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Perception and Sense of Control Over Eating Behaviors Among a Diverse Sample of Adults at Risk for Type 2 Diabetes

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Abstract

Purpose—The purpose of the study was to explore and understand knowledge and attitudes about food, diet, and weight control, focusing on barriers and motivators to reduce risk of developing type 2 diabetes.

Methods—Six focus groups were conducted in May and June 2010. The groups were stratified by sex. A total of 35 ethnically diverse samples with a high risk for type 2 diabetes participated. The average age was 51 ± 10.6 years, and 57% of the sample represented women.

Results—Four themes emerged from the focus groups: (1) demonstrated knowledge and source of knowledge, including participants' basic understanding of "good" and "bad" food and what constitutes a "healthy diet" and trusted sources of information; (2) perceptions of food and diet, encompassing how participants expressed their perception of and interaction with food and diet; (3) sense of control over dietary intake, reflecting participants' discussion of their perceived ability to control their eating patterns and food choices; and (4) eating behaviors, describing participants' patterns of eating and perceived barriers to eating a healthy diet.

Conclusions—Study findings demonstrate that eating healthy requires a complex interaction between individual perceptions of food and sense of control over eating patterns and socio-political and economic structural factors that restrict healthy eating options while promoting unhealthy ones. Programs for long-term eating behavioral change necessary to reduce type 2 diabetes and obesity need to incorporate strategies that address individual-level factors of perception of food and sense of control over eating patterns, as well as structural level factors such as poverty and food insecurity.

The prevalence of type 2 diabetes (T2DM) continues to rise at an alarming rate worldwide.[1] By the year 2030, the prevalence of T2DM is expected to double if no action is taken.[2] In particular, racial and ethnic minority groups were disproportionately affected by T2DM. In the United States alone, approximately 11% of the population has diabetes, and 33% are prediabetic.[3] Moderate amounts of weight loss and weight maintenance through intensive lifestyle modifications are critical components of a T2DM diabetes prevention program to

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prevent or delay its onset.[4–6] Given the epidemic of T2DM and obesity, a considerable amount of food and dietary information is available to the general public. However, such dissemination of information appears not to have halted the surge of T2DM.

Eating a healthy diet is a major part of T2DM and obesity prevention. People at risk for developing T2DM have to make day-to-day decisions about healthy food choices and diet. However, healthy diet and food choices involve a complex interaction of social, cultural, and personal experiences.[7] To understand why current diabetes prevention campaigns and strategies have largely failed to stop or slow down an epidemic of T2DM and to inform the development of more successful future techniques to combat T2DM, it is essential to understand perceptions of healthy diet and food choices among overweight/obese people at high risk of T2DM within the context of their lives.

While prior studies have explored weight perceptions and dietary behaviors, less emphasis has been placed on understanding the complex interaction of social, cultural, and personal experiences. Qualitative research, such as focus groups, aids researchers and health care providers in exploring diet- and food-related experiences of people at risk for developing prediabetes, which will lead to the creation of effective health messages that facilitate their participation in diabetes prevention programs. Therefore, we conducted focus groups to explore and understand knowledge and attitudes about food, diet, and weight control, focusing on barriers and motivators to reduce risk of developing T2DM in a diverse sample of adults at risk of T2DM.

Methods

Study Design

Six focus groups (4 female and 2 male groups) with overweight/obese adults at risk of developing T2DM were conduced in May and June 2010.[8] Focus group size ranged from 5 to 10. Part of the focus group findings were previously published, regarding the acceptability of a mobile phone healthy lifestyle program and how to apply emerging mobile phone technologies in a T2DM prevention program.[8]

Inclusion/Exclusion Criteria and Recruitment

The focus group inclusion criteria were as follows: (1) age from 20 to 69 years, (2) ability to speak and read English, (3) a sedentary lifestyle at work and/or during leisure time (screened by the Stanford Brief Activity Survey),[9,10] (4) body mass index > 25 kg/m^2 (Asian > 23 kg/m^2) based on self-reported weight and height, (5) self-reported prediabetic condition, and (6) ability to participate in a focus group. Exclusion criteria were as follows: (1) known medical conditions or other physical problems requiring special attention in an exercise program, (2) severe hearing or speech problems, (3) current participation in lifestyle modification program or research study, or (4) known eating disorder. The majority of participants were not able to report an exact number of their last fasting plasma glucose or A1C level. Participants were enrolled if (1) they were told in the past that their blood sugar or blood glucose level was higher than normal but (2) they were not taking any insulin or oral medication to control blood sugar.

Study flyers including focus group dates and inclusion and exclusion criteria were posted in local San Francisco newspapers and hospital and university bulletin boards.

Sample Size and Characteristics

Individuals who were interested in participating in the focus group contacted the research office. In total, 63 potential participants were screened over the telephone for inclusion and exclusion criteria. Potential participants were scheduled for a male or female focus group. Of those, 44 met all inclusion criteria, and of those, 35 participated in a focus group. Nine met all inclusion criteria but either did not show up for their scheduled focus group or their schedule did not accommodate focus group dates.

In total, 35 participants (15 men and 20 women) who met all the inclusion criteria participated in the focus group. The average age was 51 ± 10.6 years (range, 23–69); 45.7% were racial/ethnic minorities; 42.9% were never married; 25.7% had a part- or full-time job; 48.6% reported a household income < $20 000; and the mean body mass index was 32.6 ± 6.5 kg/m^2. The mean waist and hip circumferences were 106 ± 14 and 117 ± 16 cm, respectively.

Setting

All focus groups were held in a conference room at the University of California, San Francisco. Focus groups were stratified by sex to encourage participants to feel comfortable in sharing their thoughts and in light of the potentially sensitive nature of discussing weight and diet. A PhD-prepared nurse researcher who has extensive qualitative research training and focus group experience moderated all groups. Another PhD-prepared nurse researcher and a master-prepared research assistant participated in the focus groups to take notes.

Ethical Consideration

The study was approved by the University of California, San Francisco, Institutional Review Board. All participants signed a written informed consent on-site before the focus group study.

Procedures

Upon arrival for the focus group, written informed consent was obtained. To ensure confidentiality, participants were assigned a focus group name associated with an alphanumeric identifier; they then completed sociodemographic and medical information questionnaire (or survey).

Each focus group session began with brief introductions to promote comfort and sharing of ideas within the group. To initiate the discussion, prescripted open-ended questions were used to explore knowledge and attitudes about food, diet, and weight control, focusing on barriers and motivators to reduce risk of developing diabetes. For example, the focus group moderator asked, “What does a healthy diet mean to you?” to explore behaviors related to food and diet; she also asked questions such as “What is your pattern of eating?” and “What motivates you to eat a healthy diet?” Within the discussion, the focus group moderator probed for clarification and verified as needed. For example, when participants stated that a

healthy diet is eating a small portion, the focus group moderator asked, “What does a ‘small portion’ mean to you?” Participants discussed at length their perceptions of food and diet, the focus of this article. Each focus group lasted approximately 90 minutes, and participants were paid $20 for their time.

After each focus group, the research team—consisting of the primary investigator (Y.F.), focus group moderator (T.G.L), and one research assistant (K.B)—discussed the process and flow of data collection to identify potential changes that needed to be made. Additionally, the focus group moderator and the note taker explicitly debriefed on the focus group, achieving consensus on modifications to the interview guide and early emerging themes that needed exploration. The focus group interviews were digitally recorded and transcribed verbatim by a professional transcriptionist. To ensure the fidelity of the transcription, spot-checking of interviews was conducted, comparing the transcript to the digital recording.

Data Management and Analysis

Focus group transcripts were imported into version 6.0, ATLAS.ti for Windows (ATLAS.ti, Berlin, Germany), a data management program designed to facilitate retrieval and organization of qualitative data for coding and analysis. A qualitative description approach was used to reduce and thematically analyze the focus group data. Qualitative description involves a type of analysis that is “low inference” and less interpretive, not requiring a “highly conceptual or abstract rendering of data,” making it useful for researchers who wish to obtain “unadorned” or “minimally theorized” answers to specific questions.[11]

Analysis began with the first focus group, leading to a few modifications of subsequent group interviews by rearranging the question order and adding probes as needed. Three investigators (E.K., Y.F., and T.G.L.) reviewed the transcripts independently and identified multiple codes based on significant dialogues raised from interview questions. Early potential themes and codes were compared among the 3 researchers and codes agreed on. Data were then coded by E.K. using hermeneutic methods to assign meaning to each category. Codes were clustered into categories by observed similarity, and these categories were discussed among the researchers. As the final stage of analysis, larger meaningful themes were extracted from these categories; then, the relationship between themes was articulated.

Results

Four themes emerged from the focus groups: (1) demonstrated knowledge and source of knowledge; (2) perceptions of food and diet; (3) sense of control over dietary intake; and (4) eating behaviors, barriers, and strategies for a healthy diet. Demonstrated knowledge and source of knowledge diet define (1) participants’ basic understanding of “good” and “bad” food and what constitutes a “healthy diet” and (2) trusted sources of information. Perceptions encompass how participants expressed their perception of and interaction with food and diet. Behaviors emerge from discussions of participants’ actual eating habits and patterns. Sense of control reflects participants’ discussion of their perceived ability to control their eating patterns and food choices. Eating behaviors describe both participants’ patterns of eating and their perceived barriers to eating a healthy diet.

Figure 1 shows the conceptual framework that emerged from the data, reflecting the relationships among knowledge, perceptions, sense of control, and behaviors toward food and diet as prevention of progression from prediabetes to diabetes among people at high risk for T2DM. Per the framework, knowledge affects behaviors directly and indirectly through perceptions of food and diet and sense of control over dietary intake. Attitude likewise influences behaviors directly. However, participants' perceptions of food and diet and sense of control over dietary intake are also influenced by each other. The 4 major focus group themes with subthemes are described.

Demonstrated Knowledge and Sources of Knowledge

Demonstrated knowledge of food and diet varied within the focus groups. Some participants demonstrated adequate knowledge about food and diet, while others revealed inadequate knowledge. One participant showed adequate knowledge when defining a healthy diet as "eating 3 meals a day, balanced meals with fruits and vegetables, salad." Another referenced the food pyramid, stating that a healthy diet involved "making the right selections from the food pyramid of healthy carbohydrates, proteins, fruits, and vegetables in the proper amount for the individual person because everyone is different."

Participants also talked about the need to limit intake of "fried foods, steak, or something" to "a little bit." One participant reflected on the need to read food labels, stating, "Because I do try to watch the labels and I look for things, juices that don't contain high fructose syrup."

Finally, the eating of vegetables was generally perceived as healthy, and one woman stated that her dietician told her that she will not gain weight eating "a whole bunch of vegetables, especially green vegetables and make sure, once I eat vegetables it should be the color of the rainbow."

However, a number of participants demonstrated inadequate knowledge of food and diet. Participants especially demonstrated limited knowledge about nutrition, healthy diet, balanced diet, and food preparation. Portion size is a case in point. A few participants knew the importance of portion control, but many were confused by what constitutes a healthy portion. A 34-year-old man described a healthy diet as "a certain amount of grains, a certain amount of beans, a certain amount of this—vegetables, a certain amount of cereal, you know" without articulating what a "certain amount" meant to him.

Misconceptions of healthy diet or food choices were also frequently reported among participants. For example, participants looked at nutrition labels to see how many calories were in a particular food, but they did not know what constituted a healthy recommended daily caloric intake, as evidenced by this man: "My calorie thing, between 100 and 750 calories a day. … That's what we should be eating."

Frozen dinners were considered healthy if they were named as such:

> I get the frozen dinners, the Healthy Choice dinner, I don't get the big Hungry Man ones cause they're like 1000 calories. I just heat those up almost every night. Um, but I get a variety of things. I try to get the healthy ones.

Some participants reflected on the notion that eating healthy was eating everything in moderation, or “enough,” but what constitutes “enough” was not clear: “Sandwiches, we do pizza every now and then. We do fried chicken. We do eat pretty healthy, enough of it, not too much of anything, you know, just enough.” Eating a “balanced” diet was also considered healthy, but what constituted a “balanced” diet was often poorly understood, as evidenced by this quote: “I go to a place called Mother Brown’s and they serve like hot cereal, bacon, eggs, and things like that. It’s a pretty balanced diet.” Certain cultural foods were perceived to be healthy, while others were seen as unhealthy. One participant felt that Chinese food was very healthy because it includes vegetables:

> They [Chinese] use a lot of vegetables when they cook. You know, I don’t see a lot of other cultures, you know, promoting—vegetables. I mean me being African American, we got greens or cabbage or green bean casserole or something like that but, you know, we not eating it every day.

Sources of food and dietary knowledge were also discussed at length by participants. These sources included media/Internet, health care providers, and past dieting experience.

Media and Internet searching were common sources of knowledge about food and dieting. One 57-year-old man stated, “I watch TV. I know about olive oil, I know about skim milk.” Another man reflected on the availability of electronic information: “You can go to the library and read for yourself. … You can get anything you want out of the library. Especially on the Internet.” However, a woman addressed the conflicting messages that she received from Internet sources:

> When I read that stuff I thought, “This is very different from what I understood before.” I mean my doctor will say, “You just need to lose weight,” and then like that teacher at [University of California] Davis. She said, “Well, not necessarily. You can be healthy and obese.” So—I would like accurate information.

Several participants were involved in a program to help patients with chronic diseases, which provided education classes on food and diet. One participant explained, “We do retreats on nutrition. You know, we did a retreat where we learned how to read the back of a label!”

Knowledge from health care providers was also addressed, but participants demonstrated ambivalence to such information, which was related to trust. Those who had a good relationship with their provider took up the advice, as evidenced by this woman talking about her motivation to lose weight: “Well, what have motivated me is having a bond with my primary doctor and going there—and the gynecologist—and by them telling me some things. I really listened when they told me.”

However, for others there was little trust in the medical profession due, in part, to the perception of conflicting messages from physicians and other health authorities. One woman stated her lack of trust thusly: “I don’t trust the medical field anymore because they just say one thing one day and next week they say—like those Carol Burnett shows, you know, where it’s like going to the opposite.”

Female participants' experiences with diet and weight loss strongly related to their current knowledge of good dietary practices regardless of the success or failure of previous experiences. Participants talked about counting calories and following a low-calorie diet. Others discussed combining diet with exercise, following a raw food diet, and participating in commercial weight loss programs, such as Weight Watchers. However, they still struggled to follow the dietary programs for several reasons. One stated that although she lost 25 pounds, she "couldn't stick to the low-calorie diet anymore, it was too hard." Another woman lost 20 pounds on Weight Watchers but stopped going because "it started getting sort of humiliating because I thought they were judging me every time I got on [the scale]."

Perceptions of Food and Diet

While for some participants, food was just food, many participants, especially women, demonstrated an almost love-hate relationship with food. A number of women stated that they perceived "food as the enemy" and that it was "scary." In these negative attitudes toward food, women articulated their struggle between "good food" and "bad food": "bad" food was perceived as problematic and even "addictive." One 46-year-old woman went so far as to equate certain foods as "like having a loaded gun around the house." Yet, both men and women viewed food as a pleasurable part of life and admitted using certain foods as "rewards" for good behavior or for a bad day.

Female participants felt that they are "their own worst enemies" when it comes to food and diet, but they also articulated their struggle with food, as this 37-year-old woman explained:

> People here have all expressed, like, "food is scary, I can't have this food in the house or I'll"—and like that makes me feel really sad, that we're all struggling with this thing about there's bad food and good food but honestly it's like the enemy and it took me a long time to get away from that aspect. I still see people eat like, food I'd like to eat but I don't. I feel jealous sometimes, like I wish I could eat that food. I still have that push-pull with it but sometimes I feel like we're our own worst enemies. If you see food as the enemy, on some level its gonna be hard to change your life.

Alternatively, food can bring pleasure or be used as a reward. While discussing what kept men from eating healthy, one participant offered an answer that was short but all-encompassing: "'Cause food be good." Eating was comforting, something to look forward to after a long day. For both men and women, food that was perceived as bad for them, such as "soul food," was described as "the good stuff" because they enjoyed eating it, as one man noted: "I can hear the pleasure they get from food."

Participants personalized their rationale of having food. Food became a reward; they treated themselves with food when they were being good. Additionally, food could alleviate unwanted feelings and make them feel better or happier. One 57-year-old woman stated this clearly:

> I think people are emotionally invested in food, it's like, "do I deserve to eat this?" you know, the "rewards system"—have I been good? Can I have my cookie? Can I have another cookie 'cause I'm depressed? Can I have a whole bag of cookies?

Attitudes are greatly affected by how people were raised, social and family pressures, or life changes. Current diets were influenced by childhood eating habits and beliefs about food. Participants given sweets as a treat when they were young continue to treat themselves with those foods now: “It’s been engrained in us since we were growing up. How many times did you have a problem, mom pulled out something sweet and you talked about it.” Perceptions of food appropriate to the time of year was also evident: “The problem is the last diet that I went on I was on the raw food diet, which was really, really great except when it started getting cold then I had to eat heavier food.”

Some participants believed that aging had a negative influence on their diet. The mean age of participants was 51, with a range of 23 to 69 years old. Aging influenced diet for several different reasons. One 60-year-old participant indicated that signals to stop eating no longer functioned: “I think when you get older, the ‘off’ switch shuts down.” Aging also changed people’s taste buds, causing them to seek out foods or food combinations that they did not eat when younger: “I’ve changed some of my tastes as I got older too. I enjoy chips with chocolate. I know it sounds weird.” Finally, with aging, participants felt that they could give up dieting: “I’m older now, why do I have to struggle so much? Now I want to just enjoy my life.”

Sense of Control Over Dietary Intake

Sense of control over food and diet in addition to knowledge about food and diet is an important component influencing attitudes toward and behaviors related to food and diet. Although some clearly maintained control over their diets, articulating good eating habits and knowledge about healthy diets, many participants said that their eating desires were out of control or they lacked control over their eating. A 37-year-old women said,

> I eat all day and it was pretty scary, I was eating all night too, every day. So I would eat meals plus a million snacks plus. … If I tried to go work out, if I tried to go to a movie, no matter what I would do it would turn into a food experience because I would sneak away to a snack bar.

Eating was also connected with certain daily routines, such as reading and watching television. One 46-year-old woman described eating as “automatic”: “When you’re sitting back and watch a movie you automatically eat. … And then my dog, he’ll eat 24 hours a day if I let him and, of course, you know, we’ve got to eat together.” Finally, some participants talked about their struggles with food and diet using language common to those suffering with addiction.

Several participants reported out-of-control eating and addiction to different types of food. They were obsessed with certain types of food, often chocolate or other high-fat, high-sugar foods or sources of food. One 65-year-old woman stated, “I get high on chocolate, excuse me. I really do. I get the endorphins, it really does that,” while another woman blamed food producers for everyone’s obsession with food:

> I know that the big industries like McDonald’s and all these other, they get you addicted to salt, to sugar, and to fat. So it’s an addiction like alcohol, drugs, sex. I

> know that as a total fact and there's lots of books and studies to bring that up. so it's just an addiction like anything else.

Discussion of food addictions was strongly connected to foods that were difficult to give up, but participants also talked about different triggers for out-of-control eating, such as television commercials, food programs, advertisements on streets, family gatherings, or magazines: "I do get hungry watching TV. The ads are really bad for me. They stimulate my hunger."

Emotions can also trigger obsessive eating. For some, being emotional curbed their eating, but others ate even when they were not hungry and they often ate "something I shouldn't have," which in turn made them feel worse. One woman described it thusly: "It's like this vicious cycle actually because you feel bad then you eat then you feel bad about eating and then, you know, you kind of get into this horrible sort of cyclical thing." Conversely, other women felt that eating improved their depression in the short term: "When I started getting depressed there, I was like, ok more sugar! 'Cause it did give you an instant gratification. I knew I wasn't getting [it] anywhere else."

Finally, boredom was often stated as a trigger for inappropriate eating: "Sometimes out of boredness I eat something wrong, you know, not just because I wanted it." What was clear was that participants felt that their obsession with food and their attempts to resist were like a circle: "You just keep going around and you never get anywhere."

While food "addictions" made eating healthy difficult, dieting itself was also problematic:

> But sometimes it's just—when you diet and lose weight, you get a hollow feeling after a while. And every once in a while, you just really wanna gorge and fill it up and portion control is very hard because with me, I turn into this, I get into this feeding frenzy like a shark. I'm just hungry all of the sudden. It's just very hard. And the more you diet, the more I get that sensation of you know, wanting the whole thing.

Family and social relationships can negatively or positively influence sense of control over healthy diet and food choices. Some participants expressed the feeling that they had few choices in food or diet due to their family or friends. Several women noted the difficulty of controlling food when having to cook for and eat their husband's diet:

> I'm on a totally different eating schedule when he's at home. Because sometimes when you live with someone, especially a man, he wants his dinner he wants it a certain way. He wants meat and potatoes and heavy things. And he wants you to eat right there with him, like dueling forks.

Friends can also be problematic such that one woman stated she did not want to tell anyone that she was on a diet:

> I would be embarrassed to tell my friends I'm on a diet. People look at you funny sometimes. I'm really paranoid, it's like they get really obsessed with it, like more than you would. "Can you have this cake on your diet?" or they ignore it and just

> keep pushing food on you, and you keep saying, “No I really don’t wanna have any more food.” So I’d rather keep it to myself.

Conversely, for some, their partners positively influenced their food choices and eating habits, especially if that partner did the cooking. As one 49-year-old woman stated,

> I feel like I eat a good diet. My boyfriend does all the cooking. He doesn’t like to use anything processed, he doesn’t like to go to fast-food restaurants, he likes to cook at home. So we have a lot of grains, we have a lot of fresh vegetables, herbs, lean meats. I mean I feel like the food that he produces is very healthy. But I still like my McDonald’s.

Participants’ sense of control or lack of control over their diet coupled with their knowledge and attitudes towards food affected their eating behaviors.

Eating Behaviors, Barriers, and Strategies for a Healthy Diet

Behaviors related to food and diet formed the most frequently described theme in focus groups, and they were influenced by knowledge, attitudes, and sense of control. Within this theme, participants described eating habits/patterns, perceived barriers to healthy eating, and strategies to promote healthy eating.

Some participants clearly described good eating habits/patterns, including eating breakfast, lunch, and dinner with in-between snacks, a vegan diet, or a diet high in vegetables and fruit; however, a number described irregular habits, such as skipping meals and then eating large portions later, eating snacks in front of the television at night, and eating when not hungry. Some participants (especially women) stated that they would diet for awhile but could not keep it up and so would stop, experiencing yo-yo weight fluctuation. Although a number of participants knew that they should be eating “good” food, many indicated that this was not how they ate. One man stated this disconnect clearly:

> And they always say I don’t ever know because I don’t eat it like that [chuckle] but it’s supposed to be like, have your vegetables, your meat, your salad and maybe some rice. And then you only supposed to have a little bit of meat, and then a little portion for dessert. I don’t eat like that but, I be knowing you supposed to have vegetables and stuff.

Even though some participants had adequate knowledge of healthy food, several barriers to healthy eating prevented them from applying their knowledge. Diet is complex and is influenced by contextual factors.

When participants were asked what kept them from eating a healthy diet, one of the major barriers discussed was limited finance. Approximately three-fourths of participants in this study did not work for pay, and their finances were tight. Constricted budgets limited participants’ food choices. Lack of affordable healthy foods was frequently stated as a barrier to eating a healthy diet: “If I had a lot more money, I’d buy better quality food. Instead I went to McDonalds today and got the Mini Meal, which is $3 and disgusting. But, you know, I can’t afford to eat what I really want to eat.” Participants also bought groceries

from discount stores with limited fresh food options, such as Pac-n-Save: “We have to do it like that, some of us that are on fixed incomes ’cause, you know, I mean, food is expensive.”

The physical environment is another barrier to healthy eating, especially when it limits access to fresh vegetables and fruits, while providing easy to access to fast/junk foods or sugars. A number of participants lived in an impoverished residential area of the city, a “food desert,” which had no grocery stores but many liquor and convenience stores: “Depending on where you are on the totem pole—is what you get. If you live in the ghetto you may not get a fresh banana because you can only go to the liquor store and get it if they have one.”

Not having a car or extra money for public transportation makes it difficult to travel to a grocery store to get fresh fruits and vegetables, and this reflects a larger issue:

> Do you have bus fare to go across town to go to the grocery store, is your food stamps going to last a whole month? So these are other issues that dictate what you can and cannot eat and it makes you plan your life better while you’re out traveling. Do I bring an extra sack if I have to tote groceries home so I can get the fresh vegetables. So it’s also time management, planning, being conscious of what it is you need in your home and what it is you want for your life.

The perception that dieting is all about calorie counting was also addressed as a barrier to eating healthy:

> And me personally, if I had to sit and think about this has this many calories and this has this many calories, by the time I start to get it all together, ok, this is gonna be healthy, I don’t wanna eat it. I’d rather just sit down, eat what I want, eat the portion that I want, and be through with it.

One of the biggest barriers was situated in participants’ complex and financially challenged lives; focusing on eating healthy was not a priority: “I have so many other things that I’m dealing with that taking care of my physical health seems to be the last thing on my mind.” Participants reported feeling stressed and time constrained due to family issues or the need to care for a partner: “I take care of my boyfriend who has epilepsy so a lot of times his health issues will take over and I’m so busy making sure he’s not falling down hurting himself. So I put myself last.”

Although a few participants had no real desire to change their eating habits, most did discuss actual and potential strategies to promote healthy eating. Some reduced temptation by not buying certain foods: “I stopped buying bread and butter. If you have bread and you have no butter, you’re not going to eat as much bread.” Others sought to change their eating patterns by stopping eating when they feel full:

> Another thing is stopping eating when you feel full. Like if you stop eating halfway between the end of your meal. Stop eating for a couple of minutes, you actually—the food will settle and you’ll notice that you don’t really need to finish that plate.

Some are substituting healthy alternatives to their eating regimens: “I’m good about no coffee, no sugar. I used nonfat canned milk because its evaporated milk, instead of cream. So basically I’m watching fat calories. I don’t use butter, I use olive oil.”

Others are trying to modify their habits slowly:

> I start off with this big plate and if I didn’t finish it then I go—set it aside and go back and eat it. Now I still start off with a big plate because I haven’t made that adjustment to giving myself smaller portions but I’m eating less of it and I don’t feel like I have to eat the rest of it today, I’ll eat it tomorrow.

Several factors that motivated participants to improve their eating habits were also discussed. What was clear was that physical appearance was not a big motivator. Most participants, especially the older ones, did not really care about how others saw them. The most frequently reported motivation was to imagine unwanted outcomes from bad eating habits, such as a heart attack, diabetes, or likelihood of death. For this, they would try to change their eating habits. One man stated this clearly:

> I’m going to be honest about it. If I was to find out I had some kind of disease behind my eating habits like I caught a heart attack or I had diabetes or something, that would be a primary factor to start eating healthy and start exercising would be, you know, my health concerns. I’m not trying to say it in a negative way but sometimes that’s the only way, you know, some people get woke up after they have that heart attack.

Media can also play a positive role in motivating people to change their eating habits: “I know, like the commercials—high-cholesterol medications—so that kind of inspires me, because I don’t wanna have a heart attack—at my age it’s too young to have a heart attack.”

Discussion

The goal of this focus group study was to explore and understand perceptions of healthy eating and dieting in an ethnically diverse sample with a high risk for T2DM. Four major themes emerged from focus groups of people with a high risk of prediabetes: (1) demonstrated knowledge and source of knowledge, (2) perceptions of food and diet, (3) sense of control over dietary intake, and (4) eating behaviors, barriers, and strategies for a healthy diet. Consistent with multiple studies, food and diet knowledge and sources of knowledge play a role in the eating behaviors exhibited by the participants in this study. However, these findings also suggest that while knowledge is important, participants’ perceptions of food and diet and sense of control over their eating seem to enact important mediating roles that influence healthy eating behavior.

Consistent with other studies, women in this study had more knowledge of healthy foods and more experience with dieting than men.[12–14] However, the knowledge exhibited by both women and men was not necessarily accurate. While participants talked about calories, portion control, and even the food pyramid, misconceptions were common. Despite all the information available on healthy foods and healthy eating, participants’ understanding of this information was surprisingly limited. Participants knew the words related to dieting but

did not always know what they meant, highlighting the need for health care providers and dieticians to fully assess clients' understanding of a healthy diet.

Knowledge and understanding of healthy eating was also affected the myriad of information available on foods and diet. Participants used a variety of sources for information, such as the Internet, but they were confused by conflicting messages and a lack of guidelines to evaluate the trustworthiness of information sources. In general, women tend to seek more information about diet and nutrition than men, especially via the Internet.[15] In this study, health care professionals were trusted at times and not trusted at others, in part because of lack of message consistency among them.

Perception of food was also gendered to some degree. While men had knowledge about "good" and "bad" food and talked about how they found food comforting, women tended to have a more negative attitude toward food. Only women described food as the "enemy," and more women than men discussed food "addictions." This negative attitude was directly connected to women's articulation of a lessened sense of control over their dietary intake. Food and food addictions were something that women had to struggle with, making it difficult to stay on a healthy diet. Understanding individuals' attitudes toward food and sex differences is critical to develop sustainable tailored programs to prevent T2DM.

The main sources for lack of sense of control are social and environmental stimuli and cues (eg, television commercial), lack of family support for a healthy diet, bad food choices in response to emotional distress, and underlying addiction to specific foods or portions of food. Diabetes prevention programs have focused on changing knowledge of individuals, but this study indicates that (1) identifying sources of lack of sense of control over eating behavior and food choices and (2) providing skills and techniques to gain a sense of control may be key components of behavioral interventions.

Sociopolitical issues also play an important role in eating patterns and behaviors within our diverse focus groups. Today, US supermarkets carry an average of up to 60 000 different foods.[16] People can choose from a virtually endless array of food items. Marketing strategies promoting high-calorie, high-fat, high-sugar foods can make it difficult not to choose tempting snack foods instead of more healthy alternatives on a regular basis.[17] This variety contributes to how much we eat. Despite all the food options theoretically available to American consumers, participants in this study highlighted the realities of living on a limited budget and with limited access to healthy foods, which severely constrained their food choices. Approximately 18 million American households were food insecure in 2011,[18] with limited physical or economic access to food that meets people's individual dietary needs and food preferences.[19] Although being food insecure is an independent risk for obesity and T2DM, little progress has been made to improve food insecurity. Fast foods and highly processed foods remain cheaper and more available than fresh fruits and vegetables.

The strengths of the study include the diverse sample (nearly half the participants were racial/ethnic minorities) and the fact that the focus groups were conducted by sex. However, the study results should be interpreted within the following limitations. All participants in these focus groups were recruited from only 1 geographic location—the San Francisco Bay

area—which is one of the most expensive places to live in the United States. The majority of participants were economically disadvantaged; therefore, the findings in the study may not be representative of the more affluent.

Conclusions

This study demonstrates that eating healthy requires a complex interaction between individual perceptions of food and sense of control over eating patterns and socio-political and economic structural factors that restrict healthy eating options while promoting unhealthy ones. Starting on a healthy diet is challenging in the short term, but maintaining healthy eating patterns is even more difficult. Programs for long-term eating behavioral change necessary to reduce T2DM and obesity need to incorporate strategies that address individual-level factors of perception of food and sense of control over eating patterns as well as structural-level factors such as poverty and food insecurity.

Implications

Changing people's eating habits and patterns is, at best, difficult but necessary if health care educators/providers are to stem the tide of T2DM and obesity. The majority of US programs designed to reach out to adults at risk for diabetes have focused on increasing knowledge of diabetes and promoting weight loss through healthy diets and physical activity. There is an abundance of information available on diabetes and diet, primarily on the Internet, and it is easy to assume that people already know about diabetes and a healthy diet. Indeed, participants in this study accessed information found on the Internet and in the media but demonstrated both accurate and inaccurate knowledge about diet and healthy eating. Providing consistent, simple messages regarding healthy diets and eating habits is critical to improve public knowledge. More important, health care providers need to consistently reinforce these simple messages to reduce confusion among the public.

Data from this study demonstrate that knowledge is not enough. Understanding and modifying individuals' perceptions of food and diet and their sense of control is a necessary component of a successful dietary change program. This aspect, as well as knowledge, needs to be assessed and then incorporated into diabetes prevention programs tailored toward at-risk individuals and families. However, individual behavioral change programs also need to take into consideration larger sociopolitical issues that affect individuals' and families' abilities to change and sustain new dietary habits—namely, policies to eliminate "food deserts," thereby increasing access to fresh foods, and to increase the affordability of fresh foods in urban and rural communities.

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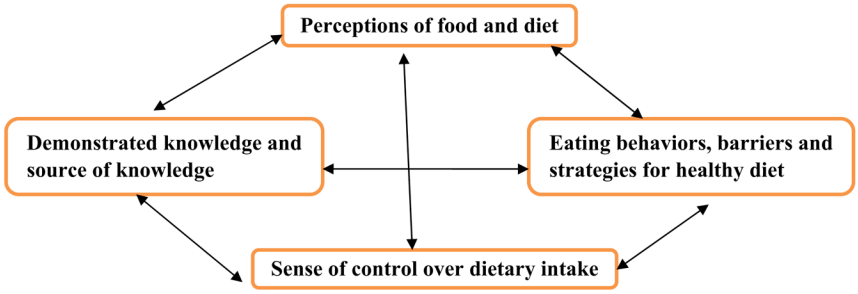

Figure 1.

Conceptual framework of relationships among knowledge, perceptions, sense of control, and behaviors toward food and diet as prevention of progression from prediabetes to diabetes among people at high risk for type 2 diabetes.