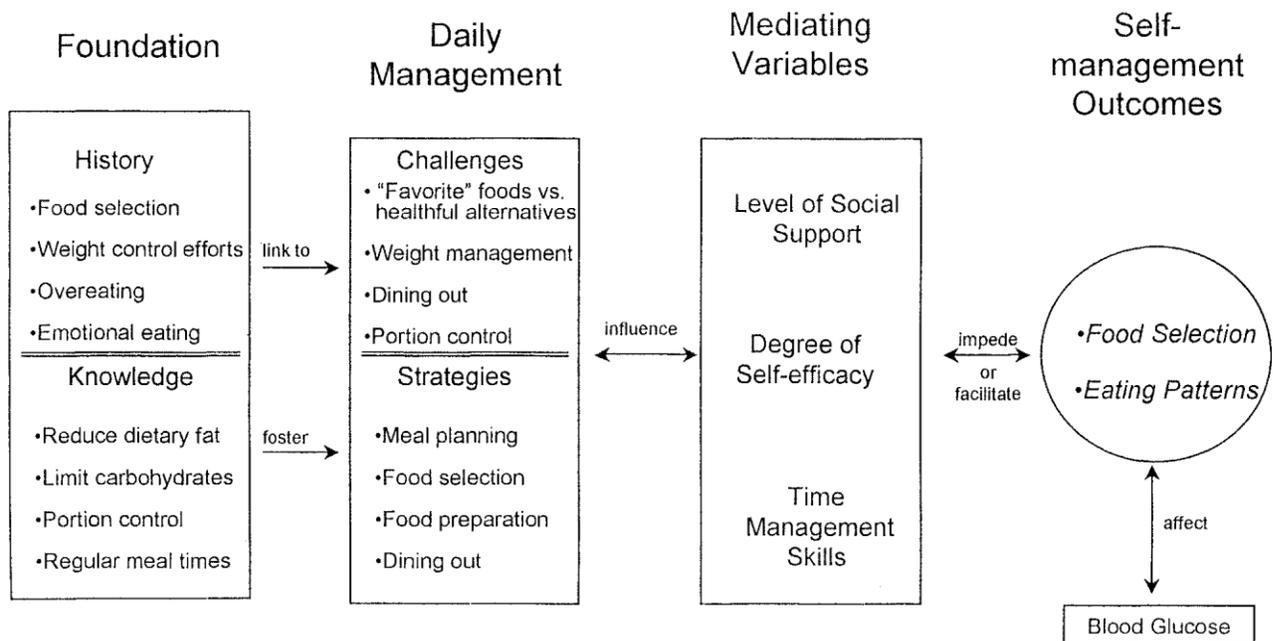
However, many individuals had conditional commitments to adhering to dietary recommendations. A sustained increase in blood glucose became worrisome and a reminder of the risk for developing complications from the disease. Therefore, an elevated blood glucose level prompted some participants to temporarily pay more attention to their eating habits until they were satisfied with their daily blood glucose levels. One participant referred to this as "being able to play a game with my sugar."

**Relationships among components influencing food selection and eating patterns.** Participants described elements that influenced their meal planning and eating patterns and offered insight into the relationships among these elements and their self-management practices. Figure 1 organizes these findings into three components and illustrates a preliminary view of how these components related to each other and influenced the food selection and eating behavior among members of the sample. The three primary components reported by participants included elements that served as a foundation for food selection and eating patterns, the challenges and strategies that influenced daily management practices, and mediating variables that either impeded or facilitated eating patterns.

This view begins with a foundation for dietary management that included participants' previous eating history and knowledge of a recommended meal plan. Key elements of the eating history included repeated unsuccessful efforts to lose weight, a tradition of eating high-fat and energy-dense foods, eating in response to emotional stress, and eating beyond the point of physical satisfaction. Knowledge reflects the individual's understanding and interpretation of a "recommended diet." This interpretation placed the greatest emphasis on reducing dietary fat intake, limiting carbohydrate intake, being aware of portion sizes, and eating at regular meal times.

The component of daily management included participants' strategies for healthful eating and challenges to overcome. Strategies for healthful eating included meal planning, food selection, food preparation, and dining out skills. Participants' knowledge of diabetes management was used to develop strategies for minimizing the challenges encountered. Many strategies were reported for reducing dietary fat intake, and few strategies were reported for limiting portion sizes of food. The challenges described by participants in the present study included efforts to overcome the desire for their favorite foods and identify new foods that were healthful and tasty. Other challenges were to exercise eating restraint in stressful situations, when feeling hungry or deprived, and in situations outside the normal routine (e.g., travel, holidays). Past eating practices, such as food selection

and portion control, and discouraging weight loss efforts were directly linked by participants to their current challenges in diabetes management.



**Figure 1.** Elements influencing food selection and eating patterns among people with type 2 diabetes mellitus.

Three variables (social support, time management, and self- efficacy) were identified as mediating variables in the present study. Among study participants, these mediating variables appeared to impede or facilitate food selection and eating patterns that influenced their daily management efforts. Social support influenced food selection and preparation practices of home-prepared meals. In this study, most male participants' spouses prepared the meals within the home. The efforts of their wives ensured that food choices and cooking practices supported healthful eating strategies at home. Participants who were married women were responsible for meal preparation. For these women, the challenges presented by past eating practices were especially difficult to overcome since family members resisted their efforts to alter the types of foods served at home. Time management represented an individual's ability to make health a priority and control the direction of care. Participants reported that when they were not able to manage their time effectively, food was not available when needed to prevent hypoglycemia, medication administration was delayed to prevent hyperglycemia, or the appropriate kind of food was not available in the appropriate quantity. Self-efficacy represented an individual's commitment to or confidence in their ability to perform a certain behavior.<sup>13,14</sup> In the present study, participants described many skills that were required to support a healthful eating pattern. For example, the ability to control portion sizes of food using a variety of techniques depending on the particular situation was considered by many to be their greatest strength in managing blood glucose levels and body weight.

Finally, for several participants, elevated blood glucose readings appeared to affect their dietary practices. Blood glucose readings considered by participants to be higher than desirable became a visible sign of poor glycemic control and thereby encouraged some participants to pay greater attention to their meal planning efforts.

## DISCUSSION

Behavior change and intervention research is more effective when it is tailored to a specific audience and behavior.<sup>15</sup> Many of the elements found in the present research were identified in previous research about diabetes self-management behaviors. However, the present research provided a view of specific food selection

and eating patterns and identified how these may be influenced by various elements in the lives of people with type 2 diabetes.

This research identified personal dimensions, behavioral requirements, and environmental characteristics that may affect food selection and eating patterns among people with type 2 diabetes. Personal dimensions included an individual's desire to eat favorite foods when under emotional stress and a lifelong history of eating beyond the point of satisfaction. These practices influenced the type and quantity of foods consumed. Effective diabetes meal planning involved specific behavior patterns. These included organizing meals in advance, identifying alternatives to favorite foods, and learning to prepare unfamiliar foods, such as vegetables. The environment influenced food selection and eating patterns as well. For example, meals eaten outside the home represented one aspect of the environment. Restaurants offered limited selections of vegetables and low-fat alternatives but offered large portions of food. Within the home environment, spousal support represented a key characteristic that made it easy or difficult to maintain a healthful meal plan.

Food was an integral part of these participants' lives, and the diagnosis of diabetes did not always alter eating patterns. Instead, controlling food intake became one of the challenges participants faced. Previous qualitative research found support for the effect of eating history on current practices.<sup>16-18</sup> Individuals who believed that their past eating practices contributed to the development of the disease were more likely to take responsibility for following dietary recommendations. Therefore, awareness of how past eating practices may influence dietary self-management behaviors needs to be integrated into nutritional counseling for people with diabetes.

The knowledge component of diabetes management in this research included participants' understanding of the types of food that "should" be eaten at the appropriate times in the proper portions. Previous qualitative research found a positive relationship between participants' level of dietary adherence and their knowledge of food selection and meal planning techniques.<sup>8</sup> Knowledge about food selection practices and food estimation tasks was found to be a better predictor of dietary self-care than demographic variables.<sup>19</sup> In the present study, most participants (63%) attended formal diabetes education programs prior to participating in the study. Yet, many felt that they lacked the ability to transfer nutrition-related knowledge into the skills necessary to achieve a balanced, varied meal plan. Participants stated that they needed to receive more detailed, individualized meal plans and needed additional training to resolve the challenges faced in the daily management of diabetes. Therefore, tailored nutrition education appears to be essential for effective diabetes management.

Diabetes self-care requires daily attention to meal planning. In this study, participants described strategies that addressed food selection and eating patterns for meals eaten at home or away. Previous qualitative research among people who had successfully integrated diabetes self-management practices into their lives found that individuals learned to balance diabetes self-management practices with the demands of daily living.<sup>20,21</sup> Ultimately, those who responded successfully to diabetes did so by making their self-management routines a way of life. In the present study, many participants adapted dietary recommendations to their own lifestyles. Qualitative research among individuals who did not improve their diabetes self-care after receiving formal training and among Mexican Americans found that participants expressed a desire to eat "normally" in social situations with family, friends, or coworkers.<sup>21,22</sup> Focus group research among older African-American women also found that the amount and source of stress and coping styles were related to daily self-management behaviors.<sup>23</sup> In quantitative research related to the nutritional aspects of diabetes self-management, those measures related to weight control and eating in specific situations outside the home were highly correlated to each other and explained differences in dietary self-management behaviors.<sup>24</sup> Thus, nutrition education programs for individuals with diabetes need to highlight specific challenges, such as those described by the participants in this research, and review specific counter strategies to improve meal planning efforts.

Mediating variables can be targeted during interventions to change a desired behavior.<sup>12</sup> In the present study, potential mediating variables included social support, time management skills, and self-efficacy. Social support influenced food selection and preparation practices of home-prepared meals. Time management ensured that healthful foods were available at the right times. Perceived self-efficacy described a range of skills needed and

the confidence to perform these in a variety of situations. These same variables have been identified or evaluated in other diabetes self-management research as key variables in the management process.<sup>18-31</sup>

Two studies conducted among Hispanics and one among African-American women with diabetes observed that adherence was related to the traditional support roles of women.<sup>18,22,23</sup> Women felt that they were not able to eat as recommended since they were cooking for other people and found it difficult to avoid tempting foods. In additional research, men reported greater support for following a healthful eating regimen.<sup>25</sup> Support from spouses appears to be an important component of dietary self-management practices. Quantitative measures of disease management among Hispanic- and European-American individuals with type 2 diabetes found that the most effective disease management practices were within families in which both spouses were able to resolve conflicts about diabetes management practices.<sup>26</sup> However, further qualitative research is needed to identify the specific role that partners play in dietary management efforts to provide partners of people with diabetes with greater awareness of their potential contributions to healthful eating. It would also help to better understand the meal planning practices of those who live alone to tailor nutrition counseling to the distinct needs of this group.

Time management reflects the ability to integrate diabetes care into a daily routine. Previous research among women with diabetes showed that the ability to integrate dietary changes into busy routines was a critical component of successful diabetes care.<sup>20</sup> In another study, people who improved their diabetes self-care after receiving formal training did so by making self-care activities a part of their daily routine.<sup>21</sup> In contrast, those who did not improve their diabetes self-care after receiving formal training described each day as a series of decisions about whether to perform various diabetes self-management behaviors. For individuals unable to adopt a routine, self-management practices were viewed as a daily struggle. Therefore, diabetes education programs should consider having participants explore the differences between individuals who manage their time well and those who are less inclined to establish routines. This may heighten awareness of the need to establish routines that meet individual meal planning requirements and lifestyle changes.

Previously, the psychosocial concept of self-efficacy has been applied to diabetes self-management research in several ways. It was used as a theoretical framework for the design of diabetes education programs,<sup>27</sup> as an outcome measure for clinical or educational interventions,<sup>28</sup> and as a psychosocial measure related to glycemic control and diabetes self-care practices among various patient populations.<sup>29</sup> In addition, measures of perceived self-efficacy have been developed and validated for people with type 2 diabetes across multiple self-management behaviors.<sup>24,30,31</sup> However, the specificity of the behavior assessed has varied widely across assessment tools. Questions on assessment tools have been as broad as asking participants to rate their level of self-efficacy to set dietary goals or as specific as asking participants to rate their level of self-efficacy to adhere to a specific meal plan when on vacation. The present study provides additional behaviors and situations that can be incorporated into perceived dietary self-efficacy measures. It also offers new ideas for diabetes education programs that seek to broaden individual skills and help individuals reduce the barriers associated with healthful eating patterns.

People change their eating behavior when they have knowledge about the relationship between food and health, when they possess practical skills to apply this knowledge, and when the motivation exists to embark on long-term change.<sup>14</sup> Health behavior theories attempt to explain the complexity of behavior change. Social Cognitive Theory (SCT) explains how people adopt new behaviors and provides a starting point for the development of interventions.<sup>32</sup> For this reason, constructs from SCT were examined to determine if they apply to the findings from this research.

SCT describes health behavior as a dynamic process involving the constant interaction of an individual's personal characteristics, the environment, and the behavior.<sup>32</sup> The interaction among these three elements is defined as reciprocal determinism. SCT proposes that if one or more of the elements are altered, behavior change is likely to occur. The participants in this study described several personal characteristics that influenced dietary behavior. These characteristics included their knowledge of a recommended diet, prior weight control practices, and time management skills. Elements of the environment identified in the present study that

influenced dietary patterns included spousal support and the types of foods found in restaurants. Food selection and eating patterns were affected by these elements. Participants who ordered healthful, good-tasting foods in cafeterias found that this change provided a healthy way to “eat on the run,” offered an alternative to other restaurants, and reinforced future healthful food choices. Reciprocal determinism was illustrated by the discovery of a variety of good-tasting, lower-fat entrees in cafeterias. Thus, the positive experience of trying new foods in a cafeteria reinforced the behavior to return to cafeterias on future occasions, and a new dietary habit was established.

Self-efficacy plays a central role in SCT’s application to health behavior change.<sup>33</sup> In addition to self-efficacy, other SCT constructs can be applied to the findings from this study. The theory proposes that individuals engage in some form of cost-benefit analysis to ensure the maximum gain for the effort.<sup>32</sup> For these participants, weight management was a desirable outcome. However, past experience created low expectations for weight loss success and minimized their attempts to repeat weight loss efforts. If new food patterns can increase the likelihood of success, adhering to a new dietary lifestyle may improve expectations and motivate repeated behavior. This was a pattern found among participants in this study. In addition, SCT recognizes that certain stimuli produce fearful, angry, or anxious thoughts that can lead to heightened emotional arousal.<sup>32</sup> This excessive emotional response may reduce an individual’s willingness to learn or perform a new behavior. Participants reported that they ease anxiety or fear by overeating. People susceptible to emotional arousal may need to learn to minimize their responses to fearful or stressful stimuli before long-term adoption of new behaviors is possible.

The development of type 2 diabetes is strongly influenced by eating practices.<sup>3</sup> Once diagnosed, a critical part of treatment is the modification of a lifetime of food and eating habits. Although the diagnosis of diabetes may change an individual’s view of life, many elements of daily living remain the same (family, friends, jobs, food preferences, etc.). SCT may provide a framework for future research to understand the elements that influence dietary behavior and suggest intervention strategies to influence future behavior.

The limitations of this study need to be considered when evaluating the results. This was a small convenience sample of individuals with type 2 diabetes. The participants did not represent low-income or lower-literate groups, and almost all had health insurance coverage. Further research is needed to be able to generalize these findings to those who received little diabetes education and to individuals with more diabetes-related comorbidities. Additional research is also required to confirm the proposed relationships among these elements, as illustrated in Figure 1. Finally, these findings should be evaluated using other health behavior theories to identify the features of other models that broaden our understanding of eating patterns among people with type 2 diabetes.<sup>34</sup>

## IMPLICATIONS FOR RESEARCH AND PRACTICE

Nutrition education emerged as a key foundation element for effective diabetes management. Therefore, nutrition education programs for people with diabetes should include education about food selection and meal planning. Educators can facilitate the adoption of healthful food selection and eating patterns among clients by helping them assess their longstanding eating practices. Education programs should incorporate skill-building activities to help clients increase their self-efficacy, develop effective time management skills, and practice problem-solving techniques. The lifestyle changes required for diabetes management require establishing new routines and may be fostered through social support. Support groups that emphasize successful strategies for dietary change should be part of the educational process. Some of the skills required to achieve healthful eating practices and situations that challenge commitment to change were identified in this research. Clients who have been successful problem solvers can share their perspectives through support groups. This may be an effective technique for helping clients generate new ideas about how to resolve the challenges encountered in diabetes management. Future research is needed to refine and validate a model

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