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Healthy Eating Practices: Perceptions, Facilitators, and Barriers Among Youth With Diabetes

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Abstract

Purpose—The purpose of this study was to explore the perceptions of healthy eating by youth with diabetes as well as facilitators of and barriers to healthy eating behavior.

Methods—One hundred forty youth aged 7 to 16 years with diabetes participated in 18 focus groups. Sample race/ethnicity was 71% white, 18% African American, 6% Hispanic, and 5% other; 69% of the participants were female.

Results—Healthy eating was defined primarily in terms of eating fruits and vegetables, low fat, low sugar, and eating to keep blood sugar in range. However, there were notable differences in perceptions of healthy eating versus perceptions of eating practices good for diabetes management. Specifically, “free” foods (foods high in fat but low in carbohydrate) were commonly reported as being good for diabetes management. Major barriers to healthy eating included widespread availability of unhealthy foods, preparation time, and social situations. Parental behaviors, including monitoring food choices and positive modeling, were the most commonly reported facilitators of healthy eating.

Conclusion—Findings suggest that youth with diabetes have a general understanding of healthy eating and face similar barriers and facilitators to healthy eating as nondiabetic children do. However, the diabetes regimen may influence their understanding of healthy eating, sometimes negatively. Diabetes nutrition education sessions should emphasize the connection between healthy eating and both short- and long-term diabetes outcomes, and they should highlight strategies to reduce saturated fat consumption while avoiding excessive carbohydrate consumption. The diabetes educator can play an integral role in promoting healthy dietary practices by facilitating parental involvement, designing action plans for managing social situations, and increasing awareness of healthier alternatives to widely available unhealthy foods.

Adolescence has been described as a time of physiological, emotional, and behavioral change.^{1,2} In particular, eating behaviors transform as youth gain autonomy over their food choices. Poor eating habits initiated during adolescence can pose acute and chronic health, growth, and developmental consequences. Not only are adolescent eating habits associated with subsequent adult diet, but recent research suggests that chronic disease risk can be perpetuated during this time.^{3,4} Cardiovascular disease risk factors have been seen in youth,⁵ and the prevalence of type 2 diabetes has increased markedly in the adolescent population.⁶

Healthful dietary practices are of particular interest for youth with diabetes. Many children and adolescents with diabetes are unable to sustain recommended blood glucose values for optimal health.⁷ The American Diabetes Association recommends that nutritional guidelines for children and adolescents with diabetes center on achieving optimal blood glucose levels, reducing hypoglycemic episodes, and maintaining normal growth and development. As with the general population, it is recommended that youth with diabetes consume a diet rich in fruits and vegetables, whole grains, low-fat dairy, and lean protein.⁸ However, an extensive analysis of current dietary practices of youth with type 1 and 2 diabetes found that fewer than 20% were meeting guidelines for fruit and vegetable consumption, none were meeting guidelines for whole-grain consumption, and fewer than 7% were meeting guidelines for saturated fat consumption. Moreover, the dietary practices of youth with type 1 diabetes were no better than those with type 2 diabetes in any of these areas.⁹ Healthy eating practices may improve blood sugar control^{10,11} and reduce the risk of long-term complications, including obesity, cardiovascular disease, retinopathy, neuropathy, and nephropathy. Currently, poor eating habits combined with sedentary lifestyles are resulting in the emergence of insulin resistance and even double diabetes (both type 1 and type 2) in some youth with diabetes.^{12,13} In addition, the prevalence of cardiovascular risk factors in youth with diabetes is concerning, with lipid abnormalities common,¹⁴ greater arterial wall thickening and stiffening than in children without diabetes,¹⁵ and the prevalence of 2 or more cardiovascular disease risk factors at 7% for children 3 to 9 years old and 25% for youth 10 to 19 years old.⁵

Because the foundation of a healthy lifestyle is fostered during childhood and adolescence, understanding youths' perceptions of healthy eating is paramount for optimally designing educational materials and interventions addressing dietary intake in youth with type 1 diabetes. Surprisingly little research has addressed the dietary practices and perceptions of youth with diabetes. A review of the current literature yielded no research investigating knowledge or perceptions of healthy eating or facilitators and barriers of healthy eating behavior among youth with diabetes. A study comparing dietary intake of adolescents with and without diabetes¹⁶ found that adolescents with diabetes consumed less sugar but a higher percentage of total fat, saturated fat, trans fat, and unsaturated fat than adolescents without diabetes.

Research conducted on healthy youth highlights both individual and socioenvironmental influential factors on eating behavior. In previous studies, children were generally aware of healthy eating behaviors but frequently did not practice them.^{17,18} Taste preferences, convenience, appearance, satiation, time constraints, peer factors, poor-quality food provided in the school environment, other social factors, and a general lack of concern regarding the impact of foods on health status have been indicated as barriers to healthy eating among adolescents.^{18–21} Motives for eating may differ between girls and boys, with girls emphasizing the effect of dietary choices on physical appearance and boys concerned about foods' impact on physical ability.¹⁹

Youth with diabetes vary in the degree of dietary flexibility afforded by their insulin regimen. While some youth are restricted to eating specific amounts at specific times, most youth now have the flexibility to eat when and what they choose, matching the amount of insulin taken to the amount of carbohydrate consumed. These flexible regimens better accommodate irregular meal times and schedules, varying appetites, and changing activity levels. This greater flexibility may also increase the opportunity to choose types and amounts of foods, potentially making nutritional education even more important for youth with diabetes.

The purpose of this study was to explore perceptions of healthy eating by youth with type 1 diabetes as well as facilitators and barriers of healthy eating behavior. Because of the current lack of research in this area, the authors chose focus group methodology to provide a rich and detailed source of data to guide future work.

Methods

Setting and Participants

This study was conducted at a diabetes camp in southern Maryland offering 3 consecutive summer sessions. Youth were assigned to cabins during their stay at camp, with cabin assignments based on gender and age. They participated in typical camping recreational activities, along with diabetes-specific educational activities. Youth attending more than 1 session were invited to participate in this study during their first session of attendance.

Recruitment

Prior to camp, potential participants and their parents were sent a letter describing the study and inviting them to participate. Research staff met with each youth and parent during registration to answer any questions and obtain informed consent. The study protocol was approved by the National Institute of Child Health and Human Development Institutional Review Board.

Focus Groups

Eighteen focus groups were conducted during three 1-week camp sessions with 6 groups per session. Because participants generally talk more openly when they share similar characteristics with other group members,²² same-gender and similar-age groups were used. Each focus group consisted of youth from 1 or 2 cabins, having the same gender and a 2- to 3-year age range. There were 12 groups of female and 6 groups of male participants, with 5 to 12 participants per group (mean of 7.8 participants per group). Each 45-minute focus group session was led by a research assistant with extensive training and practice in facilitating focus group discussions. Each focus group guide contained a standard set of semi-structured open-ended questions regarding perceptions of healthy eating and an additional set of questions probing 1 of 3 constructs: the influence of family, friends, or school on youth eating behaviors (see the appendix). Youth were first queried about their general perceptions of healthy eating and then asked to discuss the relationship of food to their diabetes management.

Data Analysis

Sessions were audiotaped, transcribed verbatim, and coded. To reduce bias, different transcribers, coders, and data analysts were used. Content analysis involved identification of themes across groups.²² The investigators, who had developed the focus group questions, read the transcripts and identified recurrent themes in the data. These themes were used to create a coding system, including coding categories and a description of each category, to guide classification of responses to codes. Two trained research assistants then independently coded all transcripts, assigning coding categories to responses, and the research team evaluated all discrepant coding. Only minor discrepancies were observed, which were resolved by examining the original data and developing a consensus on interpretation. The qualitative software package CDC EZ-test version 3.06c was used to facilitate data management and coding. Findings are presented as a description of recurrent themes as well as a reporting of the frequencies of each code, using the focus group as the unit of analysis. Thus, the percentages provided refer to the percentage of groups in which the specific coding category arose.

Results

Participants

A total of 157 youth aged 7 to 16 years attended 1 or more of the 3 camp sessions. Of these, 141 consented to participate, 12 declined, and 4 were ineligible, resulting in a consent rate of 92%. One participant left camp prior to data collection, resulting in a total sample of 140. The

sample ranged in age from 7 to 16 years, with a mean age of 11.76 years; 69% were female. Participant race/ethnicity was 71% white, 18% black, 6% Hispanic, and 5% other. Mean age at diagnosis was 6.97 years. Insulin administration was by injection for 58% (n = 81) and pump for 40% (n = 56) (oral medication: 2%, n = 3).

Perceptions of Healthy Eating

Healthy eating was defined by youth primarily in terms of eating low-carbohydrate foods, vegetables, vitamins and minerals, and low-fat foods (Figure 1). Fruit and vegetable consumption was frequently cited as being healthy, and a preference for fruits over vegetables was noted; many suggested this is due to the sweeter taste of fruit. Some youth expanded on why they believed fruits and vegetables to be healthy. “Vegetables, they kind of help your eyes and help you grow more.” “Fruit has a lot of vitamins and potassium, like bananas.” Understanding of individual properties of foods, such as micronutrients and fiber, was observed for many youth. Some youth had knowledge of specific vitamins and minerals and how they function to maintain health. “I think of vitamins B₆, B₁₂, C, D, calcium, potassium, all that stuff.” Several older youth made comments regarding the ability of fiber to satiate. “White bread is made from the stuff that fiber is taken out of. So if you eat white bread you are hungry again sooner.” “The fiber found in whole grains helps you to fill up and not be so inclined to keep eating.” Some youth also discussed the concept of balance. “If it’s well balanced, like if you are eating a meal, you want to have something from each food group.” Another youth suggested, “It has the right elements, then it should be healthy because it’s like protein, carbohydrate, fruits, and vegetables, but you usually can’t get that out of one type of food, yeah you definitely can’t. That would be the perfect balance of healthy.”

Eating and Diabetes Management

Youth varied widely in the extent to which they believed that eating healthy was beneficial for diabetes management. Some children reported that they ate more healthfully because of their diabetes, while others said that eating healthy was not an integral aspect of their diabetes management—only that they match their insulin to the food eaten. Moreover, several differences in the perception of healthy eating and in the perception of foods that were beneficial for diabetes management were observed (Figure 1). Food categories mentioned as being good for diabetes management tended to be those that elicit a lower glycemic response rather than those that are beneficial for overall health. Foods low in carbohydrates were most frequently mentioned, followed by sugar-free foods, “free” foods (foods containing no or negligible carbohydrates and therefore not requiring insulin), and high-protein foods.

Youth commonly reported that diabetes affects the quantity of sweets they consume. Most youth stated that they were able to consume some sugar-containing foods but limited portions of these because of their diabetes. Several noted that most sugar-free foods still contained carbohydrates and thus had to be included in their carbohydrate counting. Many of the sugar-free foods mentioned (eg, sugar-free cookies and candies) were high-fat, processed, nutrient-depleted foods. Some of the participants discussed the difference between naturally occurring sugars and added sugars. “They [fruit] have natural sugars, natural vitamins, and minerals.” “They also have natural sugars which we need as long as we have insulin.” “It makes you healthy, like fruit gives you the sugar that you need and energy too.”

Many youth reported that free foods were good for diabetes management. When probed to describe what they meant by this term, youth classified these foods as those that did not have to be counted in their carbohydrate count. Most of the examples of free foods reported to be good for diabetes management were high in saturated fat, such as cheese, meat, and even bacon. One youth responded with “steak, because I can have as much as I want and it is free, as in no carbohydrates.”

Conversely, some youth noted that high-fat foods were problematic because they prolong blood sugar responses. A common example of this was pizza. “Vegetables are good and the things that really screw me up are like pizza and fries, things with a lot of fat.” “Sometimes pizza, because if you eat it on the pump you have to extend bolus, if you have the pump, otherwise all the fat on the pizza will make you go high.”

In 76% of the groups, children discussed being able to eat greater amounts of unhealthy foods because of the flexibility afforded by an insulin pump. “I can eat honestly anything because I have the pump.” “I couldn’t eat a lot of sugary foods before I got the pump but now I can.” A few children reported caution in excessive eating despite having this flexibility, however. “I don’t pig out as much because if you take more insulin even though you can do it with the pump, if you take more insulin it makes you feel sicker.”

Barriers to Healthy Eating

Across all environments, the most commonly discussed barrier to healthy eating was the constant and extensive exposure to unhealthy food. The school environment was the most frequently cited location of exposure to unhealthy foods. Youth reported lunch menus containing pizza, corn dogs, hot dogs, chicken nuggets, and ice cream. Some acknowledged that their schools did offer some fruit and vegetable choices; however, they were often unappealing or served with sugar. “I try to eat the fruit but it is usually drenched in sugary syrup.” The extent to which unhealthy foods have become normative in the school environment is reflected in the following youth’s statement: “Pizza, chips, every once in a while I get an ice cream, and they have chicken patties. *They don’t have any junk foods* [emphasis added]—they have pizza, chicken nuggets, we have donuts and milk and hot dogs.” Peer relationships were also discussed as a barrier to healthy eating. Peer interactions increased both the availability of unhealthy food and the social pressure to eat it. One youth stated,

I won’t eat healthy food when I am around them [friends]; I am too embarrassed. Well actually at my school there’s no healthy food. Everyone steals everyone else’s food. You’ll just reach over and grab somebody else’s french fries, but then when you are out of school you still have that mentality. We won’t buy healthy food because otherwise nobody can take anything from you, because then you are not contributing. You have to buy something that you can share, and no one wants healthy food.

While the family environment was the least common barrier to healthy eating, many youth did report difficulty eating healthy because of the food available at home. “It’s kind of difficult for me because we have so much ice cream around the house.” “Well my family is not the healthiest eaters, we eat pretty much anything in the closet, which consists of mac and cheese and pizza sometimes and a lot of other stuff.”

Convenience was also commonly discussed as a barrier to healthy eating. Youth reported a preference for prepackaged foods that require no preparation. “Most of the healthy stuff takes preparation and the junk food is already prepared. Like carrots you have to peel the outside off of them and you have to do a lot of washing and stuff.”

I think sometimes when deciding what to eat, like the junk stuff is already prepared and you don’t have to cut it or anything, and it’s in its little packages and you can just like pick it up, and if you go to the store to buy fruit already cut up, they add all this sugar and syrup and it is not really healthy so it’s easier to grab junk food.

Children also reported that their families ate fast food and other less healthy meals because of busy schedules and lack of time to prepare a meal. “I eat out a few times a week because my mom says she doesn’t feel like cooking and sometimes we get fast food.” “When we don’t have time to prepare, we go out for subs or pizza once or twice a week.”

Facilitators of Healthy Eating

Parental behavior was the most commonly reported facilitator of healthy eating. In most groups, youth reported that their parents' monitoring of their food choices helped them to eat more healthfully. "If my mom sees something that isn't healthy or is bad for me, she won't let me get it. She says no and that is the end of it, if it is unhealthy." "My mom says I think this will be healthy and you've already had a lot of junk today and she just says what she would eat."

Some of the children suggested that their entire family can be supportive of healthy eating and can even model healthy eating habits. When the entire family ate healthfully, they found it much easier to do the same. One youth stated, "I think it's easy because if your whole family eats healthy then you don't have sugar things at home then you get used to it." "Usually when I go to this buffet near my dad's house, we sometimes go for dinner or for lunch, since I am diabetic, my dad helps me choose stuff, like stuff I'm not supposed to eat. He helps my brother out too."

Peer involvement was also noted as a facilitator to healthy eating. Some youth said that friends encouraged them to avoid unhealthy foods, particularly high-sugar foods. "You're not supposed to have that; that has sugar." "Because my friends are always there to remind me—like if I'm going to get ice cream, they help you make choices on like what is best to get because of like low sugar and carbohydrates and how small the amount, they may help you decide." In addition, some youth mentioned that when their peers ate healthfully they were more inclined to do the same.

Discussion

In this study, youth with diabetes demonstrated a general understanding of healthy eating and reported similar barriers and facilitators to healthy eating as nondiabetic children. Youths' attitudes regarding the impact of diabetes on eating behavior varied greatly, with some reporting efforts to eat healthier because of having diabetes while others not. A notable differentiation was observed between perceptions of healthy foods and identification of foods that are good for diabetes management, with a greater emphasis on lower-carbohydrate foods. As a result, foods high in saturated fat were frequently described as being good for diabetes management. Youth associated healthy eating with foods that best control blood sugar levels. Many reported controlling carbohydrate consumption by substituting foods high in saturated fat for carbohydrate-containing foods. While this may in fact be one way to reduce blood sugar excursions, high consumption of saturated fat substantially increases the risk for cardiovascular disease, the most common complication associated with diabetes. Findings from this study suggesting that youth may consume greater amounts of saturated fat in an effort to control their blood sugar levels concur with the findings of Helgeson and colleagues,¹⁶ in which adolescents with diabetes consumed greater amounts of fat and saturated fat than youth without diabetes. This is especially concerning given the high prevalence of cardiovascular risk factors recently observed in youth with diabetes.^{5,14,15}

Implications for Practice

In the past, dietary prescriptions for youth with diabetes were more restrictive and alienating. Current use of the insulin pump and flexible injection regimens have greatly improved dietary flexibility and decreased dietary stigma. Today, many youth on flexible regimens eat as they please. This has shifted concerns from limitation and alienation to greater potential for poor dietary choices. In addition, the flexible regimen could enable youth with diabetes to over-consume unhealthy foods. Considering national trends in overconsumption, obesity, and associated comorbidity, diabetes education around dietary intake needs to be proactive,

teaching youth to make healthy diet choices to facilitate not only blood sugar control but also overall health.

The next step in improving dietary education for youth with diabetes, then, involves the educator building on the positive aspects of carbohydrate counting and flexibility in eating while promoting more healthful dietary choices. Based on compelling epidemiological and intervention research,^{23,24} current national guidelines emphasize increased consumption of unrefined vegetables, fruits, whole grains, legumes, and nuts/seeds and decreased dietary reliance on high-fat meat and dairy foods and highly processed carbohydrates. The importance of promoting these guidelines for youth with diabetes is particularly compelling given both the potential benefit for blood sugar control and protection from long-term complications, particularly cardiovascular disease.

Promoting healthier eating practices among youth is challenging but achievable. Since youth with diabetes already pay greater attention to food intake because of the need to monitor carbohydrate intake, diabetes educators can build on this foundation to guide youth toward healthier food choices. When teaching about carbohydrate counting, the educator should emphasize that while different carbohydrates are counted the same, this does not mean that they are equally healthy, and they should encourage youth to choose whole, unrefined foods such as fruits, vegetables, legumes, and whole grains. Findings from this study also indicate that youth need assistance in determining healthy choices when controlling carbohydrate intake, such as choosing peanut butter or nuts over cheese or meat to decrease saturated fat consumption.

In addition to specific nutritional content, diabetes education sessions aimed at enhancing diet quality of youth should address social and behavioral components that influence eating behavior, including parental involvement in youths' dietary choices, accessibility of healthy foods, and management of social situations. Encouraging parents to be involved in their child's food choices may positively affect diabetes management. Positive modeling behavior, assistance with appropriate food choices, and limiting the amount of unhealthy foods in the household can result in better eating practices for youth. In addition, both youth and their parents can benefit from nutrition education sessions that focus on product availability, increasing exposure to new healthy foods, and enhancing skills to find healthy foods in their current environment. Finally, barriers to healthy eating, including poor food choices at school as well as social pressure to eat unhealthy foods, should be addressed, and diabetes educators should equip youth with tools to overcome such barriers to healthy eating.

Effective diabetes nutrition education for youth requires a greater understanding of the perceptions and influence on their eating behavior. While several studies have assessed healthy eating perceptions and influences on eating behavior in youth, research on youth with diabetes is limited. This study provides in-depth information about these youths' understanding of healthy eating, the relationship of healthy eating to diabetes management, and barriers to and facilitators of healthy eating. While study participants were from a single diabetes camp and thus a limited geographic range, the camp served urban, suburban, and rural areas and included youth from a broad range of socioeconomic status. Thus, findings are likely to be relevant to the broader population of youth with diabetes. Importantly, findings from this study strongly support the relevance and importance of expanding education and behavioral interventions designed to promote healthy eating among youth with diabetes. Findings both mirror concerning dietary issues among youth without diabetes and elucidate particular nutritional pitfalls unique to children with diabetes that further increase the morbidity and mortality risk among this population.

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Appendix

Focus Group Questions

Perceptions About Diabetes

- How does diabetes affect what you eat?
- Tell me about the foods that work best for you and your diabetes management.
- Why do you think these foods work best?
- Are there any foods that give you problems or make it harder to keep your blood sugar in control? What do you think it is about these foods that make it harder to keep your blood sugar under control?

Perceptions About Healthfulness

- What makes a food healthy?
- How important is it to you to eat healthy foods?
- What are some reasons you might want to eat foods that are good for you?
- Now I want everyone to think of a healthy food that you like to eat.
- What makes these foods healthy?
- Tell me what you like about it.

Influences of Family on Healthy Eating

- How does your family decide what to buy at the grocery store?
- How often do you go along to the grocery store with your parents?
- What happens if you add food to the shopping cart?
- What types of food do you (or would you if you could) add to the shopping cart?
- Tell me about a time when you asked for a specific type of food or meal.
- How often do you ask for a certain type of food or meal?
- What happens when you ask for it?
- If your parents don’t get it for you, tell me why you think that happens.
- Are there any foods that are not around your house that you would eat if they were?
- Why do you think they are not around your house?

- How easy is it for you to eat healthy foods at home?
- Other than at mealtime, how often are healthy foods ready to eat at home?
- What is it that makes it difficult to eat foods that are good for you at home?

Influence of Friends on Healthy Eating

- How much do you think about your diabetes when you are hanging out with friends?
- What about when you are eating around them?
- Tell me about how your diabetes affects your food choices when you're with friends.
- What makes it difficult to eat foods that are healthy when you are with friends?
- Tell me how your friends make it easier to eat in ways that help you manage your diabetes?
- What do they do that makes it harder to eat in ways that help you manage your diabetes?
- When you're with your friends, how often do you eat foods that you don't think your parents would let you eat?

Influence of School on Healthy Eating

- How many of you buy your lunch at school?
- How many of you bring your lunch to school?
- For those of you who buy your lunch, what are your choices?
- What kinds of foods do they have in your cafeteria?
- How do you decide what to eat at lunch?
- How does your diabetes affect what you eat at lunch?
- Tell me about packing your lunch.
- Who decides what gets packed?
- How much do you get to decide?
- How do you decide what to pack for your lunch?
- How does your diabetes affect what you pack for lunch?
- What foods do you eat at school that you don't eat at home?
- Are there times when it is difficult to eat foods that are healthy for you at school?

Figure 1.
Description of healthy eating versus foods good for diabetes management.