

Qualitative analysis of diet, physical activity, and body image of children using focus groups and Photovoice and quantitative analysis of dietitians' perspectives on integrating sustainable agriculture into professional practice using survey methodology

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Dedication

I would like to dedicate this project to my family.

Abstract

This study explored the food, physical activity, and body image perspectives of low-income children living in urban Minnesota and dietitians' perceptions on including sustainable agriculture into their professional practice. The research was conducted in four phases. The first three phases used qualitative methodology and the Social Cognitive Theory (SCT) as the theoretical framework. For the first two phases of research, focus groups and Photovoice were conducted to gather information on children's food environments, dietary habits, and physical activity practices. The third phase explored low-income, African American and Native American children's perceptions on body image and body image assessment tools using focus groups and two body image assessment instruments. The fourth phase used quantitative methodology to investigate dietitians' perspectives on including sustainable agriculture in dietetics practice. The survey was informed using the Theory of Planned Behavior (TPB) and administered to registered dietitians in the U.S. Data analysis for the focus groups and interviews used the open coding method. Photographs were coded using a coding protocol that was developed and agreed upon by the two researchers. SPSS was used to analyze body dissatisfaction and the dietitian survey data. Analysis included descriptive statistics, independent t-tests, Pearson correlations, and stepwise regressions. Seven themes were identified across focus groups related to diet, health, and physical activity; four themes were identified from the food environment Photovoice data; and three themes from the physical activity Photovoice data. Three themes emerged from analysis of the body image focus groups. Quantitative data from the body image research revealed that obese and overweight children viewed themselves as healthy weight. Results of the survey with dietitians showed that all four TPB variables correlated with behavior in 2013 and that intention was the most predictive of behavior to include environmental issues into practice. Findings from the first three phases provided insight into how children view their food and physical activity environments and can inform interventions to better meet the needs of low-income, urban children of diverse ethnic backgrounds. Results from the fourth phase of research can help the Academy of

Nutrition and Dietetics identify dietitians' educational needs related to sustainable agriculture.

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CHAPTER 1: Literature Review

INTRODUCTION

Childhood obesity is a major public health concern. The number of overweight or obese children in the United States (U.S.) more than doubled between 1980 and 2010.¹ Childhood obesity is a concern because obesity is associated with physical and psychosocial factors that have negative effects on immediate and long term health.^{2,3} For example, obesity has been associated with an increased risk of type 2 diabetes, hypertension, and hyperlipidemia.³⁻⁶ The psychological effects of obesity on youth include poor body image, low self-esteem, and depression.⁷ Further, obese children are more likely to become obese adults and the comorbidities associated with obesity may continue to effect their health throughout adulthood.⁸

The diet and physical activity habits of African American and Native American children are important to investigate because of the high prevalence of overweight and obesity in these populations. In the African American population, 76% of adults and 20.2% of the children were overweight or obese in 2011-2012.¹ In Native Americans, 70% of the adults were overweight or obese.⁹ Also, 21.1 % of preschool aged Native American preschoolers had a high BMI in 2011 and this was higher than the average of 14.7% of children across all ethnicities.¹⁰ To explore the children's perspectives on food choice, physical activity, and body image of these two ethnic groups, focus groups and body image assessment instruments were used.

The final phase of this project focused on environmental issues related to water and the food supply. Sustainable agriculture refers to farming practices that meet human dietary needs, improve the community, and preserve the natural and nonrenewable resources that are needed for agricultural practices.¹¹ Research has shown that consumers are becoming more aware of the impact food production has on the environment, but may not be sure how to identify sustainably produced foods.¹² The Academy of Nutrition and Dietetics (AND) has recognized the important role that registered dietitians can play to promote sustainable agriculture. Dietitians can provide education to consumers and the food service industry about ways to be environmentally conscious when making food choices,¹³ but research into dietetic practice related to environmental issues is limited.^{14,15} Therefore, a survey was administered to registered dietitians in 2013 to examine dietitians' perspectives on including sustainable agriculture into dietetics practice.

In the following sections, the relevant literature related to food insecurity, Native American and African American children's health, body image, Photovoice, and dietitians' opinions on sustainable agriculture will be reviewed. Additionally, the Social Cognitive Theory (SCT) and the Theory of Planned Behavior (TPB) will be discussed. Then five chapters will report on research that explored diet, health, physical activity, and body image perspectives from low-income, urban children. One chapter will describe registered dietitians' perceptions on incorporating environmental issues into their professional practice. The final chapter will summarize the conclusions and implications of this research.

Food Insecurity in Children

Food insecurity can have harmful effects on children's health. Food insecurity is defined by the USDA as a household-level economic and social condition of limited access to adequate food.¹⁶ Children living in food insecure households are at an increased risk for malnutrition that can delay brain growth, learning ability, and physical and behavioral development.¹⁷ Additionally, children living in food insecure households have higher rates of overweight and obesity than the general population.^{18,19} Research with homeless children (9- to 13-year olds) in the Twin Cities, MN, has found that over half of the participants were overweight or obese.^{20,21}

In the United States, food security is measured using a standardized survey. The survey was originally developed by the U.S. Food Security Measurement Project to measure food security status over a 12-month period.²² These data were first collected in 1995 as part of the U.S. Census Bureau's Current Population Survey.²² Food security statistics are reported by the U.S. Economic Research Service and is categorized on four levels: 1) high food security, 2) marginal food security, 3) low food security, and 4) very low food security.²³ The first two categories are considered 'food secure' and the lower two categories are considered 'food insecure'.²³ In 2014, food insecurity in households with children was 19.2% and this was higher than those without children (14.0%).²³

There are many factors that may contribute to the increased rates of obesity in children living in food insecure households. One possibility is that families experiencing food insecurity tend to choose foods of lesser nutritional value that are less expensive and more appealing than healthier foods.²⁴ This contributes to a diet that is higher in salt,

sugar, fat, and calories and inadequate in whole grains, fruits, vegetables, low fat dairy, and lean protein than children living in higher income households.^{20,25-28} Research has also shown that children may alter their eating habits to compensate for an inadequate food supply by eating a larger quantity when food is available and snacking at night.²⁰ The food choices that low-income children make may contribute to a high BMI.

In addition, there are environmental barriers that make it difficult for low-income families to obtain healthy foods. Research by Powell et al²⁹ found that parental socioeconomic status and environmental context (food prices and store density) explained a significant portion (63%) of the BMI gap between black and white males. Also, Shier et al³⁰ found that a higher frequency of food stores of any kind in a given neighborhood was associated with high BMI. Additionally, Findholt et al³¹ found that there were fewer fruit options available in food stores located near low-income and rural schools than high income schools. Further, research with homeless families living in shelters found that the shelter environment (limited cooking equipment and storage space for food) and lack of an adequate food supply were barriers to eating healthy foods.³² Overall, low-income environments can pose a barrier to meeting nutrition recommendations.

Low physical activity levels have also been found in children in low-income households. Research has shown that low-income children are not meeting physical activity recommendations^{25,33} and are less active than children living in middle- and high-income households. Fram et al²⁵ found that, on average, children living in low-income households engage in 17 minutes less physical activity than children in high income households. In Massachusetts, Rogers et al³⁴ compared the socioeconomic status to BMI and found that there were fewer parks and recreation centers, exercise facilities, and grocery stores in the low-income neighborhoods than higher income areas. Also, the overweight and obesity rates were higher in the low-income neighborhoods.³⁴

There are programs in the U.S. to help food insecure families meet their food supply needs. The food assistance programs that are available to low-income families include the Supplemental Nutrition Assistance Program (SNAP), the National School Breakfast and Lunch Programs, and the Special Supplemental Nutrition Program for Woman, and Infants, and Children (WIC). There are also community programs, such as food shelves and community meal sites, to provide food assistance. However, these

programs may not provide recipients with healthy food choices.³⁵⁻³⁷ Previous research found that food pantries offered an abundance of processed, high sodium, and canned foods³⁵ and did not include ethnic foods that were consumed by food shelf recipients.³⁶ Also, SNAP benefits may not be used to purchase nutritious foods.^{37,38} In the Twin Cities, MN, Laska et al³⁹ measured the availability of fruits, vegetables, whole grains, and milk in retail stores that participate in the SNAP program and found that only 33% of the stores had vegetables available. They also found that whole grain choices, besides cereals, were limited.³⁹ Kohn et al⁴⁰ suggested that there is a need to provide healthy food assistance that does not contribute to excess energy intake. Obtaining an adequate food supply that consists of healthy options is a challenge to food insecure families.

African American Children

Obesity rates vary by race and ethnicity. African Americans are at a higher risk of obesity and obesity-related health concerns than the general population.^{1,41} In 2011-2012, 20.2% of African American children were overweight or obese, and this was higher than non-Hispanic white and Asian children.¹ Research has shown that, in general, this population regularly consumes low-nutrient dense, high calorie foods and beverages, such as fast foods and sugar sweetened beverages,⁴² but little dietary fiber.² Another factor that may contribute to higher rates of obesity among African American children is that their parents may underestimate their children's weight status and view them as normal weight when, in fact, they are overweight.⁴³ The high rates of obesity in the African American population may contribute to an increase in morbidity and mortality.

Because of the obesity rates in this population, African American children have been the focus of intervention and prevention programs. The Memphis Girls Health Enrichment Multisite Studies (GEMS) used a nutrition and physical activity intervention to prevent excess weight gain in 8- to 10-year-old African American girls.^{44,45} After two years, there was an increase in vegetable intake in the intervention group, but no significant differences in anthropometric measurements (including BMI) or physical activity levels between the two groups.⁴⁶ The Stanford GEMS worked with a similar population with the goal to increase physical activity through dance and reducing screen time.⁴⁷ At the end of the intervention, BMI did not differ between the two groups, but there were significant decreases in cholesterol, LDL cholesterol, incidence of elevated

fasting insulin, and depressive symptoms in the intervention group compared to the control.⁴⁷ Additionally, McKinney et al⁴⁸ used community-based participatory research with African American and Latino high school students to improve the students' attitudes towards nutrition and fitness, but a BMI change was not seen. In the Twin Cities, MN, Lautenschlager and Smith⁴⁹ found that a community garden increased children's interest in gardening, cooking, and trying new foods in a sample that included African American children. Currently, there is an intervention (B'More Health Communities for Kids) in Baltimore that focuses on social and environmental changes to improve children's health in a low-income, African American community.⁵⁰ Finally, a review article by Robinson et al⁵¹ assessed the effectiveness of pre-school- and school-based obesity prevention or treatment programs that targeted African American children and found that only two of 17 studies showed a significant decrease in obesity among the participants. The mixed results of these studies and the fact that the rate of obesity among African American youth continues to be higher than the general population suggests that further information is needed to better understand how to decrease overweight and obesity rates in this population.

Native American Children

Overweight and obesity are also prevalent in the Native American population. To illustrate, one-fifth of Native American 2- to 4-year-olds were obese in 2011.⁹ This trend continues through adulthood, with 70% of Native American adults categorized as overweight or obese in 2008.¹⁰ This population has experienced many changes in their diet and lifestyle over the past few hundred years. Historically, Native Americans consumed diets that were based on regional foods and were high in fiber, fruits, vegetables, and animal protein, and low in processed, refined foods, and sweetened beverages.⁵³ Current research has shown that Native American children consume less fruits and vegetables and more sugar sweetened beverages than their traditional diet.⁵⁴ Physical activity levels have also decreased, and low levels of physical activity and frequent television viewing have been correlated with high BMI in Native American youth.⁵⁴ These changes have contributed to Native American children having one of the highest obesity rates in the U.S.

To lower obesity rates and improve the health of the Native American population, obesity prevention and treatment programs have been tailored to this population. Programs have been conducted at Head Start programs (The Child Health Initiative for Lifelong Eating and Exercise),^{55,56} schools (Pathways),^{57,58} and in the community.⁵⁹ Bright Start was a school-based obesity prevention project that intended to reduce excessive weight gain by improving healthy eating and increasing physical activity among kindergarten and 1st grade Native Americans.⁵⁷ Although there were no significant changes in mean BMI or body fat percentage, there was a decrease in sweetened beverage, whole milk, and chocolate milk intake in the intervention group.⁵⁷ Another school-based intervention that targeted older children (3rd-5th graders) was the Pathways study.⁵⁸ This multicenter project was conducted from 1994-1996 with the goal of preventing obesity by improving knowledge and self-efficacy related to food choice and physical activity using a physical activity, nutrition, foodservice, and family education program.⁶⁰⁻⁶² After three years, the students in the intervention schools consumed fewer calories from fat and saturated fat than the control group.⁶³ Physical activity did not differ between the two groups and there was no association between BMI and activity in normal weight children.^{64,65} A community-based intervention with Native American youth in the Twin Cities, MN, was intended to improve self-efficacy related to healthy eating.⁵⁸ This research found an increase in self-efficacy in the children, but not in the adolescents.⁵⁸ As can be seen from the available research, obesity prevention programs with Native American children have had varying levels of effectiveness in decreasing obesity rates.

One challenge to creating obesity prevention programs for Native American children is that they may have different health and nutrition beliefs than other populations. For example, Jennings and Lowe⁶⁶ worked with 4th and 5th grade Native American children and found that education programs based on western ideas of health may not be appropriate for Native Americans. Also, Fila and Smith⁶⁷ found that intention to eat healthy foods was not associated with behavior and that taste and availability of healthy foods were the main barriers to healthy eating among a sample of 9- to 18-year-old Native American youth. Similarly, Jahns et al,⁶⁸ with a sample of 5th grade Native American children, found that the main barriers to consuming healthy foods were personal (such as taste or preference) and environmental. Previous research has

suggested that understanding specific culture's view of health is important prior to creating education programs and that tribal involvement may be especially important with this demographic.^{69,70} Based on this information, more research with Native American children is needed to better understand their perceptions of body size, physical activity, and dietary habits.

Body Image in Children

Body image encompasses perception, attitude, behavior, fear of fatness, and body distortion. There are many factors that influence body satisfaction, including age, race, ethnicity, and gender.^{6,71,72} Body dissatisfaction has been found in children and adolescents of minority ethnic groups.^{72,73} Poor body image has been linked to disordered eating habits, depression, and suicide in adolescents.⁷⁴ Furthermore, obese and overweight children are more susceptible to body image disturbances than healthy weight children.⁷⁵

Body dissatisfaction is present in children across race and ethnic groups, including those with high rates of overweight and obesity. Research with Native Americans,⁷⁶ African Americans,⁷⁷ and Hmong children⁷² have shown that poor body image is a concern in these groups. With a sample of Native American children, Smith and Rinderknecht⁷⁶ found 5- to 18-year-old girls were less satisfied with their bodies than boys. Also with Native American children, Story et al⁶² identified that weight control behaviors were present among 2nd and 3rd graders, especially the obese children. Interventions to decrease obesity rates can also influence body image. For example, Sharma et al⁷⁸ measured body image pre- and post-intervention and found that body satisfaction was the lowest after the intervention among the obese, African American girls that consumed more calories and fat. These studies demonstrate that there are differences in body image perception between race and ethnic groups.

To measure body image, multiple assessment tools have been used. Questionnaires and figure rating scales have been developed to measure body image in children and adolescents.⁷⁹ One tool that uses silhouette figures is the Figure Rating Scale (FRS). The FRS was originally developed by Stunkard et al⁸⁰ for use with adults and has been adapted for use with children,⁸¹ including African Americans^{73,82} and Native Americans.⁷⁶ A scale that uses photographed figures is the Children's Body Image Scale

(CBIS). This was developed by Truby and Paxton,^{83,84} adapted by Saxton et al,⁸⁵ and validated with Caucasian children in Australia. Both body image scales appear to be of photos of Caucasian children, but have been used to measure body image in children of other ethnicities.⁷³ There has been little research into minority children's perspectives and feedback on the instruments and if they can identify with the figures used on the scales. Furthermore, research has suggested that the African American and Native American communities should be involved in creating assessment tools to make them more accepted within their community.^{49,86} Thus, feedback on these instruments from minority children is important and can be used to create a figure rating scale that they can identify with.

Photovoice

Photovoice combines photographs and interviews to understand a phenomenon of interest. This method was first used by Wang and Burris⁸⁷ to study reproductive health in rural Chinese women. Since then, Photovoice has been used with multiple populations,^{88,89} and may be useful when working children for many reasons. First, creative forms of data collection, such as photography, can be a way to build trust between researchers and children.⁹⁰ Second, using a combination of data collection methods may be the most effective way to conduct research with children.⁹¹ Third, this method could involve children who are not comfortable in group settings. Finally, research has found that 8- through 12-year olds are capable of discussing abstract concepts, such as health, and are able to take photographs.^{90,92} Previously, Photovoice has been applied research with children and adolescents on a variety of topics.⁹³⁻⁹⁶ The available data suggests that this method may be useful to open a discussion with children about health-related topics such as nutrition and physical activity.

In addition to its use with children, Photovoice has been used with minority groups. Harley et al⁹⁷ identified Photovoice as a culturally competent research method and that it could be appropriate to use with African American populations. It has been used with African Americans^{96,98} and Native Americans.⁹⁴ Kovacic et al⁹⁶ used Photovoice with 8- to 13-year old African American children living in an urban, low-income area in the U.S. to investigate how the environment influenced the children's health and found that poor eating habits, poor nutrition, safety, and violence were barriers

to health in the community. In suburban New York, Hackett et al⁹⁸ used this method with youth to identify the environmental factors that effected diet and physical activity in the community and found that limited access to healthy foods, especially fruits and vegetables, and limited access to safe places to play were barriers to health. The current research provides support for the use of Photovoice with children of various ethnic groups.

Sustainable Agriculture among Dietitians

The food system provides food to people around the world. As the population continues to grow, so does the demand on the food system. This has caused a decline in natural resources and effected the global climate.^{99,100} Thus, there is a need to support more environmentally friendly food production methods than the conventional food system.¹⁰⁰ Sustainable agriculture encompasses economic, environmental, and social sustainability of the food system. The goal of sustainable agriculture is to meet human dietary needs while preserving the natural and nonrenewable resources that are needed to produce food, support local farmers, advance the quality of the community, and improve food security.^{100,101}

Registered dietitians are health professionals that provide nutrition education to the public and are in a position to educate people on sustainable agriculture. Therefore, dietitians can play an important role in influencing the food system and Tagtow and Harmon^{13,102} and Wilkins¹⁰³ have outlined the ways in which dietitians can incorporate environmental issues into their dietetics practice. However, research with dietitians has shown that they are not consistently including environmental issues into their discussions with clients and they may not perceive that this topic is within their scope of practice. In 2002, Robinson & Smith¹⁴ found that only 13% of Minnesotan dietitians included sustainable agriculture in their practice. Additionally, research by Hawkins et al¹⁵ found that only 34% of dietitians believed that they should have a role in reducing climate change. In a sample of Australian dietitians, 67.5% of dietitians reported that issues related to climate change and the sustainability of the food supply was quite or very important.¹⁰⁴ To further highlight the need for nutrition professionals to educate on this topic, research has found that consumers are interested in purchasing sustainably produced products but do not know how to find these foods.^{12,105,106} Nutrition

professionals can use their expertise to educate consumers about ways to support a sustainable food system, but more research is needed to explore their barriers to doing so. To investigate dietitians' perspectives on incorporating sustainable agriculture into dietetics practice, a survey informed by the Theory of Planned Behavior was administered to dietitians across the United States.

Social Cognitive Theory (SCT) in Nutrition Research

Behavioral theories have been applied to research on health behaviors, including diet and physical activity. These theories, such as the SCT, can be useful because they provide a framework to explain human action.¹⁰⁷ The SCT, grounded in sociology and psychology, evolved from the Social Learning Theory and explains behavior through the dynamic relationship between personal, behavioral, and environmental factors as they relate to behavior change (**Figure 1**).¹⁰⁸ One of the fundamental concepts of the SCT is that there is reciprocal determinism between the three factors.¹⁰⁸ Reciprocal determinism refers to the belief that personal factors, environmental factors, and behavior are continually interacting and influencing one another.^{108,109}

There are multiple concepts of the SCT that influence the personal, environmental, and behavioral components. The personal factors encompass the learned abilities of an individual and their past experiences.¹⁰⁸ Behavior is influenced by a person's behavioral capability, or their knowledge and skills to perform an action, and their outcome expectancies, or the outcome they anticipate from a behavior.¹⁰⁸ The concept of expectancies is subjective and reflects the value an individual places on a given outcome.¹⁰⁸ The environment includes both the social and physical environments.¹⁰⁸ Situation is a concept that is related to environment and refers to how a person perceives their environment.¹⁰⁸ Another concept related to the environment is observational learning, which is when an individual watches the actions and outcomes of another's behavior.¹⁰⁸ Reinforcements increase or decrease the likelihood of a person repeating a behavior.¹⁰⁸ Emotional coping response refers to how a person manages their emotional responses and self-control describes how a person regulates their behavior.¹⁰⁸ Finally, but possibly the most important predictor of behavior change, is a person's confidence to perform the desired behavior, or their self-efficacy.¹¹⁰

The components of the SCT play an important role in determining health behaviors. Previous research with children has suggested that personal, behavioral, and environmental factors influence low-income, urban children's diet and physical activity behaviors.^{28,57} The SCT has also been applied to research with minority groups^{21,57,111} and to interventions.^{57,112} For example, Freedman and Nickell¹¹² created an intervention that was based on the SCT with the goal to improve fruit and vegetable consumption long-term among 9- to 14-year-olds. Research by Rinderknecht and Smith⁵⁷ used the SCT improve dietary self-efficacy in Native American children. Other SCT-based research has been effectively conducted with multi-ethnic youth that live in low-income households.^{21,113} This research suggests that the constructs of the SCT may be effective to understand children's diet choices and this information can be applied to interventions intended to change behaviors.

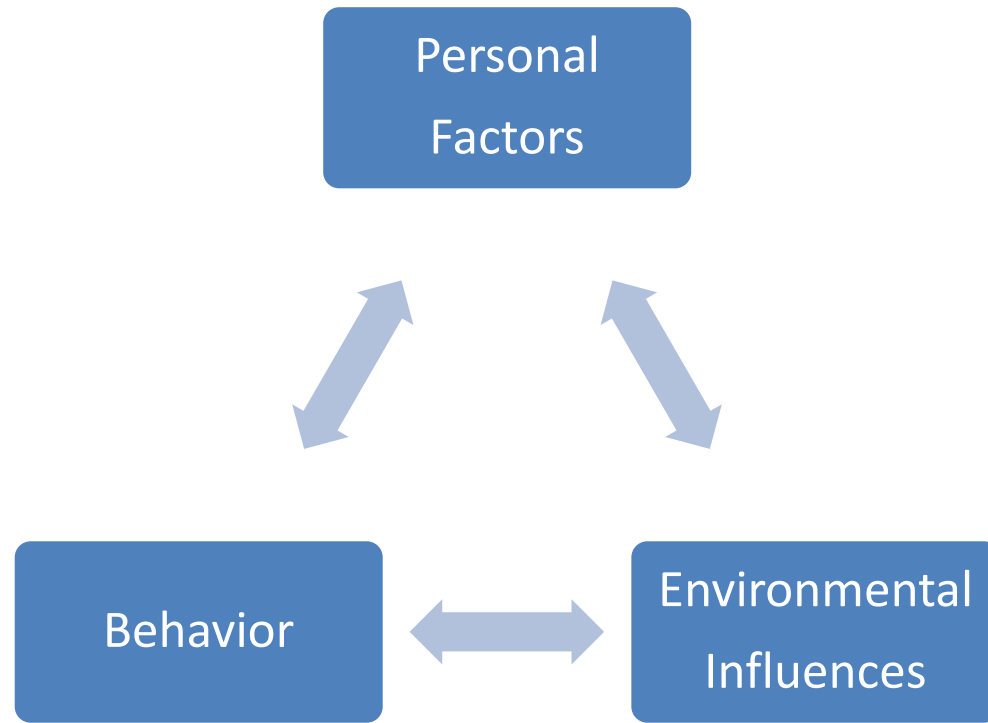


Figure 1. Social Cognitive Theory Model^{108,110}

Theory of Planned Behavior (TPB)

Another theory that has been used to explain health behavior is the Theory of Planned Behavior (TPB). The TPB is an extension of the Theory of Reasoned Action and was proposed to explain behaviors that people have self-control over, such as dietary practices (**Figure 2**).^{114,115} This theory is based on the belief that behavioral intention is the main determinant of behavior and intention is influenced by subjective norms, perceived behavior control, and attitude.^{114,116} A meta-analysis found that the TPB predicted 44.3% of the variance in intention for health-related behaviors.¹¹⁷

There are several components of the TPB. The main components are behavior, intention, attitude, perceived behavioral control, and subjective norms.¹¹⁴ Intention to perform the behavior indicates an individual's readiness.¹¹⁴ Attitude consists of a person's beliefs about a behavior (behavioral beliefs) and of the person's beliefs about the outcome of performing the given behavior (behavioral outcomes).¹¹⁴ Perceived behavioral control measures an individual's perception of their control and power to perform a behavior.¹¹⁶ Subjective norms refer to whether a person's referent groups would approve or disapprove of a behavior and their motivation to comply with the referent group's beliefs.¹¹⁴ To use this theory, research has suggested that all components should be measured simultaneously in a survey or intervention.¹¹⁴

The TPB has been used to study behaviors related to dietetics practice and nutrition behaviors. With a sample of registered dietitians, Robinson and Smith¹⁴ used a TPB-based survey to measure their perspectives on including environmental issues into dietetics practice. The TPB has also been applied to research on dairy intake in older adults,¹¹⁸ women's intentions and consumption behaviors related to soy,¹¹⁹ sugar sweetened beverage intake among adults,¹²⁰ and veteran's dietary intention and behavior.¹²¹ Also, the TPB has been applied to a community garden intervention with 9- to 15-year old minority children.^{49,122} The research presented in this section suggests that the TPB may be an appropriate theory to apply to understanding the factors that influence dietitians' beliefs about including environmental issues into their professional practice.

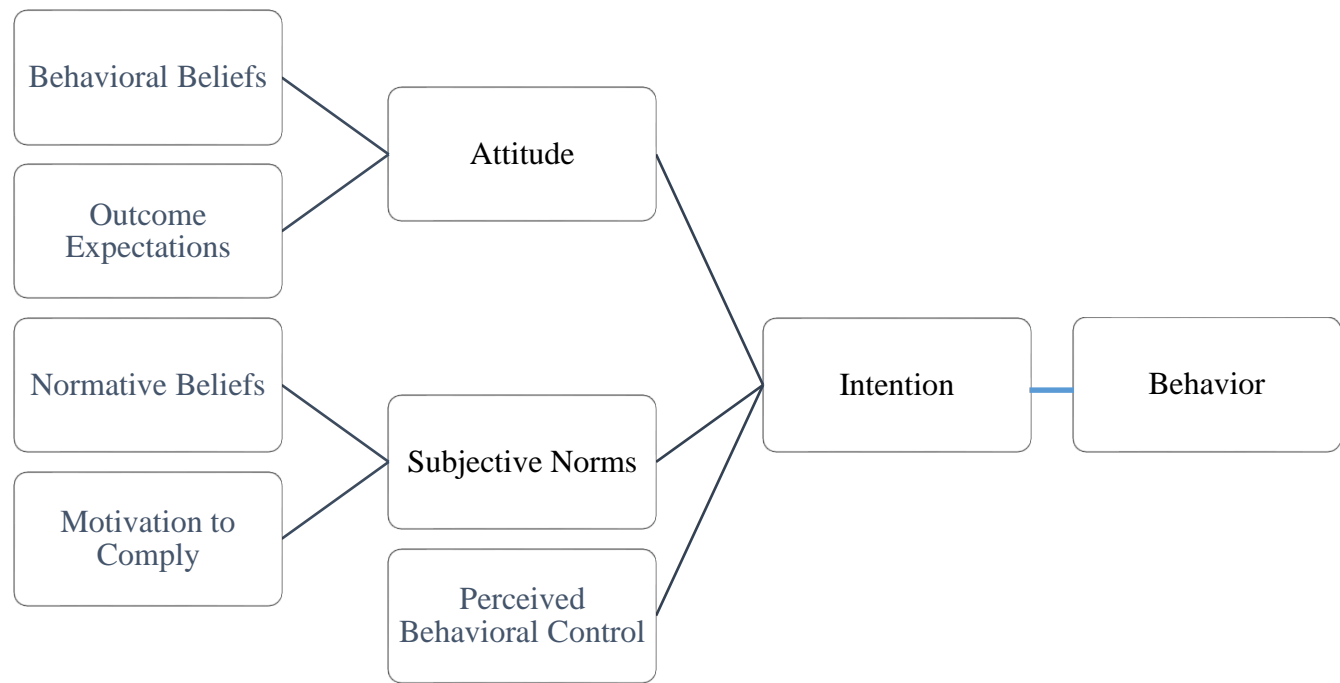


Figure 2. Theory of Planned Behavior Model^{114,116}

PURPOSE STATEMENT

The purpose of this research was to: a) explore the food, physical activity, and body image beliefs among urban youth that lived in low-income households in Minnesota using the SCT as the theoretical framework and b) investigate dietitians' perspectives on incorporating water and food systems issues into their professional practice using the TPB. To address the research questions outlined below, focus groups and Photovoice were conducted with children living in low-income, urban households. Also, two body image assessment tools were completed by Native American and African American children living in low-income households. To investigate dietitians' viewpoints on environmental concerns, a survey that was developed in 2002 was administered to members of the AND living in the United States.

RESEARCH QUESTIONS

Phase 1: Focus Groups

1. How does the environment (home, community, school) influence low-income, urban children's food choice and physical activity habits? Who influences their dietary and physical activity habits?
2. How do personal characteristics and culture influence the food choice and physical activity habits of 8- to 13-year-old children living in low-income, urban households?

Phase 2: Photovoice

1. How do minority, low-income children pictorially observe their food and food environment?
2. How do urban, minority children living in low-income households perceive their physical activity habits and environments, as represented in photographs and interviews?
3. Is Photovoice appropriate for low-income, minority, 8- to 13-year olds living in an urban area and does this method engage this population in diet and physical activity research?

Phase 3: Body Image

1. Do African American and Native American children living in low-income, urban households prefer outlined/drawn figures or photo figures?

2. Do African American and Native American 8- to 13-year olds that live in low-income, urban households have a realistic view of their body size? Is their ideal body image different from their actual body image?
3. Who influences how African American and Native American children living in low-income, urban households view their body size and what do they perceive to be an ideal body size?

Phase 4: Sustainable Agriculture survey with dietitians

1. Are the three TPB variables (subjective norm, attitude, and perceived behavioral control) correlated with intention to integrate sustainable agriculture into dietetic professional practice in the 2013 survey?
2. Are the three TPB variables (subjective norm, attitude, and perceived behavioral control) and intention correlated with behavior to integrate sustainable agriculture into professional practice in the 2013 survey?
3. What percent of dietitians incorporated sustainable agriculture into practice in 2013 and how does this compare to 2002 data from Minnesotan dietitians?
4. Which TPB variable is the most predictive of behavior in the 2013 survey?

HYPOTHESES:

Phases 1, 2, and 3: Focus Groups, Photovoice, and Body Image

There were no hypotheses determined prior to conducting the focus groups, Photovoice, or body image research. The first three phases used focus groups or Photovoice methods that are exploratory in nature, therefore hypotheses are not determined for research using these methods.^{87,88,123} The quantitative data collected for these phases were for descriptive purposes.

Phase 4: Sustainable agriculture survey with dietitians

1. Attitude, perceived behavioral control (PBC), subjective norm, and intention are correlated with behavior in 2013.
2. More dietitians incorporate issues related to sustainable agriculture into their dietetics practice in 2013 than in 2002.
3. In 2013, intention is the most predictive of behavior compared to the other TPB variables.

ABBREVIATED METHODS

Study Design

This project consisted of four phases of data collection that used both qualitative and quantitative research methods. The first phase used focus groups to evaluate the personal, environmental, and behavioral factors that influence food choice, physical activity, and health beliefs among children. Focus groups provide descriptive data and the setting allows for multiple perspectives to be shared on a given topic.¹²³ Data analysis is rigorous and sample sizes are determined to be adequate when saturation is reached.¹²³ The second phase used Photovoice methodology to gain insight into urban, low-income 8- to 13-year-olds' food environments and physical activity habits. The third phase used two different types of figure rating scales (the FRS⁸¹ and the CBIS⁸³⁻⁸⁵) to assess low-income Native American and African American children's body image and body dissatisfaction. These data were supplemented with focus group data to discuss the children's perceptions of completing these instruments and the social factors that were associated with body image for the children. The quantitative data that was collected during phases 1, 2, and 3 included demographic information and children's height and weight measurements. The questions that guided the focus groups and Photovoice were underpinned with the SCT. Recruitment criteria for the first three phases of this research included 8- to 13-years of age and living in a low-income household. Low-income was defined as a family that received federal assistance from the SNAP program. The results from the first three phases of this research are intended to be used in planning future nutrition education programs that work with our target population.

For the first three phases of the project, height and weight were measured for each child. Measurements were taken by the same researcher twice, following standard protocol,¹²⁴ using a stadiometer (model 217, SECA, Chino, CA, 2008) to measure height and an electronic medical scale (Health-o-Meter 320KL, SECA) to measure weight. Participants were instructed to remove their shoes and outer layer of clothing to improve accuracy of the measurements. Gender-specific BMI-for-age was calculated for each child using the taller of the two heights and an average of the two weights. Body mass index (BMI) in kg/m² was plotted on the corresponding CDC growth chart and

categorized as underweight (<5th % BMI-for-age), healthy weight (5-85th%), overweight (85-95th%), or obese (>95th%).¹²⁵

The fourth phase of this research was to analyze survey data that measured registered dietitians' perceptions on including sustainable agriculture in their practice. The survey was first administered in 2002 to members of the Minnesota Dietetic Association (n=149)¹⁴ and was repeated with a nationwide sample in 2013. The data from the 2013 survey were analyzed and compared to the 2002 data, thus this phase was both cross-sectional and longitudinal. The survey was framed using the TPB. To meet inclusion criteria, each participant needed to be a member of AND and a practicing dietitian.

Each phase of this study was approved by the Institutional Review Board at the University of Minnesota. All participants gave informed consent (parent/guardian) or assent (children) (**Appendices A, B, and C**) and received compensation for their time.

Phase 1: Data Collection

To reach low-income children, participants were recruited through flyers/outreach at afterschool programs and community centers that served primarily low-income children in Minneapolis and St. Paul, MN. Participants resided in low-income households, were 8- to 13-years old, and were predominately Native American or African American.

Two researchers trained in focus group methodology co-moderated eight focus groups. Each group lasted approximately 75 minutes and was conducted at an afterschool program between February and April, 2013. Focus group questions were framed using the SCT and examined the factors that effected the children's food choice, health, and physical activity practices (**Appendix D**). There were 6-8 children per group, separated by age (8-10 and 11-13 years), and race/ethnicity. Demographic data were collected from the parent/guardian (**Appendix E**). Heights and weights were taken following the procedures described previously.

Phase 1: Data Analysis

Focus groups were audiotaped, transcribed verbatim, and analyzed independently by two researchers. Researchers independently coded each line of the transcript from each focus group using the open coding method.¹²³ After each focus group was coded,

the researchers met to discuss coding and reconcile discrepancies. Major and minor themes emerged from the data and representative quotes were identified. Quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows version 20.0 (SPSS, Chicago, IL).

Phase 2: Data Collection

Recruitment for the Photovoice project took place at the same afterschool programs as the first phase and the eligibility criteria was also the same as the first phase. Data were collected from May through August, 2013. Twenty-nine children participated in the food environment portion of the project and 24 children participated in the physical activity portion. The researchers met with children in small groups (2-5 children) to gather demographic data (**Appendix E**), measure height and weight, and explain proper camera use and ethics. Each child received a disposable camera (27 exposures) and was asked to take photographs that represented their food environment and physical activity habits and to include pictures at home, at school, and in their community. Children were provided examples for photography based on the SCT (**Appendices F and G**).

Interviews were conducted with the children individually or in pairs after the child turned their camera in to researchers for their photographs to be developed. During interviews, children met with a trained interviewer to discuss 3-5 of their photos that the researchers wanted to learn more about (**Appendix H**). Photos represented the environment, behavioral, and personal concepts of SCT. Each child was also asked how they felt about the Photovoice project and if they enjoyed taking photos. Interviews lasted 10-30 minutes.

Phase 2: Data Analysis

Photographs were analyzed quantitatively by recording the picture content of usable photos and qualitatively by selecting 3-5 photos for each child to discuss with a researcher. Foods were categorized as healthy, unhealthy, or mixed following guidelines established by the United States Department of Agriculture's Economic Research Service.¹²⁶ Physical activity photos were also categorized by location (indoor/outdoor) and by activity level (sedentary, moderate, or vigorous activity).¹²⁷ Descriptive statistics (frequencies, means, standard deviations) were calculated from the photograph coding,

demographic questionnaire responses, and body mass index (BMI) (categorized using the CDC growth charts¹²⁵) using SPSS (version 20.0 for Windows, Chicago, IL).

For qualitative analysis, all interviews were audiotaped, transcribed verbatim, and reviewed by two researchers using the open coding method. Researchers independently read through and then coded each transcript. After coding transcripts, the researchers met to compare findings, and identified themes and subthemes common across interviews and photographs.

Data Collection and Analysis: Phase 3

Participants were recruited at afterschool programs in Minneapolis and St. Paul, MN. Children were sampled to include African American or Native American children that were 8- to 13-years-old, and that lived in a low-income household. Focus group methodology was described in Phase 1. Children also completed two gender-specific body image assessment tools. The instruments that were used were the CBIS⁸³⁻⁸⁵ (**Chapter 6, Figure 1**) and the FRS⁸¹ (**Chapter 6, Figure 2**). These scales are used with children and represent a scale with photograph images (CBIS) and another with outlined images (FRS). Previous research has found test-retest reliability with each instrument.^{81,83-85} Each figure was assigned a letter, A through G, and the same letter corresponded to the same figure size on both instruments. Children were asked to circle one silhouette/photo of “the boy/girl that looks the most like you” (perceived body image) and “the boy/girl that you would most like to look like” (ideal body image). Body satisfaction was calculated by subtracting ideal body image from perceived body image. For the purposes of data entry, “A” was coded as 1, “B” was coded as 2, and continued through “G”, coded as 7. To categorize the BMI-for-age category of each figure, the guidelines according to Truby et al⁸³ were used. This states the figures on the CBIS were created to represent the 3rd through 97th% according to the 1997 NCHS percentiles. Each figure was given a specific percentile for body size. The figures were categorized as follows: “A” was “underweight”, “B” through “E” were “healthy weight”, “F” was “overweight”, and “G” was obese. Because, visually, the CBIS and FRS are comparable scales, figures on the FRS were categorized the same way. Heights and weights were also collected from each child using the procedure described previously.

Phase 3: Data Analysis

Focus group analysis was described under Phase 1. Demographic, anthropometric, and body image assessment tool data were analyzed using SPSS (version 20.0 for Windows, SPSS, Chicago, IL). Frequencies, means, standard deviations, and percentages were calculated from the quantitative data. Body dissatisfaction scores were calculated from the absolute value of the difference between ideal and perceived body size.

Data Collection: Phase 4

The survey instrument included demographic and TPB-based questions (**Appendix I**). Questions under each construct pertained to the results from literature review and an elicitation survey (n=19).¹⁴ The content validity and reliability for the survey were tested previously.¹⁴ The questions were written to address the main constructs of the TPB: attitude (behavioral beliefs and outcome expectations), perceived behavioral control (control beliefs), and subjective norm (normative beliefs and motivation to comply). The survey was administered from 2011-2013 to a nationwide sample of members of the AND, and this survey will be referred to as the '2013' survey. Findings from this survey will be compared to the same survey administered to a sample of Minnesotan dietitians in 2002. The survey included scaled variables based on the TPB (attitude, PBC, subjective norm, intention, and behavior) and importance of knowing about issues related to sustainable agriculture. All variables were scored from -3 to +3 with -3 representing the most negative score and +3 representing the most positive score.

Prior to conducting the 2002 survey, a preliminary survey was reviewed for content validity, readability, understandability, and ease of completion by Minnesotan dietitians (n=20).¹⁴ The Cronbach's alpha values for the pilot survey ranged from 0.69 to 0.93.¹⁴ In 2012, a second pilot survey was sent to a different, nationwide sample of dietitians (n=19) to assess the internal reliability and the Cronbach's alpha scores for this pilot were similar to the first (0.67 to 1.0). Additionally, for the 2013 survey (n=626), Cronbach's alpha scores ranged from 0.73 to 0.97.

Phase 4: Data Analysis

Data were analyzed using SPSS (version 21.0 for Windows, SPSS, Chicago, IL). Demographic data were analyzed using means and percentages. Independent t-tests and

Pearson correlations were used to compare selected demographic information to independent and dependent variables based on the TPB. Pearson correlations were used to compare subjective norm, attitude, and PBC to intention; and subjective norm, attitude, PBC, and intention to behavior. Stepwise regression analyses were used to identify the demographic and psychosocial variables that predicted behavior. Demographic data from the 2013 survey were compared to the data from the 2002 survey using independent samples t-tests. Analysis was conducted using scale means for the non-missing data. Statistical significance was set at the p value <0.05 .

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CHAPTER 2:

**A Child's Viewpoint: Determinants of Food Choice and Definition of Health in
Low-Income 8-13 Year Old Children in Urban Minnesota Communities.**

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Summary

Pediatric obesity is a major public health concern. To investigate factors that influence children's dietary habits and beliefs, focus groups were conducted with 8- to 13-year-olds (n = 52) in the Twin Cities, Minnesota. Four major themes emerged: (1) health beliefs, (2) food characteristics, (3) cooking ability, and (4) mealtime practices. These results support incorporating cooking education into children's educational experiences to increase acceptability of healthy foods. Interventions geared toward children should integrate their perspectives, health beliefs, and factors affecting food choice. These data provide support for parents, social programs, and schools to increase their role in promoting children's health.

Key Words: food choice, children's dietary perspective, low-income, qualitative methodology

LITERATURE REVIEW

Pediatric obesity is a major public health concern. The number of overweight or obese children in the United States more than doubled between 1980 and 2010 and the number of overweight or obese adolescents more than tripled.¹ Childhood obesity is concerning because there are many comorbidities associated with obesity, such as high blood pressure, hypercholesterolemia, and diabetes. There are many psychosocial factors correlated with obesity in youth, including depression and low self-esteem.² All of these factors affect immediate and long term health.³⁻⁶

Individuals living in food insecure households are at a disproportionately increased risk for obesity.^{4,6-12} Financial constraints lead to frequent consumption of processed, convenience foods that are high in salt, sugar, and calories.¹³⁻¹⁷ This in combination with inadequate intake of more expensive foods such as whole grains, fruit, vegetables, low-fat dairy, and lean protein contribute to the high prevalence of obesity in this population.^{13,14} Children residing in low-income households, like their parents, are already at high risk of obesity.^{5,6,18,19} and are not meeting dietary recommendations set by the US Department of Agriculture.²⁰ Weight concerns in children are particularly important because research has shown a high percentage of obese children become obese adults.^{7,8}

To address the weight concerns in low-income children, qualitative research to gather information with American children is necessary. Qualitative research is an effective way to involve groups of people in conversation to gain insight into complex issues.²¹ Research on dietary beliefs with children has been conducted in Europe^{22,23} and Australia^{24,25} but may not be applicable to our American population. The limited amount of qualitative research in the United States has been done with Hmong^{4,26} and homeless^{6,7} children and Caucasian, Latino American, and African American adolescents.²⁷ Contento et al, working with an ethnically diverse group of children, found that children ate what tasted good but were concerned about their health.²⁷ Research to gather opinions on health and food beliefs from an ethnically diverse group of children, including the understudied Native American population, who reside in low-income households is limited.

To combat the obesity epidemic, learning about children's current knowledge, beliefs, and perceived solutions is necessary to assist health care providers and educators to create successful interventions. Past interventions with children have had varying levels of success¹³⁻¹⁶ possibly because nutrition education has been too general²⁸ in addition to the lack of knowledge on children's perspectives on health, food choice, and nutrition.²⁸ Contento et al suggested that direct nutrition education is more effective than generalized education.²⁸ Thus, there is a need to explore these factors with children. The purpose of this study was to use qualitative methodology to investigate the factors that influence low-income, ethnically diverse 8- to 13-year-olds' dietary habits and beliefs, including their perceived solutions to childhood obesity.

EXPERIMENTAL METHODS

Eight focus groups of 6–8 children, 8–13 years of age, were moderated by 2 researchers trained in focus group methodology and lasted approximately 75 minutes. Participants were recruited through flyers/outreach at afterschool programs in Twin Cities, Minnesota. Children (n = 52) resided in Supplemental Nutrition Assistance Program (SNAP)-eligible households and were predominately Native American or African American. This study was approved by the University of Minnesota Institutional Review Board. Written informed consent (parent)/assent (child) was obtained and youth received \$10.

Focus group questions examined factors influencing dietary intake. The Social Cognitive Theory (SCT) was used as the framework for forming questions. Questions were then reviewed by SNAP-Ed nutrition educators and dietitians for appropriateness of content. SCT has been successfully used in qualitative research with children.^{29,30} Qualitative research using a construct such as SCT provides valuable information to fill in the gaps left by quantitative data. There are 3 constructs of SCT that are constantly changing, interrelated, and determine behaviors. The constructs include the learned ability of an individual (personal), how an individual responds to achieve a goal (behavioral), and the physical and social factors (environmental) that relate to behavior change.³¹ Sample questions included “How do you decide when you are done eating?” (personal); “What foods do you eat that are good for your body and why?” (behavioral); “Tell us about any mealtime rules at home?” (environmental). Focus groups were

audiotaped, transcribed verbatim, and analyzed independently by 2 researchers. An open coding method was used, discrepancies were reconciled, and the data were analyzed to identify themes occurring across groups.³² Representative quotes are throughout the results and are reported using the children's voice. To avoid altering the children's meaning, the quotes have not been grammatically corrected.

Demographic information was collected and the data were analyzed using the SPSS for Windows Statistical Analysis Software Package Version 20.0 (SPSS Inc., Chicago, IL). Height and weight measurements were taken.³³ Body mass index (BMI) was calculated,³⁴ plotted on the appropriate Centers of Disease Control growth grid, and then categorized into underweight (<5th percentile BMI for age), healthy weight (5th–85th percentile), overweight (85th–95th percentile), or obese (>95th percentile).³⁵

RESULTS

Demographics

Participants (29 boys, 23 girls) were separated by age group (8–10 years and 11–13 years) and sample characteristics are shown in Table 1. This sample size was adequate as saturation was reached.³² Saturation occurs when further data collection provides no further insights.²¹ Native Americans (44%) and African Americans (40%) living in a nontransient household (82.7%) participated. Most caregivers were female (88.5%) and households averaged 4.7 people with 3.2 children (Table 1). Mean BMI for age percentile for African American children was 85% and for Native American children it was 91% (Table 2). Overall, 36.5% were normal weight, 21.2% were overweight, and 42.3% were obese.³⁵

Four major themes emerged through focus group analysis,¹⁷ including (1) health beliefs, (2) food characteristics, (3) cooking ability, and (4) mealtime practices.

Health Beliefs

Subthemes under health beliefs included defining health, social environment, media, and school environment.

Defining Health. Health was defined as an intermingling of dietary practices and physical ability. Health-promoting dietary characteristics included practicing moderation, limiting fast foods, avoiding junk food, drinking water, and consuming fruit and vegetables frequently. The importance of moderation was explained by one child: “You

can be healthy by eating one piece of candy but if you eat candy every day then you are not going to be healthy.” The children said that healthy foods increased strength, improved growth and eye health, increased muscle mass, and protected from illness. Although dietary knowledge was apparent, few had a full understanding. One child explained, “I think meat is good ... Because it gives you protein, even though I have no idea what that is.”

The connection between physical ability and health was well understood. According to children, a healthy person was strong, in shape, exercised, played sports, lived longer, and does “more things and more things faster.” One child summarized health as “Exercising a certain amount of time, make sure you can handle it, and not eating junk food every day because that’s just outrageous.”

Many had misinformed ideas of how to be healthy. For example, children claimed that rice and sugar promoted health, excess body fat is healthy, one must be skinny to be healthy, and not all believed that food and health were connected. Children believed that health encompassed the entire body, which was evident in one child’s description of health as “Wanting your system to grow the right way, you don’t want there to be something in your system that’s messed up.”

Social Environment. Children’s health beliefs were strongly influenced by their parents and culture. Parents taught their children how to be strong, healthy, fit, and limit certain foods to promote health. Generally, children believed their parents wanted them to be healthy; one child stated, “When my mom, she makes this change, she said to go for like how many months or dates, I can’t eat junk food so then she goes to the grocery store and gets these Nutri Grain bars. ... I know my goal is no junk food.”

In contrast, children reported negative parental influence regarding health. For example, physical activity was planned around television shows, children’s weight issues were ignored, they were forced to follow parents’ diet, and they were given dietary misinformation. Children questioned health claims made by their parents; one boy (BMI for age 99th percentile) described, “I told my dad that I’m chubby he said, no you’re not, you’re healthy. I was like ... if I was healthy I’d be skinny.” Another child’s statement demonstrated misinformation, “You have six stomachs ... one is for junk food, one is for

soda, and one is for healthy food.” This child believed that the stomach for junk food was larger than the one for healthy foods.

Cultural factors also influenced children’s view of health. Diabetes complications including loss of body parts and death were discussed in Native American groups. To illustrate this, one Native American boy stated, “Some people get diabetes and they lose some part of their bodies, and some of them don’t take their medicine, and some of them die.” African American children were aware of high blood pressure and sodium concerns. One African American child remarked, “I know what’s not good for me, that’s McDonald’s fries are not good for you; they got too much salt on it.”

Media and School Environment. Media (Internet and television), school, and grocery stores provided children with health information. Children learned about food from commercials and incorporated this information into their health knowledge regardless of understanding or accuracy of the claim. For example, advertisements led one to believe that protein was liquid that will, “Make you want to do stuff ... you don’t just sit in the house and do stuff, it’ll wake you up at the same time.” Another child learned, “Pediasure makes you grow” from a commercial.

The film *SuperSize Me*³⁶ was an educational tool viewed at a couple of schools. Children learned from this film that regular fast food consumption could negatively affect their health. One child stated, “You see if you eat like fast food you don’t want to eat it every single day.” School influenced health beliefs through teaching the food guide pyramid and MyPlate.

Children had many ideas about how to help other children to be healthy. When asked how to help overweight children make changes, one child recommended to “exercise more and eat more healthy food.” In creating any intervention, the 2 most important aspects mentioned by children were to play games and have fun. Specific ideas included team sports, dance classes, a “Biggest Loser” type game, and food tasting games. Children wanted to their parents to exercise with them and keep them accountable to living a healthy lifestyle. Children asked for parents to be given a list of healthy foods and activities “and our parents check them off every day to make sure that we are eating healthy and everything.” Children wanted to learn about basic physiology, including how to build muscles, and how “big people get big,” so that they could avoid getting too big.

Food Characteristics

Subthemes under food characteristics included favorite foods, healthy food barriers, and junk food consumption. Healthy food is defined as nutrient dense food. Junk food is defined as high-calorie food with little nutritional value.

Favorite Foods. Favorite foods included unhealthy foods with the exception of fruit. Examples included bacon, cheese, Hot Cheetos, Takis, tacos, pizza, fried chicken, Indian tacos, ice cream, chocolate, and fruit. All were prepared at home or restaurant such as Old Country Buffet, McDonald's, and Kentucky Fried Chicken. Flavor enhancers were an integral part of favorite foods, including ketchup, parmesan cheese, ranch, sour cream, and a variety of sauces.

Certain characteristics made these foods desirable, including salty or sweet taste and smell, as one stated, "I like the smell of bacon." Creamy, crispy, greasy, and juicy were preferable textures; one girl explained, "What I like about the chicken is ... it's greasy, crispy, tastes delicious." Variety and choice were also important factors; one child described this: "I like it when we go to Subway and get to choose my different toppings." Certain fruits were identified as favorite foods; for example, oranges because, "They are sweet, juicy." Traditional or cultural foods were favorites, such as Indian tacos made with Indian Fry Bread.

Healthy Food Barriers. Children believed that choosing healthy foods was a challenge. They described healthy foods as monotonous and boring, with little or poor taste; as one said, "If you eat it every day you sort of like get sick of it, and you want to try something new, like chocolate." Another child explained, "Because if you eat a healthy food every day, you are gonna get kind of tired of it and then you just kind of pig out on junk food, so you don't wanna eat healthy food every day but you want to eat it once in a while." When given a choice, children chose junk food over healthy food; children were "distracted" by junk food. One boy (BMI 19.2) did not share these challenges; he described healthy eating as "It's easy, all you do it put it in your mouth, chew, and swallow."

Despite their feelings about healthy foods, children verbalized the importance of choosing them. Children identified healthy foods but were unable to explain why food was healthy. For example, a child described fruit as "really healthy for you and cause it's

like, I don't know." Children connected healthy food to their weight and overall health. One boy described this: "Because I don't want to get fat, because it's really easy to get fat but hard to get skinny."

Junk Food Consumption. Children easily identified junk food and discussed regular consumption in each focus group. Junk food was "fake" food that tastes good, was mouthwatering, desirable, greasy, something they "crave," and "has a lot of calories in it, if you eat a lot it'll make you huge." The desirability of junk foods was emphasized: "To me, junk food is like heaven." Examples of junk food included many of their favorite foods, such as Takis, Hot Cheetos, Doritos, pizza, fast food, soda, candy, ice cream, and chocolate. Despite statements about limiting junk foods, children reported eating these on a daily basis.

Multiple barriers to avoiding junk food were listed. If family members or peers were seen with an unhealthy food, the item became more desirable. As described by one child, "If someone brought a treat to school and everyone wanted it and they gave it to you, but they were just kidding, but then you want it really bad." Another child discussed lack of self-control with junk food: "If someone really likes something, like pie, they try to overload themselves on it cause people think that they aren't going to get it again for a long time."

When the children were asked how to help children decrease junk food intake, they had many recommendations. To decrease junk food intake, one child recommended "don't start eating junk food early" and others stated "throwing it away" or "hide them so they [children] don't find them and eat all of them." Children wanted their parents to purchase healthy foods, throw away junk foods, and punish them for eating junk food by "grounding" them. One boy provided his insight into the store's role in decreasing junk food consumption: "Stores should ... have this card saying you can only buy certain foods once a week ... that you have to scan and [if you] are trying to buy extra, they won't let you." Based on the children's report, the responsibility falls on parents and society to limit junk food intake in children, not on the children themselves.

Cooking Ability

Subthemes under cooking ability included role models, cooking education, and diminished gender roles in children.

Role Models. Parents, siblings, chefs, and social programs influenced children's cooking knowledge and ability. In general, parents prepared meals and were present while children were cooking. Some children had limited access to cooking and thus little cooking skill. As stated by one child, "My mom she just doesn't let me touch the stove. ... The only thing we can use to cook is the microwave." In other cases, uninvolved parents increased children's independence in cooking; one child described, "My mom, she doesn't really come downstairs and teach me how to make it, she just usually tells me what do and the box tells me what to do." This independence may promote a sense of pride in children, as shown by one child: "If I want French toast, she [Mom] tells me to make it myself or if I want eggs, she tells me to make it myself or bacon or stuff for myself. I get treated, not spoiled."

Siblings acted as role models and were often more involved in cooking education than parents. One child learned to cook from her brother: "My brother, he taught me how to make eggs, and then he taught me how to make some noodles in the microwave because I don't know how to make them on the stove." Further, children perpetuated cooking knowledge by cooking for younger siblings; one child remarked, "I already know how to cook, 'cause when my mom and dad are sleeping, me and my sisters all try to get up early and then I'll cook for them."

Role models outside of the home included chefs, specifically in a restaurant environment, and mentors from social programs. Children ate food outside of the household often and learned about ingredients in this setting; as one girl stated, "I like the shrimp fried rice or the white rice and shrimp sauce with extra teriyaki sauce on my steak and I like the spider roll which is the crab that goes around with the rice and then I like the sushi, the California roll with the sprinkles." Mentors from the Big Brother, Big Sister program also modeled cooking skills; one child said, "I learn from my big sister, because I'm in the Big Sister, Big Brother program and so I went to her house and ... we made homemade pizza and we had to went to the grocery store and get all the stuff and we made a pizza."

Cooking Education. Children learned cooking by observation and experimentation. When children were alone at home, hungry, and did not have someone else to prepare a meal for them, their own cooking ability determined their food. Individual cooking skill

varied from simple, convenience foods such as eggs, ramen, or cereal to moderate skill such as baked goods, chicken, and hamburgers.

Children reported learning to cook through observation of a parent, mentor from a social program, cooking class, or restaurant. Observational learning was an enjoyable experience; one girl described, “I remember one restaurant ... my mom and my dad went there ... and instead of making the pizza, for kids, they will just bring you the ... dough. They bring you the stuff you want and will have you put the stuff on there and they will come back and take it.”

Experimentation with different ingredients, recipes, or cooking skills, with little or no direction from an adult, was also discussed. To illustrate this, one child quipped, “Well I mainly learn from myself. ... Well I learn from my mistakes. I guess what to make and I do it then. ... I know how long and how to make it better.” Through these methods, children were able to expand their food preparation ability and dietary intake.

Gender Roles Are Diminished in Children. Gender did not dictate cooking ability or interest among children. Both boys and girls reported basic cooking knowledge and ability. Only one child had no cooking knowledge. Though some had both male and female role models, indicated by “Me, my mom, my dad, my little brother, my two older brothers, and [my sister].” Most had predominantly female role models who were in charge of food preparation. This extended outside the nuclear family, with grandmother, mother, aunt, and sister discussed. If a female was not available, children often prepared a meal for themselves or their family. As one boy stated, “Tonight I’m probably going to have to cook dinner ’cause my mom’s not home. My dad never cooks.” Few children reported a male preparing food at home and, if so, a woman was also involved.

Children wanted more cooking education. Both boys and girls were interested in cooking and requesting cooking education to be included in an intervention. Children wanted to learn basic cooking skills and were especially interested to learn how to make healthy snacks to bring to school. Children were also interested in making healthy snacks at home such as smoothies.

Mealtime Practices

Subthemes under mealtime practices included dining environment, mealtime rules, and fullness cues.

Dining Environment. Family dinners were reported as both social and solo experiences. Many children were involved in dinner preparation and service, but meals were eaten in the kitchen, living room, bedroom, on the couch, or in front of the TV, sometimes with family or by themselves. Frequency of meals consumed with others varied from never to every night; “some” nights was most frequent; as one child stated, “Sometimes we eat and watch TV and sometimes we don’t; we sit at the table.” Another child reported eating “at the family table at birthdays and a couple of holidays.” Whether in a dining room, living room, or bedroom, TV was often part of the meal. “When we have dinner at my house, we all sit in the living room or in any room, just watch TV,” explained one child.

Mealtime Rules. Mealtime rules centered on cleanliness (washing hands or dishes), politeness (avoid talking when others are, don’t talk with a full mouth or reach over other’s plates), and food intake. Some rules alluded to food insecurity; one girl explained, “If you ate ... before we had dinner and you only eat not even a whole entire portion or a very little portion, then my Mom is going to say at least one more bite when we all eat together. She doesn’t want to throw away the food or anything.” Child responsibility at home was common; as one child described, “My mom, she doesn’t do the dishes, but I be a big help or I will do the dishes myself.” Responsibility was important in some households to earn a meal; one boy discussed, “We have to work to get our food. Now, if you don’t finish your room in about 20 minutes, you don’t get no food.”

Fullness Cues. Because overweight and obesity are common among this population, children were asked to describe how they determined fullness. Children identified fullness as a feeling beyond satiety. Fullness was described as a “weird” feeling in their stomach, soreness, or feeling that they had enough. Some tried to avoid feeling soreness by stopping before reaching that point.

When asked about buffets, children frequently visited popular establishments. When asked about portion size, one child stated, “I’ll eat until like I feel full, but then when I feel full I just go back for more.” Food insecurity was indicated and some ate beyond full; as one child reflected, “When I haven’t eaten anything at all, I just try to eat as much as I can. I just try to get my energy.” Furthermore, some families expected children to eat all food on their plate.

Children discussed multiple factors that influenced their dietary intake at mealtime; however, few had recommendations on how to increase healthy food intake. The most important aspect of meals that children were interested in learning about was how to cook. Children did not connect overeating at buffets to their overall weight or health, indicating a gap in understanding how food affects their health.

DISCUSSION

This qualitative study illustrates the complex factors that affect dietary practices of low-income children, and their viewpoints provide insight into unhealthy behaviors that can lead to obesity. Importantly, in order to understand health, the children in our study consolidated information from social, school, and media environments, regardless of accuracy. Other notable findings from this research included (1) children found junk foods most desirable, and healthy foods, with the exception of fruit, lacked flavor and variety; (2) children enjoyed cooking, and role models were important to them because they helped them improve their cooking skills; (3) female family members primarily taught children to cook; however, these gender roles were not defined in children; and (4) children watched television frequently during mealtimes. Preference for junk food over healthy foods and intake of these foods, along with television watching during mealtimes, may contribute to childhood obesity^{12,37} and explain, in part, the cause of high rates of childhood obesity in this low-income, diverse population.

Eating Behaviors Are Connected to Obesity

The results from this qualitative study show that children living in low-income households have inaccurate and incomplete health knowledge that may contribute to unhealthy dietary practices, leading to high weight gain and obesity. Other research with this demographic has demonstrated similar knowledge gaps in adults, including poor understanding and adherence to dietary recommendations.³⁸ Dammann and Smith found a disconnect between dietary practices and health in a diverse group of low-income women.²⁹ Research has found that adults feel that children should receive health education in school.³⁹ However, children gathered information from multiple sources, including their parents, school, and the media, and are confused by the inconsistent messaging they receive. Based on the children's report, they form health beliefs early in

life and if misconceptions are not corrected, children may perpetuate a continuous cycle of misinformation to their siblings and peers.

The most striking misconception discussed by children in this study was their parents' inability to identify weight issues in their children. The children were better able to identify their own weight concerns than their parents but were given mixed information when their parent disputed any concerns the child had about their weight. However, most children in this study also did not have a realistic view of their weight. Dammann et al found that a group of diverse low-income mothers significantly underestimated their children's height and weight; this was especially true in mothers of overweight children.⁷ Burnet et al suggested children determined overweight by appearance, whereas parents defined weight concerns based on ability.⁴⁰ Other research with African Americans found that parents believed that overweight is related to genetics and cannot be altered by lifestyle.³⁸ Children in the current study also reported a lack of understanding of basic physiology; this may contribute to the disconnect between diet and body size. The inability of parents and children to recognize weight concerns is a major barrier to decreasing obesity rates.

Despite children's lack of awareness of weight concerns, most were aware of cultural health concerns. Specifically, type 2 diabetes was discussed by Native American children and sodium restrictions were noted by African American children. Previous research with Native American and Hmong youth have also shown cultural specific disease knowledge.^{41,42,43} However, obesity was not identified as a concern by this group of children, although 63.5% in our study were overweight or obese. Americanized diets have been recognized as one culprit in the decreased intake of traditional foods in minority groups¹⁸ and increased reliance on convenience foods.⁴⁴ Native American and African American children in this study reported high-fat diets, commonly including convenience foods. These results display the lack obesity awareness, and this barrier needs to be overcome in organizing an effective intervention. Health care providers and public health programs must build obesity awareness before conducting an intervention in this population.

Cooking Knowledge Can Improve Healthy Food Acceptance

Children identified multiple barriers to healthy eating, including boring, monotonous choices and poor taste. Previous quantitative research suggested that taste has the most direct relationship to food choice and is a learned preference determined early in childhood.^{45,46} Another major predictor of fruit and vegetable consumption was food preference, which, like taste, is determined at a young age.^{47,48} In the current study, children chose junk foods because of texture and variety and because they allow children to make a personal choice. Because these characteristics are desirable to children, improving the flavor, variety, and cultural appropriateness of healthy foods is necessary to increase consumption. Most important, increasing the acceptability and intake of healthy foods would have a positive impact on children's dietary intake.

Another challenge in creating an intervention geared toward children is that parents control their food options; thus, parental food preferences must also be considered. Adults have identified many barriers to choosing healthy foods, including cost,²⁹ limited knowledge of dietary recommendations,^{50,51} low availability of culturally specific foods,⁵² and lack of cultural appropriateness.^{48,50} The current research provides insight into the dietary habits of a group of low-income, diverse children and should be incorporated in creating education programs geared toward children to initiate dietary changes.

In order to increase acceptability of healthy foods, cooking education is essential, and children were interested in expanding their current cooking knowledge. Every child in this study expressed interest in cooking and most were interested in learning to prepare healthy foods. Unfortunately, current cooking education resources are limited to their parents' cooking ability, skill, and interest, with very little outside influence. Our findings support an expansion of cooking education for children by creating school and community gardens and involving local chefs to demonstrate how to make vegetables tasty. Cooking ability has been associated with decreased fast food and fat consumption and an increase in fruit, vegetable, calcium, and whole grain intake.⁵³ Experiential learning has been successful in changing dietary habits. Previous research on community gardens has shown they resulted in increased fruit and vegetable acceptability and intake in women and children.^{54,55} Incorporating healthy foods in children's cooking repertoire,

adding fruit to cakes, and teaching children to cook with spices (curries and stir fries) were all ideas children offered to make healthy foods more appealing. Creating healthy, culturally appropriate foods is also important. To further highlight the importance of cooking education, cooking during childhood increases cooking frequency in adulthood.⁵⁶ Findings from this study showed that both boys and girls were interested in cooking. To increase the acceptability and intake of healthy foods in children, and therefore decrease obesity rates, cooking education during childhood is essential.

In order to decrease junk food consumption, children's perceived solution relied on parental involvement to determine what food options were available at home. Children had many ideas on how to decrease junk food intake, and most of these ideas relied on external factors such as parents or stores. They viewed parents as the gatekeepers to food at home and, therefore, were responsible for the amount of junk food the child consumed. The children also stated that stores were responsible to limit the amount of junk food people can purchase. Based on these results, in order to change children's eating habits, parents must be involved.

Social Environment

Any childhood obesity initiative would be incomplete without addressing social factors that influence food consumption, and this cannot be done without qualitative research into children's perspectives. In our study, mealtimes were a common social event with family but did not necessarily have a positive influence on children's diets. Previous research on mealtimes demonstrated that family meals can positively impact diet by improving healthy food consumption, including fruits, vegetables, and whole grains,⁵⁷ but must focus on healthy foods in order to change the diet. Mealtimes, in themselves, do not have this a positive impact.⁵⁸ Research by Story et al that found convenience foods are often consumed at mealtime in low-income households because of lack of cooking knowledge and increased hunger.⁵⁹ Junk food was commonly listed as a favorite food and was consumed daily among children in the current study. This finding is of great importance because high-calorie, low-nutrient-dense foods contribute to the increase in obesity rates⁶⁰ and the frequency of consumption in low-income children needs to change in order to decrease child obesity rates.

Also in this study, children reported regularly consuming family meals in front of the television. Previous research has shown that this sort of distracted eating increases overall food consumption⁶¹⁻⁶³ of unhealthy foods, including pizza, salty snacks, and soda, and decreases fruit and vegetable consumption⁶⁴ and satiety awareness.⁶⁵ Television, low socioeconomic status, and frequent fast food intake have a similar effect on diet quality.⁶⁶ The high frequency of television watching at mealtimes reported in this study, combined with the low nutrient values of foods when watching television, both contribute to the high obesity rates in low-income children.

In addition to television viewing, mealtime rules and food insecurity can affect satiety awareness. Mealtime rules reported in this study centered on chores that can teach responsibility, appropriate manners, and cleanliness. Conversely, children reported mealtime rules that required them to “clean their plate,” encouraging them to ignore internal hunger cues. Pressure to eat all food is common in low-income households, specifically low-income Native American households,⁶⁷ with low food availability where wasting food is unacceptable.⁶⁶ Food was offered as a reward and withheld as punishment. Many factors affect hunger and satiety cues, and altering these cues can have lifelong detrimental effects on BMI.⁶⁸ All of these factors decrease children’s ability to follow their satiety cues and lead to overeating.

Finally, the children reported that social programs were an integral part of social environment. Programs such as the YMCA, Boys and Girls Club, Big Brother and Big Sister, and Boulder Options were mentioned and focus primarily on physical activity. Meals and snacks are often offered at these programs and provide opportunities to improve nutrition and increase awareness or knowledge of foods. The majority of children involved in these programs are from low-income households and at increased risk for obesity; therefore, including nutrition, cooking, and chef cooking workshops may be beneficial. There has not been any research to our knowledge on the ability of these programs to promote a healthy diet in low-income children, although the children in our study placed great importance on the opportunities provided at these programs. Social programs are an ideal venue to use influence childhood obesity rates by providing active, fun, and competitive educational events centered on health.

CONCLUSION

This research builds on the limited body of knowledge about factors that determine children's food choices. Children defined health based on peer, family, media, and restaurant influences and included many misconceptions. Cooking education for children is needed and should focus on increasing flavor and taste of healthy foods. These skills could transfer to the child's home and improve the healthiness of family meals. The solutions the children provided to decrease childhood obesity rates included creating fun interventions that incorporate games. Parents should be involved in regular physical activity with their children and are responsible for limiting junk food available at home. Finally, children want to learn how to cook healthy food that is tasty. Incorporating spices and flavors from a variety of cultures might be a way to increase their interest in healthy foods. Children's health beliefs, factors affecting their food choices, and their recommendations for obesity intervention programs were identified and should be incorporated into childhood obesity interventions to decrease childhood obesity rates in the United States.

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Table 1. Demographics of Focus Group Participants: SNAP-Eligible Households With a Child Between 8 and 13 Years of Age, Minnesota^a

Characteristic	<i>n</i>	%	SD
Age child (years)	52	10.4	1.3
Age Caregiver (years)	42	41.4	11.7
Household Size	52	4.7	1.8
Children in Household	48	3.2	1.7
Grade Level of Child	52	4.6	1.6
	<i>n</i>	%	
Gender of child			
Boy	29	55.8	
Girl	23	44.2	
Race/Ethnicity of child			
African American	20	38.5	
Native American	24	44.2	
Asian	6	11.5	
Caucasian	1	1.9	
Other ^b	1	1.9	
Gender of caregiver ^c			
Male	4	7.7	
Female	46	88.5	
Race/Ethnicity of caregiver ^d			
African American	18	34.65	
Native American	19	36.5	
Asian	6	11.5	
Caucasian	3	5.8	
Living Situation ^d			
Non-transient (home based)	43	82.7	
Transient (shelter based)	3	8.5	

^aSNAP indicated Supplemental Nutrition Program.

^bCaucasian = 1, Mixed Race = 1.

^c n = 50

^d n = 46

Table 2. Participants' Body Mass Index for Age Percentile

Weight Category	<i>n</i>	%		
Underweight	0	0		
Normal weight	19	36.5		
Overweight	11	21.2		
Obese	22	42.3		
Average BMI				
for age	<i>n</i>	Mean	SD	Range
African American	20	82.0	17.3	48.9–99.2
Native American	24	91.3	12.7	49.9–99.5
Asian	6	67.6	7.5	57.7–75.7

Table 3. Key Findings and Supplemental Quotes^a

Key findings	<ol style="list-style-type: none"> 1. Children are interested in furthering their cooking skills, and cooking education could be included in intervention programs to teach children to increase the flavor and texture of healthy foods to make them more desirable. 2. Parental involvement is important because children look up to parents and depend on them to provide accurate information. 3. Children rely on their parents to limit their consumption of unhealthy, junk foods and provide feedback regarding weight issues. 4. Social programs are the ideal venue to influence childhood obesity rates by providing fun, active, and competitive educational activities to teach children about health.
Supplemental quotes by theme	
<ol style="list-style-type: none"> 1. Health beliefs <ol style="list-style-type: none"> a. Defining health b. Social environment c. Media and school environment 	<ol style="list-style-type: none"> a. “Good health means it means to me that you keeping yourself in shape.” (FG #1) b. “Sometimes we [my family and I] sleep, watch a lot of TV or do homework or go to our cousins’ house and play and barbecue family things.” (FG #7) c. [When asked where the child learned about food] “Dr. Oz.” (FG #3)
<ol style="list-style-type: none"> 2. Food characteristics <ol style="list-style-type: none"> a. Favorite foods b. Healthy food barriers c. Junk food consumption 	<ol style="list-style-type: none"> a. “My favorite food is kind of everything. I like spaghetti because I like it because it’s good.” (FG #4) b. “[McDonald’s] makes us fat because there is like grease inside of the hamburger, they gave us junk food. And then I think they make the food taste good because there’s grease in it.” (FG #3) c. “It depends on what kind of chips it is, ’cause like some chips, potato chips, are baked, those are better than regular ones.” (FG #6)
<ol style="list-style-type: none"> 3. Cooking ability <ol style="list-style-type: none"> a. Role models b. Cooking education 	<ol style="list-style-type: none"> a. “My dad, he cooks ... I love when he cooks because usually he cooks this dish called chicken parmesan, it’s like ... all big pieces of chicken with tomato sauce and, um, parmesan and cheese.” (FG #8) b. “[Describing tacos] They got cheese in there, they got lettuce in there, they got meat in there.” (FG #7)

c. Diminished gender roles in children	c. "I just learn [to cook] from my mom." (FG #8)
4. Mealtime practices a. Dining environment b. Mealtime rules c. Fullness cues	a. "We eat together in the living room and we watch the episodes of this show called <i>Vampire Diaries</i> ." (FG #6) b. "If we are having lunch, like we having chicken or burgers for lunch, so she [Mom] has a box and you have to put a check mark if you want it." (FG #5) c. "Like when you are full [is] when you think you had enough." (FG #2)

^aFG indicates focus group.

CHAPTER 3:
Physical Activity Beliefs and Influences from Inner City, Low-Income Children's
Perspectives: A Qualitative Study

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Summary

Low-income children are at increased risk for obesity and have low levels of physical activity. The objective of this study was to use qualitative methodology to understand low-income, urban children's beliefs about physical activity. Children (n=52) who were 8-12 years old, lived in an urban, low-income household participated in eight focus groups. Children were predominantly Native American or African American. Focus group questions were based on the Social Cognitive Theory. Open coding methods were used for focus group analysis. Three major themes were identified: (a) community programs and school impact physical activity, (b) physical environment effects activity level, and (c) social factors influence physical activity. Changes at the policy level should be considered to improve accessibility to safe venues for physical activity, such as recreation centers and community programs.

Key words: Climate, Social environment, Community programs, Neighborhood safety

LITERATURE REVIEW

The rapid rise in childhood obesity rates has drawn attention to the importance of physical activity.¹ Since 1980, child and adolescent obesity rates have drastically increased in the United States with current obesity rates at 18%.² Childhood obesity has become a public health concern because of comorbidities related to obesity; such as diabetes, high blood pressure, and cardiovascular disease²⁻⁴ and an increased risk of adverse health concerns in adulthood.⁵ Furthermore, obesity rates are highest among minority children⁶ who are already at risk for hypertension and diabetes.²⁻⁴

The health benefits of physical activity are numerous. Research has shown activity decreases the risk of developing many chronic diseases, including heart disease, type 2 diabetes, cancer, obesity, and hypertension.⁸ For children, decreased body fat and improvement in bone strength have been shown to be benefits of activity.⁹ However, only a small percentage of children meet the recommended 60 minutes of physical activity per day^{10,11} established by the World Health Organization and Centers for Disease Control (CDC).^{12,13} Minority ethnic groups living in low-income households have the lowest levels of physical activity.^{1,14,15} Limited physical activity in this population may explain part of the increased rates of overweight and obesity.^{3,10,16-19} While evidence of effective physical activity interventions in children and adolescents is limited, those targeting low-income groups have been least effective.²⁰

To overcome these challenges, it is important to learn about children's opinions and beliefs about physical activity. A review of the literature identified qualitative investigations of physical activity from parental perspectives²¹ and children living outside of the United States.²² Stankov et al.²³ identified that there is a need for qualitative research looking at the perspectives of multiethnic children of various socioeconomic statuses on physical activity. Therefore, the purpose of this study was to use qualitative methodology to gather information about internal and external factors affecting physical activity habits, attitudes, and beliefs from children residing in low-income households. This information will provide further insight into low-income, multiethnic children's viewpoints that can be incorporated into intervention programs to effectively promote physical activity and decrease obesity rates.

EXPERIMENTAL METHODS

Children were recruited through flyers and outreach at community programs in Midwest America. Researchers coordinated with staff at local after school programs and staff assisted in recruitment by posting flyers at their location and discussing the project with parents/caregivers of children who were interested. To participate in this study, the child needed to be between 8- to 13-years of age and live in low-income household. Low-income was defined as receiving benefits from the Supplemental Nutrition Assistance Program (SNAP). SNAP is a federally funded program that provides education and food money to families that are at or below 130% of the poverty line.²⁴ We determined a family was low-income by asking the parent or primary caregiver to indicate on a questionnaire if they received SNAP benefits. We also used this questionnaire to collect basic demographic data from the child's parent or primary caregiver. Children and parents gave informed assent or consent. The University Institutional Review Board approved this study.

Height and weight were measured using standard procedures²⁵ and used to calculate body mass index (BMI). Children were categorized as underweight (<5th% BMI-for-age), healthy (5-85th %), overweight (85-95th %), or obese (>95th %) using the corresponding CDC growth charts.^{26,27} SPSS for Windows statistical software package version 20.0 (SPSS Inc., Chicago, IL, USA) was used for quantitative data analysis.

Qualitative methodology is an effective way to engage groups of people in a conversation about topics in which there are gaps in the literature.²⁸ Qualitative methodology was used to conduct eight focus groups with six to eight children in each group. Groups were separated by age group (8-10 year olds, 11-13year olds) and lasted approximately 75 minutes. Focus group questions were formed based on Bandura's Social Cognitive Theory (SCT) to investigate physical activity habits of children.²⁹ SCT has been used as the theoretical framework for research on diet and physical activity habits with children.^{18,20} This framework was selected for this project because of the focus on individual cognitions and perceptions shaping individual behavior. Personal, behavioral, and environmental factors of SCT were chosen to investigate the extent internal or external factors have on children's physical activity habits. The following are sample questions based on constructs of the theory: 'Why do you think people exercise?'

(personal), ‘How often are you active with your family and what kinds of activities do you do with them?’ (behavioral), ‘Describe your activities in winter versus summer?’ (environmental). Prompts and probes were used to gather further information from the children. Focus group questions were reviewed for content and appropriateness by SNAP Nutrition Educators and two registered dietitians.

Focus groups were co-moderated by two researchers and both have been trained in focus group methodology. Neither researcher had worked previously with the participants. Field notes were taken by one of the researchers during each focus group. Each group was audio recorded using two digital recorders and recordings were transcribed verbatim. Focus group transcripts were independently analyzed by the same two researchers that conducted the focus groups using open coding methods.²⁸ After each focus group was coded, the researchers met to discuss coding and reconcile discrepancies. Major and minor themes emerged from the data and representative quotes were identified. Focus groups were analyzed after each group was conducted and analysis occurred simultaneous to data collection. This allowed researchers to determine when the saturation point was achieved and, thus, determine the sample size (n=52) was adequate.. Saturation occurs when further data collection does not provide new knowledge.²⁸

RESULTS

Demographics

Fifty-two children, 29 boys and 23 girls, with a mean age of 10.4 ± 1.3 years participated in the study. Children were primarily Native American (44.2%) or African American (38.5%). The majority of children lived in a non-transient household; mean household size was 4.7 ± 1.8 people with 3.2 ± 1.7 children (Table 1). Anthropometric characteristics for the sample were: 36.5% normal weight, 21.2% overweight, and 42.3% obese, thus 63.5% of the sample were overweight or obese. BMI-for-age data by gender and race/ethnicity are represented in Table 2. As can be seen from the table, the mean BMI-for-age for African American boys and Native American girls was overweight and the mean BMI-for-age for Native American boys was obese. Also, BMI-for-age for the Asian children was within the normal range. We believe that this information is important because it shows that overweight and obesity is common in African American

boys and Native American boys and girls and supports the need for obesity interventions with these children. Also, we found no differences in discussion among the children based on BMI.

Three major themes emerged across focus groups (Table 3): (a) community programs and school impact physical activity, (b) physical environment effects activity level, and (c) social factors influence physical activity.

Community programs and schools impact physical activity

Two subthemes were identified under this theme, (a) community programs, and (b) school environment.

Community Programs. Community programs provided opportunities for children to be physically active. The community programs discussed in focus groups included YMCA, Boys and Girls Clubs, Boulder Options, Big Brother and Big Sister Program, and programs at local parks and pools. Children engaged in numerous activities offered by these programs, including, team sports (basketball, football, baseball), Zumba classes, kickball, and swimming. One girl expressed, “I’m active here at the Boys and Girls Club. There’s a thing called Zumba...[The Boys and Girls club] had someone come here, paid someone to come here and get everyone ready to do Zumba and to dance.” A boy discussed the camaraderie he has with his Boys and Girls Club football team, “I get to see all my old friends on my football team. We’re kind of like a brotherhood in one place.” These programs appeared to be very important to the children because they are an outlet for pent up energy and they provide an avenue for socializing.

School Environment. The school environment also provided opportunities for physical activity (gym classes, recess) and placed importance on physical health through presidential fitness awards. Schools gave the opportunity to learn new activities and create new games, a girl described her school gym class as, “there are games ... and everyone has their own time to go outside of the school [to play]. And then, outside, or at recess, we make up games.” Frequency of physical activity was strongly determined by access to community programs and opportunities provided in schools. One child played basketball “only three days” per week because the “regular park isn’t open”; therefore his only opportunity to play was at an after school program or school.

Physical environment effects physical activity level

Subthemes identified relating to physical environment included (a) seasonal factors and (b) lack of safety in the environment.

Seasonal factors. The majority of children reported they were limited by weather constraints. The children resided in Minnesota and cold temperatures, snow, and ice that characterize the winter months make outside activities unsafe. “You slip outside and bust yourself” declared one child. Playing in the snow can also be physically difficult; one girl explained her frustration, “you want to play tag and it’s all full of snow and they tag you and you can’t run in the snow.” These obstacles led to an increase in sedentary behaviors (watching TV, movies, sitting inside, eating) during winter. One child depicted winter as, “[I’m] always outside in the summer, but in the winter I’m always inside underneath the heat or going to sleep.” Active behaviors were limited to sledding and snowball fights. Children connected weight gain with the seasonal lack of activity. One child reported, “Yeah, I just sit on the couch... A couch potato”.

To contrast the barriers of winter, summer was discussed as a “relaxing” time when they “get to go outside”. Activities reported included biking, swimming, and going to the beach, cabins, and parks. Team sports were also cyclical based on seasonality. Children described their summer activity as, “instead of staying in the house all the time, we can go outside and play with our friends” and “my favorite thing to do is to go outside and run around when it gets warmer.” However, the seasonal changes, especially the heat, made adjusting to the weather difficult for some, “it’s like hot and then it’s like hard because you’re used to the winter and then it’s summer.”

Lack of safety in the environment. All children resided in urban, low-income households and reported lack of safety and the urban environment were barriers to activity. Some children discussed the ‘hard ground’ and ‘hard grass’ common in urban areas as a challenge to activity. Another child stated her mother wouldn’t let her go outside because ‘it wasn’t safe’. Children described their favorite activities in relation to safety in neighborhoods; one boy reported his favorite activity as running because, “it keeps me active in case...I’m trying to run away from something.”

Social factors influence physical activity

Subthemes under social factors influence physical activity included (a) family/peer influence and (c) gender influence.

Family/peer influence. Family members played an integral role in shaping children's activity habits. Parents and caregivers promoted activities such as team sports (basketball and football) and walking the dog. Walking was common family activity and was discussed in relation to socioeconomic status, "[I] walk with my parents ... we will walk like a mile to my cousin's house without a car because we... don't want to waste the gas." Some parents were not a model of activity themselves but encouraged their children to be active. One boy stated, "I have the Nike+ Trainer... my mom made me get it because when I get older, she wants me to run a marathon."

Although family activity was reported, most behaviors were sedentary (eating, watching television or movies). One girl described family activity as, "sometimes we sleep, watch a lot of TV, or do homework." Other parents were uninvolved in children's activities; a girl quipped, "She [my mom] don't like to do that stuff, she's not into rides and stuff like that, like what we do, she like thinks she's like too grown up for... kid stuff." Overall, parents encouraged children to be active, but modelled low-intensity activity (walking) and sedentary activities.

Children reported their peers increased their enjoyment of physical activity. One girl described her enjoyment of kickball as, "it's like baseball and trying to steal, and laughing, and with friends." Biking was described as a social or solo activity that allowed children "freedom". Peers encouraged skill development and competition. One child expressed the importance of athletic proficiency to "get muscles so then I can play basketball and get better." A concern with peer influence is the misinformation shared between children. A few children believed physical activity determined height, thus a physically active person was taller, "some of them [children] run around, that's because they can get taller and the short ones just sit on the couch and eat."

Gender influence. Gender was an important factor in determining the activities children engaged in. Boys were taught muscle building activities, including weight lifting, by their older siblings. One boy described his brother teaching him to lift weights, "he wanted to see how long I could keep going up and I kept doing it until my arm got sore."

Aggression was discussed by boys; one boy described his most enjoyable aspects of basketball as, “I get to break they [opponents] ankles, injure them.

A racial and gender component was seen in the types of activity children engaged in. Specifically, African American and Native American boys and African American girls reported team sports, dancing, gymnastics, hip hop, and step as frequent forms of activity. In contrast, Native American girls reported sedentary and solo activities, including reading, math, drawing, and singing. Native American children also reported learning cultural dances and songs and regularly engaged in powwows.

DISCUSSION

The purpose of this study was to explore physical activity beliefs and influencing factors from the perspectives of low-income, urban dwelling children. Community programs and schools are important avenues for physical activity and consistent activity is contingent upon availability of these programs. Because of barriers related to seasonal changes in winter and the low-income, urban environment, these programs are of utmost importance to continue to keep kids active in a safe environment year-round. Within their home environment, children are influenced by family practices, media exposure, and gender. Children enjoyed active play and described solo activities (biking and swimming) and team sports (baseball, basketball, and football). The children in this study experience a combination of challenges to physical activity that are related to urban environment, weather constraints, and cultural norms. These challenges are noteworthy because they highlight the need for physical activity interventions to be tailored to children’s social and physical environments.

Importance of community programs and schools

Children in the present study reported community programs were necessary for them to be physically active. The Boys and Girls Clubs of Minnesota was the main source of play for many children in our study and most attended at least twice per week, although many went more frequently. Clubs are located in schools, youth centers, public housing associations, and on Native American reservations and rely on federal, state, and private sector support to run the program.³⁰ These programs are available to low socioeconomic status children and provide opportunities for organized sports, such as

baseball, basketball, football, golf, and educational programs about health and physical activity.

Limited research has been conducted on the influence social programs have on the activity level of a multiethnic group of children living in low-income households, as was found in our study. The majority of literature on community programs has focused on prevention of violence and destructive behaviors.³⁰ Results from the present study indicate these children rely greatly on community programs for physical activity. Research has shown that children with little or no access to a recreational facility displayed lower levels of activity.³¹ Children with access to a facility were twice as likely to engage in after school activity³², and had decreased rates of overweight and obesity.³³ Our research and that by Tucker et al.³³ and Singh, Siapush, and Kogan³⁴ suggest that providing opportunity and place for activity may be the key to fighting obesity among low-income children.

Children also reported school as a major factor influencing their activity level. This is consistent with research by Franzini et al.³⁵ who found schools, team sports, and gym classes provide safe areas for activity. This is another area lacking in research but of great importance because physical activity classes in schools worldwide are decreasing.³⁶ Despite these institutional changes, children in our groups stated many of their favorite activities occurred at school and school provided one of their main outlets for activity. Interestingly, physical education teachers were seen as a role model by only one child in our study, indicating that recess or other non-classroom activity influenced children's activity levels most. One of the few studies on physical activity in school found a significant increase in activity because indoor activity extended seasonal activities to year-round.³⁷ Providing opportunities for activity are important to avoid excess weight gain in children and community programs and schools break down the seasonal and financial barriers to physical activity for children in the present study.

Physical environment

The weather had a significant impact the children's activity patterns. Previous research has shown that children with access to recreation centers through community programs or gyms in school and access to outdoors are more active.³⁸ Based on our results, winter produced many challenges to outdoor play and; therefore, was a time of

inactivity and boredom. Winter has been associated with decreased activity in children in other parts of the world.^{39,40} Hjorth et al.³⁹ investigated physical activity levels in autumn, winter, and spring in a sample of 8- to 11-year-old Danish children and found that children spent 23% less time engaging in moderate to vigorous activity in the winter than in the spring. Minnesota and Denmark are two examples of locations that experience winter, but these are not isolated areas. A large percent of the population live in regions where extreme weather, hot or cold, is common and can limit activity.^{39,40} With 63.5% of our sample overweight or obese, inactivity is of concern because research associates low levels of daily activity with overweight/obesity.⁴¹

Neighborhood safety and the concrete environment common in urban areas were also barriers to physical activity for children in the current study. Children's perception of neighborhood safety can determine their activity level. To create a successful strategy to decrease childhood obesity rates, inner cities should include more green space, such as parks and community gardens that will encourage play. Further, neighborhood involvement against crime is needed to provide safe neighborhoods and thus provide safe play areas and decrease obesity rates long term.

Role of Family

This study found that children based their physical activity practices on the actions of their parents and siblings. These factors had both negative and positive influences on children's physical activity. Previous research has found parental involvement in activity increased the activity level of the child; however, family involvement in activity can vary greatly.⁴² The present study found children enjoyed family activity, but lack of parental interest in child-like activities and focus on sedentary activities decreased active behavior for children. Television viewing was common; parents have reported that television watching in Native American, urban households was considered a safe activity that gave parents a break from childcare.¹⁰ The perception of television as a safe activity makes families unlikely to limit television viewing within their households and high incidence of television viewing has been associated with increased BMI and obesity.¹⁰ High BMI was seen in the current study with 63.5% of children overweight or obese with most children saying that watching television was their most common family activity.

Gender influence

Although many interventions aimed at children's health do not differentiate activities based on gender or ethnicity, the current study suggests this may be appropriate. In this study, the majority of Native American girls engaged in fewer physical activities than any other group. This may be partially explained by creative activities being characteristic of women in Native culture.⁴³ Also, research has shown boys display a higher level of vigorous activity than girls.⁴⁴ This may be related to fewer girls enrolled in organized sports and a higher level of social acceptance and enjoyment of vigorous activity for boys than girls.⁴⁵ Additionally, the socialization of children by teaching girls to be mothers and boys to hunt⁴³ may impact physical activity practices. Based on our findings related to gender and ethnic differences in activity, diverse strategies are needed to promote physical activity. Cultural identities of children must be considered when designing interventions to assure that they are culturally appropriate.

Limitations

Research with children can be challenging, but every effort was made to minimize potential problems. Researchers conducted groups in a familiar and comfortable setting for the children. While the sample size in this study was relatively small, it was more than adequate for qualitative data and we achieved saturation point, thus indicating adequate sample size.²⁸ Additionally, this sample targeted low-income, urban children and data may not be generalizable to other groups of children, however these data may be useful to consider when designing interventions that target children.

CONCLUSION

The information gained from this study further the body of knowledge on low-income children's physical activity habits and provide information to create effective interventions and ideas for communities to increase support of physical activity for this population. Schools and community programs are imperative to providing physical activity opportunities in low-income, urban youth. Our research found that seasonal factors influence activity, with winter creating the multiple barriers. The implications of this research are many. Public health programs should provide the opportunity for physical activity by offering safe, easily accessible opportunities for activity year-round, including throughout the cold winter months. Changes at the policy level should include

increasing access to safe activity opportunities by improving park safety or enhancing bike and walking trails in urban areas. Further, community programs currently play a very important role in keeping low-income children active and, thus these programs should not be considered for budgetary cuts, but should be expanded to allow better access for all low- and middle-class children. Future research should address gender differences in physical activity practices, specifically with Native American girls who were involved in the sedentary activity, to determine what Native American girls want in a physical activity program and if there are exercises or activities that may be more culturally acceptable. The high rate of overweight and obesity in low-income, urban children supports the need for future research to continue to assess physical and nutrition habits and beliefs to determine the most effective way to combat the obesity epidemic.

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Table 1 - Focus Group Participant Demographics, Minnesota, USA

	<i>n</i>	%
Gender of child		
Boy	29	55.8
Girl	23	44.2
Race/Ethnicity of child		
Native American	24	44.2
African American	20	38.5
Asian	6	11.5
Caucasian	1	1.9
Other	1	1.9
Gender of caregiver		
Male	4	7.7
Female	46	88.5
Race/Ethnicity of caregiver		
Native American	19	36.5
African American	18	34.6
Asian	6	11.5
Caucasian	3	5.8
Non-transient ^a	43	82.7
Weight status		
Underweight	0	0
Normal Weight	19	36.5
Overweight	11	21.2
Obese	22	42.3
		Mean (SD ^b)
Age child (years)	52	10.4 (1.3)
Age Caregiver (years)	42	41.4 (11.7)
Grade Level of Child	52	4.7 (1.6)
Household Size	52	4.7 (1.8)
Children in Household	48	3.2 (1.7)

^aNon-transient refers to a stable living situation (total participants who responded to this question: n=46)

^bStandard deviation

Table 2 - Participants Body Mass Index (BMI)-percentile-for-age by Race and Gender

	<i>n</i>	Mean BMI-percentile-for-age (SD)
African American		
Boys	11	87.0 (15.7)
Girls	9	75.9 (18.0)
Asian		
Boys	4	68.8 (7.1)
Girls	2	65.1 (10.5)
Native American		
Boys	12	96.8 (3.2)
Girls	12	85.7 (16.1)

Table 3. Supplemental quotes by theme.

<p>1. Community programs and school impact physical activity</p> <p>a. Community programs</p> <p>b. School environment</p>	<p>a. “I have my [Bolder Options] mentor so we go to the Y or 5Ks. And we exercise with each other, work out, go to the gym, play basketball and football.”</p> <p>b. “They [school] just tell us to see how long we can exercise, and if we can do it for 60 minutes, it has to be at least 60 minutes of playing.”</p>
<p>2. Physical environment effects activity level</p> <p>a. Seasonal factors</p> <p>b. Safety of the environment</p>	<p>a. “When you, like, walk up hills, you go sliding down and you might get hurt”.</p> <p>a. “There’s nothing to do, some people like to sit around and just play video games and just look at the snow falling.”</p> <p>b. “She’ll [Mom] let me ride my bike around the block in front of the house.”</p>
<p>3. Social factors influence physical activity.</p> <p>a. Family/peer influence</p> <p>b. Media influence</p> <p>c. Gender influence</p>	<p>a. “When everybody go to sleep, she [my mom] wake me up and we get to go downstairs and watch movies together. The next day... we go to the movies... we keep ourselves in the house while she watches her movies”.</p> <p>a. “There are two shortcuts you could take. Then you just start going... but somehow I found a short cut and I came in first, I zoomed through the alley.”</p> <p>a. “My mom said she would teach me how to dance it and then I got good and then I got to go to the powwow.”</p> <p>b. “[Video games have] the aspect of building and adventure and science.”</p> <p>c. (male) Football “takes all the power out of me.”</p>

CHAPTER 4:
**The Food Environment Through the Camera Lenses of 9-to 13-Year-Olds Living in
Urban, Low-Income, Midwestern Households: A Photovoice Project.**

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Summary

Objective: To pilot Photovoice methodology with low-income, urban 9- to 13-year-olds to gain insight about their food environment and to determine whether this methodology was engaging and acceptable to them.

Methods: Photovoice methodology was used to allow children to represent their food environment. Twenty male and 9 female, low-income, 9- to 13-year-old children participated. Quantitative photograph analysis included quantity taken and usable internal/external and social environment and healthfulness categorizations. Qualitative analysis was conducted through open coding of interview transcripts.

Results: A total of 345 usable photos were taken by the children ($n = 29$), depicting both healthy and unhealthy foods. Four themes were identified (1) food characteristics; (2) social environment; (3) kitchen, cooking, and dining environments; and (4) food insecurity. Unhealthy food was most readily available to children. Children reported a lack of functioning kitchen equipment and multiple physical and environmental challenges to consuming a healthy diet. Food insecurity was prevalent. Food stamps and food pantries were used to fill gaps in the home food supply.

Conclusions and Implications: Photovoice can be effective in engaging children in conversation about their food environment and increases understanding of their experiences with food. Photovoice can provide insight into the household food environments. This information can be used to tailor interventions to better reflect the living environment and eating behaviors in low-income populations.

Key Words: Photovoice; food environment; children; low-income; food insecurity

INTRODUCTION

The food environment has an integral role in preventing or exacerbating childhood obesity. Children's dietary habits are influenced by various aspects of their food environment, including home, school, after-school programs, and cultural factors.^{1, 2 and 3} Environmental factors that affect children's diets are interesting because they may have contributed to the increase in child obesity rates over the past few decades.⁴ Childhood obesity is of concern because of the increased risk of chronic diseases such as hypertension, type 2 diabetes, and hyperlipidemia.^{5 and 6} Low-income, ethnically diverse children are at a higher risk for obesity compared with moderate- to high-income Caucasian children.^{6 and 7} To improve the dietary habits of children living in low-income, urban households and reduce obesity rates, it is necessary to learn about the urban food environment from a child's point of view, which may provide a more comprehensive understanding of the factors affecting their consumption patterns that might not otherwise be apparent.

Photovoice has been used to give a voice to populations by representing their experiences through photographs and interviews.⁸ This methodology was first used by Wang and Burris⁹ to study reproductive health in rural Chinese women (n = 62). Photovoice has been used effectively with different age and cultural groups.^{9, 10 and 11} In London, Photovoice was used with children (n = 39) to determine how the environment influenced diet and physical activity; researchers found that children photographed their home, school, and neighborhoods as the places where they obtained food.¹² In Canada, it was used to learn about factors affecting food choice among college students (n = 28); researchers found that the environment, cost, the media, and knowledge were influencing factors.¹³ In the US, Findholt et al^{14 and 15} used Photovoice with rural Caucasian teenagers (n = 6) and found that limited access to healthy foods and promotion of unhealthy foods were barriers to a healthy diet. Research into the application of Photovoice with an urban, preadolescent population is needed.

Photovoice may be appealing to children because it is a creative way for their voice to be heard. Children use digital media on a regular basis; thus, incorporating photography into data collection methods may be more effective to engage children. Lambert et al¹⁶ found that a combination of data collection methods, including visual

methods, was most effective when conducting research with sick children (n = 4). Furthermore, Clark¹⁷ suggested that photography may provide researchers with the opportunity to build trust with children and Findholt et al¹⁴ found that Photovoice promoted leadership in youth. Finally, Photovoice may attract children who are uncomfortable in group settings or with expressing their thoughts verbally. Photovoice has been identified as a potentially effective but underused method for collecting health and nutrition data.^{12, 16 and 18} The purposes of this project were to pilot Photovoice methodology with low-income, urban 9- to 13-year-olds to gain insight into their food environment and to determine whether this methodology was engaging and acceptable to them.

METHODS

This project used Photovoice methodology with 9- to 13-years-olds who lived in Supplemental Nutrition Assistance Program (SNAP)-eligible households in Minnesota. Recruitment took place at after-school programs. A contact person within the organization assisted in recruitment. Parental consent and child assent forms were completed before enrollment. Children received a small monetary incentive for their participation (\$5 at enrollment, \$5 when the camera was returned, and \$5 after the interview). This study was approved by the University of Minnesota's Institutional Review Board.

Data Collection

This study was conducted between May and August, 2013. Children met in small groups (2–5 children) to gather demographic data, measure height and weight, and explain proper camera use including the need to obtain consent from any person they photographed. Social Cognitive Theory (SCT)¹⁹ was used as the theoretical framework for photographs. The authors selected SCT because it examines how interactions among environmental, personal, and behavioral factors can influence dietary behavior and SCT has been used for research with children successfully in the past.^{2 and 20} Each child received a disposable camera (27 exposures) and was asked to take photographs of commonly consumed foods in the food environment including pictures at home, at school, and in the community, and of people who influenced food consumption. Children were provided examples for photography based on SCT: (1) the physical environment

(cabinets, cupboards, the refrigerator, where food is prepared, and where food is consumed); (2) the social environment (with whom you eat and who prepares your food); (3) behavioral examples (how much food you eat and foods you eat most often); and (4) personal examples (favorite foods and taste preferences). The researchers collected completed cameras and developed the pictures.

Individual interviews were conducted with the children individually or in pairs within 2 weeks after the cameras were turned in to be developed. During interviews, children met with a trained interviewer to discuss 3–5 of their photos about which the researchers wanted to learn more (photos represented the environment, behavioral, and personal concepts of SCT). Interview questions included: (1) What is this picture of? (2) Tell me about what was happening when you took this picture? (3) How does this picture represent the food you eat? At the end of the interview, children were given the option to describe another photo of their choice and were asked to identify 1 photo that best described their food environment. Interviews lasted 10–30 minutes. To gather children's opinion about using Photovoice, researchers asked each child how he or she felt about this project and whether he or she enjoyed taking photos at the end of the project.

Height and weight were measured for each child with outer clothing and shoes removed at the beginning of each focus group. A stadiometer (model 217, SECA, Chino, CA, 2008) was used to measure height and an electronic medical scale (Health-o-Meter 320KL, SECA) was used to measure weight. Standard weights were employed to calibrate the scale before each focus group. Standard procedures were followed to measure height and weight.²¹

Data Analysis

The researchers analyzed photographs quantitatively by recording the picture content of usable photos, and qualitatively by selecting 3–5 photos for each child to discuss with a researcher. For quantitative analysis of photographs, the total number of photos taken, usable photos, internal environment photos (kitchen and dining environment), external environment photos (restaurant, fast food, and dining), and social environment photos were recorded. Food shown in each picture was categorized as healthy or unhealthy following guidelines established by the US Department of Agriculture's Economic Research Service.²² Frequency and descriptive data were

analyzed from photograph coding, demographic information, and body mass index using SPSS for Windows Statistical Analysis Software Package (version 20.0, SPSS, Inc, Chicago, IL, 2012). Body mass index was calculated from actual height and weight data taken onsite and categorized using the Centers for Disease Control and Prevention growth charts.²³

For qualitative analysis, all interviews were audio taped, transcribed verbatim, and reviewed by 2 researchers using open coding methods.²⁴ Researchers independently read through and then coded each transcript. After coding transcripts, the researchers met to compare findings and identified themes and subthemes common across interviews.

RESULTS

Demographics

Of the 36 enrolled children, 29 (20 male and 9 female) completed the project. Children did not complete the project because they stopped attending the after-school program (n = 2), forgot to return the camera (n = 4), or reported the camera was lost (n = 1). Table 1 lists demographic information. Table 2 provides photo results. The feedback the researchers received from children about their experience with Photovoice was positive. When researchers asked children their opinion about the project, they reported that they enjoyed taking pictures and wanted to keep a copy of their photos. Each child was provided a copy of his or her photographs and 1 child started a diary of the photos she took.

Four themes were identified through the analysis and were present across interviews and photographs: (1) food characteristics; (2) social environment; (3) kitchen, cooking, and dining environments; and (4) food insecurity. Table 3 provides additional quotations. Using SCT as the theoretical framework, it appears that environmental factors, both social and physical, were strongly represented in the children's photography and discussions. The social environment, household physical environment (kitchen, cooking, and dining), and food insecurity themes demonstrate this.

Food Characteristics

There were two subthemes under food characteristics; types of food and rationale for photographed foods. Foods were categorized as 'healthy' or 'unhealthy' using the Economic Research Service guidelines.²² Using these guidelines, 'healthy' foods contain

at least half of a portion size of one major food group (fruit, vegetable, dairy, grains, and protein) and a moderate amount of saturated fat, sugar, and sodium.²²

A wide variety of foods were represented in the photographs. Of the usable photos, 79 photos represented healthy foods, 54 represented unhealthy foods, and 92 depicted a mixture of healthy and unhealthy foods (Figure 1). Healthy foods included those from all food groups (bread, sticky rice, strawberries, bananas, broccoli, chicken, milk, and cheese). Unhealthy foods included cakes, cupcakes, Doritos, Takis, Cheetos, ramen noodles, ice cream, bacon, chicken nuggets, a variety of candy, and soda. Flavor enhancers such as mayonnaise, salad dressing, barbecue sauce, and hot sauce were also photographed. Foods with multiple ingredients that were categorized as mixed foods included macaroni and cheese, peanut butter and jelly sandwiches, cold cut sandwiches, and pizza. Furthermore, children took photographs of ethnic foods consumed in their households, including sushi, sticky rice, egg rolls, and soul food (ribs, fried chicken, and cornbread). One child stated, “I’m part Italian so ... my mom, my sister, and I make meatball subs.”

Children explained the reasons why they photographed certain foods as a favorite food, typical meal or snack, special food to them, cultural/family food, or food they ate often. A child photographed her meal, which included cornbread and salad, to “fill my stomach up just in case I am not all the way filled up” after finishing her macaroni and cheese.

Social Environment

Two subthemes under social environment were parental influence and peer/sibling influence.

Most photographs of an adult (n = 16) were of the child’s parent. Parents had a strong impact on children’s home food environment. Children ate with their parents and ate foods prepared by them, and parents determined the types of foods available in the household based on what they purchased at the store or chose at the food shelf (food pantry). Parents’ health also influenced their food choice, as demonstrated by 1 child: “My mama and dad have ... high blood pressure, well not my mom but my dad because my dad likes a lot of salt ... but now he’s cutting down.” Parents determined where

children consumed their meals and many family meals took place while watching television.

Parents also influenced children's cooking ability and introduced new foods to their children. One child reported that his dad taught him to grill (Figure 2). Another prepared macaroni and cheese with her mom and she "loved to help." Yet another child described his role preparing a turkey: "Me and my dad cut it up and I was skinning it ... I started cooking it, me and my mom, actually."

Eighty-five photos captured a peer or sibling both at home and at community programs. At home, children reported eating with their siblings more often than with their parents. Children received cooking education from their siblings and peers. One child described this: "I was, like, 6 or 7 when he [brother] taught me how to cook eggs or bacon ... and he taught me how to make pancakes." One explained that his friend taught him how to make a fried egg. Another photographed his sisters making lunch together.

Kitchen, Cooking, and Dining Environments

Subthemes under kitchen, cooking, and dining environments included the home and community environments.

Children took 92 photos of their kitchen and 58 photos of their dining environment. Kitchen environment photos focused on appliances and food storage. Food in the refrigerator photos included meats, fruit, and beverages. Photos of vegetables were limited to carrots and tomatoes. Cupboards and pantries ranged from empty to full and held cereal, bread, and ramen noodles. Children also photographed their cooking appliances, including the microwave, stovetop, and oven, a George Foreman grill, and an outdoor grill. The microwave was the most commonly reported cooking appliance and was used to heat leftovers. Examples of food children prepared were eggs, ramen noodles, hot dogs, bacon, burgers, egg rolls, sushi, and meatloaf. All children had basic cooking equipment available except 1 child who was residing in a shelter. She discussed the challenges to food preparation because of the lack of appliances in the shelter: "He [my cousin] loves Wendy's ... but we can't cook so we go and get some food from there." The dining environments that children photographed included a dining room table, an eat-in kitchen, their bed, and a countertop (Figure 3).

A total of 58 photos were taken of children dining outside their home and the majority were taken at the after-school program. Boston Market was the only restaurant captured in the pictures. In interviews, children reported they ate at Wendy's, Old Country Buffet, Chinese buffets, and pizza restaurants. At the after-school program, children consumed food prepared at the program and dined at tables in groups. They ate with friends and frequented the ice cream truck in the summer. Children also attended summer school and ate lunch there 3 d/wk. The school food environment extended to the bus; 1 child explained that he took a photo when he "was on the [school] bus eating Doritos."

Food Insecurity

There were 2 subthemes under food insecurity: food availability and practices to improve food security.

Food insecurity was discussed in the interviews and shown through photographs. The amount of food stored in the refrigerator, freezer, and pantry was in various states of fullness (Figure 4). The majority of refrigerators, freezers, and cupboards/pantries were half-full based on the photo data, whereas some were nearly empty. When children were asked about the usual amount of food at their house, a variety of responses were provided. One child stated, "[My fridge] always looks empty." Another child was aware of the financial constraints affecting his food choice: "I don't really have that much money, so I occasionally eat these [ramen]."

Children reported that their families used food assistance programs, specifically food shelves and food stamps (SNAP) on a regular basis. The availability of food dollars affected the children's food environment. One child reported the "fridge is full when we have food stamps." Children also reported avoiding food waste at the after-school program; as 1 child illustrated, "that's why [the cook] likes me, because I don't waste food." Another child described taking food from a buffet to be eaten at a later time:

I love the sweet and sour chicken they serve, like every day I go there I have to bring my sweatshirt ... I don't care if it's a hundred degrees. I fill my pockets with these sweet and sour chicken things.

Children who did not have a refrigerator or freezer in their household used alternative forms of food storage; a girl described her food storage: “We put it in, like, a cooler but it’s just foam and then you put ice in it and then the food.”

DISCUSSION

This research demonstrates that Photovoice can engage low-income children in a conversation about their diets. Main findings from this research were that: (1) children were most influenced by their parents and peers, and their parents determined what foods were available in the household and provided cooking education, whereas peers and siblings were most involved at mealtimes; (2) the availability of cooking equipment and food storage were the environmental factors that affected children’s diets; (3) school, the school bus, after-school programs, fast-food restaurants, and buffets were integral parts of their food environment; and (4) concerns about food security were widespread.

Food Characteristics

The current study showed that a variety of healthy and unhealthy foods were consumed by the children. Whereas healthy foods were photographed more, children reported that they liked processed, prepackaged, high-sugar, or high-fat, low-cost foods more and that they consumed them more often. To illustrate, in Figure 2, a greater amount of soda was pictured and the child verbalized that it was consumed more often than the healthier, more expensive beverage, milk. Research has found low income is associated with low–nutrient-dense food intake and poor-quality diets.^{2, 20 and 25} Wiig and Smith²⁰ found children consumed Kool-Aid instead of milk or juice because Kool-Aid was less expensive. Although healthy foods were photographed, they were not discussed in interviews as often as unhealthy foods. Research has shown that children enjoy fruit but its availability is limited in low-income households.^{26, 27 and 28} The high frequency of high-calorie, low–nutrient-dense foods available to children may have contributed to weight gain and overweight in the current study’s population.

Social Environment

Children depended on their parents to determine what foods were available at home. Other research has also shown children prefer to eat food with which they are most familiar, and because parents have a strong influence on the foods to which their children are exposed on a daily basis, they have an integral role in shaping their child’s dietary

preferences.^{29, 30 and 31} Families also taught cultural practices to their children. Native American children in the current study reported their parents taught them to hunt, prepare, and cook wild game. The importance of family in Native American communities has been highlighted in previous research.^{28, 32 and 33} African American children in the current study were influenced by their families through the inclusion of soul food³⁴ in their diets. Children reported consuming macaroni and cheese, ribs, and cornbread. Previous research with a predominantly African American sample of homeless children also found that soul food was important but was limited because of environmental constraints in the homeless shelter.² Results from this study suggest that encouraging parents to make healthy foods more available at home and to introduce healthy new foods could improve the likelihood that children would try and accept healthy foods. Maintaining cultural practices in food preparation is important when offering healthier methods of preparing cultural foods.

Kitchen, Cooking, and Dining Environments

Children in this study photographed available kitchen appliances and food storage areas and used the microwave most often to prepare foods. The most notable photographs were of food storage because of the variable amount of food kept at home and the limited healthy food available. One child living in a shelter was limited to the top of a dresser for her food storage (Figure 3) and regularly consumed foods at nearby fast-food restaurants. Richards and Smith² also found that the environmental constraints of limited food storage and a lack of healthy food choices available within walking distance of shelter-dwelling families were challenges to obtaining healthy food. In rural Oregon, Findholt et al¹⁵ used Photovoice with high school students and also found that access to healthy foods was a concern for this population. Participants photographed the produce section in their local grocery store to illustrate the lack of healthy foods available. This population had access to fruits and vegetables through agriculture and gardens that the urban sample in the current study did not.

Children in this study ate at school and the after-school program multiple times per week. Children reported limited healthy options at school, which can lead to an increased calorie intake. Briefel et al³⁵ found that children who participated in the National School Lunch Program consumed more calories at school than did

nonparticipants, which may lead to weight gain in low-income children. In addition, children reported consuming snacks such as Doritos on the school bus. Rossen et al³⁶ reported that children who walked to school gained less weight when healthy choices were available on their route to school. Little research has addressed the types of food consumed on the school bus; this research is needed because these snacks may not be accounted for in children's diets, but they can add a significant amount of excess calories and cause weight gain.

Food insecurity

Children in this study reported SNAP and food shelf use and discussed the financial constraints that limited their food choices. Photographs corroborated the children's reports and enhanced the narrative data by providing visual evidence of the lack of food available in some households. Previous research has shown that food shelves are used by low-income families to meet their basic daily food needs.^{26, 31 and 37} The majority of foods provided at food shelves are less healthy, high-sodium options that are nonperishable, canned, bagged, or boxed items.^{26, 37 and 38} Ethnic foods are generally not available at food shelves and may cause families to alter their cooking and eating habits.³⁹ It is necessary to consider food shelves when looking at the food environment of low-income children because families rely on food shelves on a regular basis and foods available there have become staples in their diets.²⁶ Food stamps, or SNAP, were another way children's food needs in this study were met and more food was available at home when their parents had more food stamps available. In a sample of low-income women, Wiig and Smith²⁰ found that SNAP benefits do not last all month, and therefore, food options were more limited at the end of the month than at the beginning. The current infrastructure that provides food to low-income families may not be supportive of a healthy diet.

The children also discussed how they coped with food insecurity, including hoarding food from buffets and not wasting the food they were served. It is possible that lack of food and food options at home may have taught children to visually determine the amount to eat instead of following their internal satiety cues. Previous research has found that children overeat as a coping mechanism to avoid hunger among the poor.²⁰ Reports of children hoarding food in food-insecure households has been documented in children²

as young as preschool age.⁴⁰ This research adds to the data in the area of food insecurity by capturing children's experiences of limited food availability in their households. Photography may be an easier way for children to describe food insecurity, but further research is needed.

Limitations

Although results are not generalizable to all children living in low-income households, these data provide insight into the food environment experienced by a section of the population that can be used as baseline information for future research. Also, possibly because of the study's focus on youth and their lack of experience with disposable cameras, there were instances in which children photographed the same object more than once. To gather the most accurate data in these cases, researchers conducted interviews after building rapport with the children. The sample size may seem small but it is appropriate for qualitative studies, and previous Photovoice studies have had sample sizes from 4 to 62.^{9 and 28} Future studies with this population may consider using the US Department of Agriculture food security questionnaire, but care will need to be taken so that children's photo choices and interviews are not biased because of the discussion about food security.

IMPLICATIONS FOR RESEARCH AND PRACTICE

These findings contribute to the literature on children's dietary choices by using Photovoice to depict the environmental, social, and personal challenges children living in low-income households face to consume a nutrient-dense diet. The findings suggest that the diet of the entire family must be addressed before any changes in the individual child's diet can occur. Also, functioning appliances and designated places for mealtime (dining tables and chairs instead of couches and beds) could improve the mealtime experience for these children. Food insecurity was a barrier to healthy eating and diets often depended on food stamp availability and the options at the food shelf. Finally, the researchers received positive feedback from the children about Photovoice. This method may be an effective technique to conduct formative research to inform obesity prevention and intervention strategies. For example, cameras can be provided to children to take pictures of their favorite foods. Once developed, these photos could be used to open

discussion about food choices or they could be used to create a cooking demonstration to modify their food choices to make them healthier.

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Table 1. Demographic Information for Children Participating in the Photovoice Project in Minnesota (n=29)

Characteristic	<i>n</i>	Mean ± SD or %
Child's age, y	29	11 ± 1
Child's grade	29	5 ± 1
Household size, n	29	5 ± 1
Children in household	28	3 ± 1
BMI-for-Age (%)		
Boys	20	62 ± 34
Girls	9	85 ± 19
Child's gender		
Boy	20	69%
Girl	9	31%
Child's race/ethnicity		
African American	18	62%
Caucasian	4	14%
Native American	4	14%
Asian	3	10%
Weight Category		
Underweight	1	3%
Normal weight	14	48%
Overweight	4	14%
Obese	10	35%

Table 2. Average Number of Photographs Taken By Each Child Participating in Photovoice Project, by Category (n=29)

Category	Mean	SD	Range
Total	17	6	3-27
Usable	13	6	1-25
Healthy food	3	3	0-8
Unhealthy food	2	2	0-11
Mixed food	3	3	0-13
Home			
Kitchen	3	4	0-13
Dining	2	2	0-7
External			
Dining	2	3	0-11
Peer or Sibling	3	3	0-11
Adult	1	1	0-5

Table 3. Selected quotes from 29 Children Using Photovoice: Food Environment Project by Theme.

Theme	Quotation
1: Food Characteristics	<p>“I like to eat chicken soup, it just feels good going through your body.”</p> <p>“I will eat fried eggs every day.”</p> <p>“My little brother will go crazy for ice cream...sometimes he can go for five days non-stop in a tantrum crying for ice cream.... He dreams about it.”</p> <p>“You have to do the seaweed thing and then cucumber, shrimp...sticky rice and [avocado]... then you have to do the rice sheet thing and then you cut it.”</p>
2: Social Environment	<p>“We don’t usually eat at the table because we really can’t usually fit our mom in there because she’s in like a wheelchair...I don’t think most people have like family dinner.”</p> <p>“We [my family and I] usually just sit around the living room and watch [television shows] Grim, Revolution or the Voice.”</p>
3: Kitchen, Cooking, and Dining Environments	<p>“We all...share at least 2 or 3 bowls [of food], so we divide them up, half for one side of the table and the other half and the ones that eat in the living room.”</p> <p>“[Ate lunch at] a whole table with friends.”</p>
4: Food Insecurity	<p>“My fridge is kind of full.”</p> <p>“Every Sunday my dad goes to the food shelter so we get food and stuff.”</p>



Figure 1. Theme: Food Characteristics. Child stated, “I got some orange juice, but I don’t like pulp”, she likes ginger ale because “it’s fizzy”, and the lemonade was “bought at the store in a can”.



Figure 2. Theme: Social Environment. Child stated, “I was cooking steak on the grill.”
(Child’s father took the picture)



Figure 3. Theme: Kitchen, Cooking, and Dining Environment. “My mom took a picture of me eating this pasta. It’s really good pasta. It’s Alfredo and I had my hair braided and this is our table. We put stuff on it that we need. That’s my juice and my dad’s hat and my dad’s watch and stuff.”



Figure 4. Theme: Food Insecurity. Photograph of child’s refrigerator.

CHAPTER 5:
Low-income, Urban Children's Perspectives on Physical Activity: A Photovoice Project.

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Summary

Objectives The purpose of this research was to have ethnically diverse, 9- to 13-year-olds who live in urban, low-income households use Photovoice to represent their physical activity practices and their perception of their physical activity environment. *Methods* Photovoice methodology was used to allow children to capture their physical activity habits and environment through photographs and interviews. The Social Cognitive Theory was used as the theoretical framework. Heights and weights were taken for all children and BMI was calculated. Photographs were analyzed by recording the content of usable photos in SPSS software. Qualitative analysis of the interview transcripts used the open coding method. *Results* Participants were 24 children (15 male, 9 female) living in inner city, low-income households. On average, children were 10.9 years old and the mean BMI-for-age percentile was 72 %. Children took a total of 377 pictures and 339 of these were usable. Three themes were identified across interviews and photographs, (a) types of activity, (b) social environment, and (c) physical environment where activity took place. *Conclusions for Practice* This study provides insight into low-income, urban children's physical activity habits and environment using a novel approach. Potential ways to increase moderate to high intensity activity among this population are to involve church-based organizations, create more safe places to play by increasing green space in urban areas, and to provide financial support for after-school programs and community centers.

Keywords: Photovoice Physical activity Low-income Children

Significance

What is already known on this subject? Low-income, ethnically diverse children are at high risk for obesity and have low levels of physical activity. These children face unique barriers to physical activity.

What this study adds? Photovoice methodology allowed children to represent their perceived physical activity environment through photographs and interviews. It may provide a voice to minority children who are often silenced. Barriers to exercise were sedentary media activities, the urban environment, and cold weather. Peers/siblings, community centers, and after-school programs promoted exercise. Parents promoted both

sedentary and moderate to vigorous activities. Opportunities to increase exercise for urban children should focus on creating safe places to play and green space, involving church-based organizations, and to continue to support after-school programs and community centers.

Objectives

Childhood obesity rates have increased rapidly over the past few decades. In 2010, child and adolescent obesity rates had increased to 17 % [24] and ethnically diverse, low-income children had some of the highest obesity rates. The factors that contributed to the rise in obesity in this population are multifactorial and include limited access to healthy foods [17, 27, 29, 31], and low physical activity levels [10]. Increased physical activity can reduce obesity and chronic disease risk [35].

To increase children's engagement in the research process to better understand the barriers to physical activity, media-based methodology may be useful. Photovoice is a media-based method that uses photography to better understand the lived experiences of underprivileged populations [33, 34]. This methodology uses documentary photography to stimulate discussion and allows participants to depict their perception of the environment both visually through photos and verbally through interviews. Photography has been used with children to increase their interest and encourage creativity in the research process [14, 21, 25]. Also, research has shown that the use of multiple data collection methods provides useful information that cannot be gathered from a single method [8].

Photovoice has been used to research physical activity practices and environments with limited groups of children. Walia and Liepert [32] used Photovoice methodology with 13-to 18-year-olds (n = 9) living in rural Canada. This research found that television and computers were barriers to activity and family, peers, and weather were both facilitators and barriers to activity. Photovoice research was also conducted with high school students (n = 6) in rural Oregon. The results showed that inadequate recreational facilities and unsafe streets limited physical activity, but the rural environment and organized sports promoted activity [11, 12]. Pearce et al. [25] used Photovoice with 9- to 11-year-olds (n = 39) in London and found school was the most commonly photographed place that children engaged in physical activity. In Australia, this methodology was used with urban and rural 8- to 10-year-olds (n = 33) to understand their physical activity environment and found that urban children had more limitations on where they could play than rural children [20]. Each of these studies used Photovoice to study physical activity and this method was an effective way to work with children.

To date, little is known about how urban, low-income children living in the United States would use Photovoice to represent their physical activity habits and their perception of the environment. Photovoice could provide a better way to understand urban children's physical activity experiences and this information is needed because urban environments pose different challenges than rural areas [23]. This method can allow children, many of whom have no voice, to capture the reality of their physical activity habits and environment and this information can be used to promote behavioral and environmental change. The goal of this research was to engage ethnically diverse, 9- to 13-year-olds who live in urban, low-income households to use Photovoice to represent their physical activity practices and their perception of their physical activity environment.

Methods

This research was underpinned by the Photovoice methodology [33, 34] and modified based on previous research [5, 6]. Castleden and Garvin [6] had their participants take photographs of the activities and places that represented health risk, and used semi-structured interviews to get their participants' reflections on the photographs. This technique is appealing to use for research with children because it can be a creative way to involve minority children in data collection and gives them a platform to discuss their physical activity experiences. These data can be used to inform and support institutional and community changes to better encourage physical activity among diverse urban populations.

Recruitment was conducted at Boys and Girls Clubs and an after-school program for American Indian youth from May through August 2013. The multi-ethnic (African American, Native American, Asian, Caucasian), low-income children lived in an urban area with a population of more than one million people in Midwestern United States. The project and the eligibility requirements were explained to a contact person at each organization who assisted with recruitment. Participants were a convenience sample of 9- to 13-year-olds who resided in a household eligible for the Supplemental Nutrition Assistance Program (SNAP). SNAP is a federally funded program that provides education and food money to low-income families. A small monetary incentive was

given to children who participated and this study was approved by the University's Institutional Review Board.

Data collection was consistent with Photovoice methodology [33, 34]. Parental consent and child assent were completed prior to beginning the study. Children met in groups of 2–5 to gather child-reported demographic data and explain camera use. Heights and weights were taken privately and followed standard procedures [15]. Each child received a disposable camera (27 exposures) and was asked to take photographs that represented aspects of physical activity.

The Social Cognitive Theory (SCT) [3] was used as the theoretical framework to guide the children's sample photography choices and interviews. SCT was chosen because it has been used to understand the how the dynamic interactions between environmental, personal, and behavioral factors influence health behaviors, including physical activity [2, 27, 29]. Children were provided sample photography ideas informed by the SCT. Examples of photographs included: (a) social environmental (the activity you do by yourself, with your family, or with a team; who you are active with), (b) physical environment (what your play area, room, environment looks like; where you do most of your activity), (c) personal (your favorite indoor/outdoor activity), and (d) behavioral (the indoor/outdoor activity you do the most). Children were instructed to obtain consent from any person they photographed. Completed cameras were collected and photographs were developed by the researchers.

Interviews were conducted by one researcher with the children, individually or in pairs, at the after-school program because this was a comfortable, familiar place for the child. Each interview lasted 15–30 min. During the interview, the child was asked to discuss 3–5 photographs that the researchers were interested in learning more about and that represented the personal, behavioral, or environmental concepts of the SCT. Interview questions were broad so the child could explain their perception of physical activity. Interview questions were: (a) Can you describe this picture?, (b) What was happening when you took this picture?, and (c) How does this picture represent your physical activity?. Children were asked to choose the photo that best represented their physical activity practices and were given the option to describe a picture of their choosing.

Quantitative and qualitative analyses were conducted throughout the research process. For analysis of the photographs, the contents of the photographs were analyzed quantitatively using SPSS for Windows Statistical Analysis Software Package Version 20.0 (SPSS Inc., Chicago, IL, USA). Data recorded included the number of total photos, usable photos, home environment photos, external environment photos (school or after-school environment), location of photo (indoor or outdoor), peer/sibling photos, and adult photos. The photos were considered 'unusable' if the photo was blank, out of focus, or the researchers were not able to see what was photographed. Photo content was categorized by activity level (sedentary, moderate, or vigorous activity) [1]. Demographic data and height/weight were also analyzed using SPSS. Height and weight were used to calculate body mass index (BMI) and BMI was categorized using Centers for Disease Control (CDC) growth charts (CDC Growth Charts) [7].

For qualitative data analysis, we used the open coding process for analyzing focus groups described by Krueger [19]. The same two researchers that conducted the interviews were involved in analysis. After the first transcript was individually coded, the researchers met to compare coding, wording of codes, and to reconcile discrepancies. The coding that was agreed upon during this meeting was used for analysis of the rest of the transcripts, adding new codes as new ideas emerged. Researchers met multiple times throughout the analysis process to discuss results, the coding process, and reconcile any discrepancies. During each of these meetings, consensus was reached.

Photographs were also individually reviewed by each researcher to determine the main categories that were represented. Based on a preliminary review of photographs, the researchers agreed upon categories for photo coding. These categories were then used to code the remainder of the photographs, which was done individually by the researchers and compared for consistency. Any discrepancies were reconciled and any new categories that emerged were discussed by researchers before including it in the coding scheme. Themes emerged from the open coding of transcripts and photographs. Researchers did not have any preconceived notions when starting data analysis and this allowed for the themes to emerge from the data.

Results

Twenty-four children (15 male and 9 female) completed the project of the 33 children enrolled. The following were reasons children did not complete the project, (a) lost the camera (n = 5), (b) forgot to complete and return camera (n = 3), and (c) stopped attending the after-school program (n = 1). Demographic characteristics are presented on Table 1. The average age of the children was 10.9 years-old and average BMI-for-age percentile was 72 %. Children took a total of 377 pictures and 339 photos were usable (Table 2). Sixty-eight pages of transcription were collected from interviews and approximately one quarter of the usable photos were discussed.

Three themes were identified through the analytical process and were present across interviews and photographs, (a) types of activity, (b) social environment, and (c) physical environment where activity took place. The children's photographs and interviews represented the personal factor of SCT, shown by the 'types of activity' theme, and the environmental factor, shown by the 'social environment' and 'physical environment where activity took place' themes.

Types of Activity

Two subthemes under types of activity were, (a) physical activity and (b) media related activity.

Physical Activity

Of the 254 photos that represented some level of physical activity, 99 represented sedentary activities, and 155 showed moderate or vigorous activity. A wide variety of activities were captured in the photographs. Sedentary activities that children discussed and that were included in photos included playing board games, reading, playing instruments, and homework. Children also viewed both eating and sleeping as activities; once child stated, "You need energy to sleep". Creative activities were also reported including painting, drawing, and playing the piano.

Children were also involved in physically engaging activities. These activities included walking, stretching, sit-ups, biking, swimming, jumping jacks, dancing, playing on the playground, tennis, skateboarding, and jogging. Team sports were also frequently discussed and captured in photos and included basketball, baseball, and football. Children also enjoyed team sports, "I love baseball... I like fielding and hitting the ball, I like

batting, I go to the batting cages a lot.” A girl reported, “I really love playing tennis and Sundays I go to this tennis court and practice with these adults so I can get better and better at it.” Biking was reported as a favorite activity, “I love biking, if I had any one thing to do in this world it would be bike” (Fig. 1). The physical activities that children identified as the most representative of their normal activities included team sports, playing outside, riding bike, reading the bible, and playing tennis.

Media Related Activity

The majority of sedentary photographs taken were of media related activities and included watching television and movies, playing video games, and looking on the computer. Boys engaged in these media activities more than girls and did so on a regular basis. One child reported, “I play video games a lot... [video games are] one of my favorites.” Media was used for entertainment, especially when children were alone or bored. Comments from children were, “When I’m bored I play by myself...but I say I like to play with someone, I have the internet so sometimes I have a head phone so I can go online and I talk to everyone else like over the web” and “I play games sometimes when I get bored and when no one is home. I’m usually home a lot alone.” Media was also used for educational purposes, “I like to use technology...I do math just to keep my grades up when I go back [after summer break], and yeah I play games too.” Some children preferred sedentary, technology-based activities; to illustrate, when one child was asked if he liked to jog, he stated, “Not usually, I just wanted to get inside to play the computers.... I’m a computer geek.”

Social Environment

There were two themes under social environment, (a) family and sibling influence on physical activity and (b) peers influence physical activity at community programs.

Family and Sibling Influence on Physical Activity

A total of 10 photos captured adults and 175 captured siblings, cousins, or friends. Parents were involved mostly in sedentary activities, except for walking. Children reported their parents walked, played board games, or went to the park with them. One child reported, “We [my mom, cousin, and I] were at the lake feeding the ducks and playing at the park.” A boy reported, “My dad [draws]. We have competitions” and another boy described sedentary family activity as, “playing board games a lot [with] my

mom and dad”. One child, who was living in a shelter, photographed her family using public transportation as the most frequent activity she did with her parents. They walked to the train station or bus stop every Sunday to go to church.

Children reported engaging in more strenuous activities with their siblings, cousins, and friends. Activities included weight lifting and team sports such as basketball, football, and baseball. A child reported using a weight bench at home, “Probably like every day almost...but when I get tired then my brothers come down and watch and it would get hard to push it up again, they help me lift it up.” One child played baseball with his brother, “I play catch with my brother a lot...’cause my brother is really good.” Another boy stated, “Sometimes we come down here [to the Boys and Girls Club] and play basketball in the back. It’ll be me and my sister and my dad and sometimes my little brother.” A pet in the house provided children with more physical activity opportunities, “We will make an obstacle course we will have my dog do and we will do it next... Or we will try to have her do some new course and have her get her exercise with us.”

Peers influence Physical Activity at Community Programs

Children took 121 total photos of activity at the after-school community program. Children engaged in sedentary, moderate, and high intensity physical activities and were involved in team sports at these locations. Sedentary activities included video and computer games and movies. One child reported being involved in “pool tournaments, ping pong tournaments, and foosball tournaments, and rarely video game tournaments.” More active play included skateboarding, swimming in the pool, playing on the playground, and organized team activities. One boy quipped, “We play tag and soccer and stuff” (Fig. 2). The Boys and Girls Clubs also provided children the opportunity to “go to baseball games, go to football camp”. Children didn’t discuss school as a main place for activity.

Physical Environment Where Activity Took Place

Subthemes under activity environment were, (a) activities in outdoor environments and (b) activities in indoor environments.

Activities in Outdoor Environments

Children took 131 photos of outdoor activities. These activities appeared to expend more energy than indoor activities. Biking was the most frequently reported

outdoor activity (Fig. 1). Skateboarding, team sports, playing at the park (Fig. 3), and swimming were also outdoor activities reported by the children. Sledding and skiing were the only outdoor activities children reported engaging in during the winter time as one child reported, “We go to the parks that are close by us and go sledding and... and my Big Sister [from the Big Brother, Big Sister Program]... she will be taking me skiing.”

Outdoor activities were limited by the weather and most children preferred not to engage in outdoor activities during the winter. One child reported, “In the summertime I bike here... in the winter, I’ll get a ride.” Another child described winter as, “It’s cold and I don’t like to be all wet when I come back home.” Children were not able to be as active in the winter as they were in the summer, to illustrate one child who played baseball was unable to play in the winter, “We just talk about baseball [in the winter].”

Activities in Indoor Environments

Children took 100 photos of indoor activities at home or the community program. Indoor activities tended to be sedentary and video and computer games were the most frequently reported indoor activity. Children also read books, played video games, and board games indoors. One child described his favorite activity at the after-school program as, “I like reading ‘Books with the Stars’ because I help [kindergarten, first, and second graders] read books.” Another boy reported he went to the Boys and Girls Club, “to play and learn.” Children at the Boys and Girls Clubs reported playing basketball on a regular basis. A child at the Native American after-school program described the activities he engaged in at the program as, “we play some games ... tonight we’re doing bingo.” Some children had access to community centers that allowed them to engage in activity year round. For example, one child stated, “[in the winter, I’m] stayin’ in my house and sometimes I go to the Y.”

Researchers noted the gyms were often open for basketball and the computer lab was generally open and both were used by children during the day at the Boys and Girls Clubs. The other after-school program served fewer children and both sedentary (i.e. drawing and art) and moderate intensity activities were offered as organized activities for the children.

Discussion

This study used Photovoice to provide insight into the physical activities that low-income, urban children engage in. The most common sedentary activities reported and photographed by children were media related (television, computers, or video games) and most of the children had these available in their homes. Families and peers had a strong influence on activities both inside and outside the household. Children used opportunities at after-school programs for physical activity and children photographed moderate to vigorous activity there, but access to sedentary, media activities were also available. Outdoor activity was limited by seasonal constraints and children were less active when limited to indoor activity.

Media Influence

Computers, video games, and televisions were used regularly by nearly every child in our study and were considered ‘physical activities’ despite their sedentary nature. These activities were available at home and after-school programs. Children in our study reported playing video games to alleviate boredom and for the intellectual challenge. Additionally, parents may be supportive of using television on a regular basis in urban, low-income households because it provides safe entertainment to occupy their children [16]. Similarly, Walia and Liepert [32] found that a group of rural teenagers living in Canada frequently played video games. Research has estimated that 8–18 year-olds spend an average of 7.5 h using media per day [28], and this limits the time children could spend on moderate to high intensity activity. Active video games (such as Wii) that require more physical movement are available, however none of these types of games were photographed or discussed by children. Results of this study indicate that interventions to decrease obesity rates with this population need to work on restructuring time allocated to media or use media to stimulate physical activity (computers using bike or treadmill energy).

Family Influence

Parents generally did not provide opportunities to children for moderate to high intensity physical activities. Most activities done with parents were sedentary (board games, reading) or functional (walking to bus stop or church). Walking was a common activity in low-income households and often a necessary mode of transportation. Similar

to our findings, Besser and Dannenberg [4] found that walking to use public transportation was a way that low-income families met their physical activity requirements. Children were also involved in their church. In the past, church-based interventions to promote physical activity and dietary changes have been conducted with African American adults [26, 36], but have had mixed results. Further research to involve faith-based organizations to promote exercise in children is needed because this could be a way to offer safe, consistent exercise opportunities to children.

In contrast to the low intensity activity children reported with their parents, children engaged in regular moderate to high intensity activity with their siblings and peers. To illustrate the frequency of activity with peers compared to activity with parents, more photos (n = 165) were taken of activities with peers or siblings than parents. Research has found that peers influenced children's activity by being involved in activities, creating social norms, and forming or maintaining friendships [13]. The majority of photos that captured group and peer activities were located at the after-school community programs (Fig. 2) and this may have been the reason children were more active at the community program than at home. Children may not have siblings at home or peers in their neighborhood to promote this type of activity without having a community program to attend. Our photography data showed that the children perceived their peers to be more involved in regular moderate to high physical activity than their parents.

Outdoor Versus Indoor Activity

The physical environment played an important role in determining activity level for children in our study. Outdoor activities (Figs. 1, 2, 3) were more physically demanding and few were sedentary. Children reported occasionally doing sit-ups or push-ups at home, but this was not a regular activity. Children relied on the community program for indoor exercise, but school and their home were not discussed as places to be active. This may be related to the decrease in physical activity opportunities in school [9] or because they lived in the inner city and outdoor space to play is limited. Urban areas and safety concerns have been associated with decreased activity in children [22]. MacDougall et al. [20] also found that urban children had tighter boundaries limiting where they could play than rural children. Research has suggested that green space could

be a way to broaden boundaries for play, provide more opportunities for activity, and even a space for social gatherings [18, 30]. Converting rundown homes and abandoned lots to green space may be a way to add more green space to urban areas. Previous research has also found that safety is also a concern for both rural [11] and urban populations [16]. Therefore, improving safety of urban areas through community action, such as neighborhood watch policies, must be considered in order to improve physical activity levels of urban-dwelling children.

The indoor environments where children engaged in physical activity were their home and the community programs. Of these two locations, the community programs provided opportunities for high intensity activities, such as basketball and football. Children engaged in sedentary activities, such as watching movies and playing on the computer or video games, at both indoor locations. Our results were different than those by Pearce et al. [25] who found school was the most common place for physical activity for children in London. Also in our sample, indoor activities were common regardless of weather. This was illustrated by the photo data and 76 photos taken inside the home even though the study was conducted in the late spring and summer, when the weather is generally most permitting for outdoor play. Children reported that weather, specifically winter, was a barrier to moderate to high intensity activities. Our results were similar to findings with a rural Canadian sample of 13–18 year-olds who also perceived winter to promote sedentary activity and limit moderate to high intensity activity [32]. Based on this information, further research into why children engage in more physical activities when outdoors versus indoors is needed and this information can be used to bring the excitement and enjoyment of more vigorous, active outdoor play to the indoor environment.

Limitations

Although this sample size may seem small, is appropriate for qualitative studies and comparable to the sample sizes in other Photovoice research [11, 25]. These data provide insight into the physical activity environment and habits from the perspective of low-income, inner city children and may be used as baseline information for future research, although may not be generalizable to all children. Furthermore, some similar photos were taken and this may have occurred because children lacked experience using

cameras, or perhaps small differences noted by children were noteworthy to them and were re-photographed.

Conclusions for Practice

This research describes the daily physical activity experiences of a diverse group of low-income 9- to 13-year-olds through photography and interviews. Media related activity was sedentary and had a strong influence on the activity level of the children. The frequency and intensity of exercise that children engaged in were limited by what was available in their community, what was offered at their community program, what activities parents engaged in, and by weather conditions. The information gained from this research can inform healthcare providers, city planners, and public health programs to better understand urban children's perception of physical activity and encourage them to find ways to create opportunities to improve access to physical activity among inner city children. Potential ways to increase moderate to high intensity activity among this population are to create more safe places to play by increasing green space in urban areas, involve church-based organizations, and to continue to financially support after-school programs and community centers. Photovoice may be effective to conduct needs assessments or formative research to inform interventions to increase physical activity. For example, cameras can be provided to children to take pictures of activities they do with their families and these photos could be used to create programs in the community to encourage family activity. Children could also take photos of their favorite activities and this information could be used to create organized activities, such as camps, that provide low-income children the opportunity to engage in these activities year-round.

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Table 1. Photovoice Participant Demographics

Characteristic	<i>n</i>	Mean	SD
Age Child (years)	24	10.9	1.1
Grade level of child	24	5.2	1.5
Household size	24	4.6	1.2
Children in household	24	2.7	1.0
BMI-for-Age	24	72.0	30.4
	<i>n</i>	%	
Gender of child			
Boy	15	62.5	
Girl	9	37.5	
Race/Ethnicity of child			
African American	13	54.2	
Caucasian	4	16.7	
Native American	4	16.7	
Asian	3	12.5	
Weight Category			
Underweight	1	4.2	
Normal weight	10	41.7	
Overweight	4	16.6	
Obese	9	37.5	

Table 2. Total number of photos and average number of photographs taken by each child, by category

Category	Total Photos	Mean	SD	Range
Total photos	377	15.7	7.0	3-27
Usable photos	339	14.1	6.3	3-26
Sedentary photos	99	4.1	4.6	0-16
Moderate activity photos	72	3.0	5.0	0-24
Vigorous level activity photos	83	3.5	3.4	0-14
Home Environment photos	76	3.2	3.5	0-11
External Environment photos	185	7.7	5.9	0-24
Peer or Sibling photos	175	7.3	6.3	0-25
Adult photos	10	0.4	0.7	0-2



Figure 1. Child biking with sibling and cousin at home.



Figure 2. Outdoor play with peers.



Figure 3. Outdoor at playground.

CHAPTER 6:

Low-income, African American and Native American children's viewpoints on body image assessment tools and body satisfaction: A mixed methods study

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Summary

Objectives: Pediatric obesity is complicated by many factors including psychological issues, such as body dissatisfaction. Body image assessment tools are used with children to measure their acceptance of their body shape. Limited research has been conducted with African American and Native American children to understand their opinions on assessment tools created primarily for Caucasians. This study investigated: a) children's perception about body image and b) differences between two body image instruments among low-income, multi-ethnic children.

Methods: This study used mixed methodology including focus groups (qualitative) and body image assessment instruments (quantitative). Fifty-one children participated (25 girls, 26 boys); 53% of children identified as African American and 47% as Native American. The average age was 10.4 years. Open coding methods were used to identify themes from focus group data. SPSS was used for quantitative analysis.

Results: Children preferred the Figure Rating Scale (FRS/silhouette) over the Children's Body Image Scale (CBIS/photo) because the body parts and facial features of figures illustrated in the tool were more detailed. Children formed their body image perception with influence from their parents and the media. Children verbalized that they have experienced negative consequences related to poor body image including disordered eating habits, depression, and bullying. Healthy weight children are also aware of weight-related bullying that obese and overweight children faced.

Conclusions for Practice: Children prefer that the images on a body image assessment tool have detailed facial features and are clothed. Further research into body image assessment tools for use with minority children is needed.

Significance

What is already known on this topic?

Body dissatisfaction is present in minority children. Research on how Native American and African American children perceive body image assessment instruments that use images of children is limited. It is important to learn how minority children perceive these instruments.

What this study adds?

The obese/overweight children in our study viewed themselves as healthy weight. The children preferred the FRS/silhouette to the CBIS/photo scale because they preferred images with defined body parts and facial features in drawings, not photos of other children. Minority children were aware of the presence of bullying and depression among overweight/obese children in their ethnic group.

Key words: Body image, Children, Figure Rating Scales

Objectives

Body image is a complex construct. It encompasses perception, attitude, fear of fatness, and body distortion (Banfield & McCabe, 2002) and is shaped by factors such as gender and race (McCabe & Ricciardelli, 2010; Mulasi-Pokhriyal & Smith, 2010; Rinderknecht & Smith, 2002). Body dissatisfaction has been found in children as young as three years old (Tremblay, Lovsin, Zecevic, & Larivière, 2011) and has been linked to disordered eating habits, depression, and suicide in adolescents (Barry, Pietrzak, & Petry, 2008; Brausch & Gutierrez, 2009). Research has shown that obese and overweight children are more susceptible to body image disturbances than healthy weight children (Calzo et al., 2012; Harriger & Thompson 2012). With the high prevalence of pediatric obesity, the psychological well-being of children related to body image is of great concern.

Body dissatisfaction varies by ethnic group and gender. Smith and Rinderknecht (2003), using a silhouette and survey, found 5 -18-year-old girls were more dissatisfied with their bodies than boys in a sample of Native American children. Neumark-Sztainer et al. (2002), using a survey, found that African American boys were more likely than Caucasian boys to report extreme weight control behaviors. These studies highlight the importance of addressing body image differently by gender and ethnicity.

Measuring the complexities of body image can be difficult. Therefore, multiple body image assessment instruments have been used with children (Cash & Grosso, 2005). The Figure Rating Scale (FRS), a silhouette scale, was originally developed by Stunkard, Sorenson, and Schulsinger (1983) for use with adults and has been adapted for use with children (Figure 1) (Collins 1991) including African Americans (Epperson et al., 2014) and Native Americans (Rinderknecht & Smith, 2002). The Children's Body Image Scale (CBIS), a photo scale, was developed by Truby and Paxton (2002), validated with Caucasian children in Australia, and has been used with diverse racial groups (Figure 2) (Truby & Paxton, 2008; Saxton, Hill, Chadwick, & Wardle, 2009). These instruments have been validated with children, but little research has addressed children's feedback on the instruments.

Research comparing body image assessment instruments from the perspective of low-income, minority children is sparse. Childhood obesity disproportionately affects

African American and Native American children (Ogden et al.2014), thus research with this population is warranted. Additionally, Bauer and Plescia (2014) have identified there is a gap in research with Native American communities. Therefore, the objective of this study was to determine which characteristics of a figure rating scale are preferred by Native American and African American children and to gather their opinions on body image. This was accomplished by using mixed methodology including focus groups (qualitative) and body image assessment (quantitative). There are strengths and limitations with both types of research, and the combination of methodologies could provide greater insight into the body image perception of children (Keele, 2012).

Methods

The sample included African American or Native American children that lived in households eligible for the Supplemental Nutrition Assistance Program (SNAP). Researchers coordinated with staff at afterschool programs to recruit children who were interested. Fifty-one children were enrolled in the study. Consent (parent)/assent (child) were obtained. Children were given \$10 for participating. The University's Institutional Review Board approved this research protocol.

Focus Groups

Focus groups (n=8) with 6-8 children per group were conducted at afterschool programs for minority children. Groups were separated by age (8-10 and 11-13 years) and race/ethnicity. Focus group questions pertained to body image instruments, topics related to body image perception and were framed using the Social Cognitive Theory (SCT) (Bandura, 1986) (Table 1). SCT is grounded in sociological and psychological principles and is used to research how the interaction between environmental, personal, and behavioral factors influence behavior. Questions were reviewed by SNAP educators for appropriateness and phrasing.

Two researchers, trained in focus group methodology, co-moderated all focus groups. Focus group methodology was chosen because it is a way to engage small groups of children and to allow researchers to fill in gaps in the knowledge not obtained through survey instruments. Previous research has supported the effectiveness of focus groups with children (Dammann & Smith 2010; Di Noia, Contento, & Schinke, 2007; Mulasi-Pokhriyal & Smith, 2010). Groups lasted approximately 75 minutes and field

notes were taken by one of the researchers during each focus group. Each group was audio recorded using two digital recorders and recordings were transcribed verbatim. Focus group transcripts were analyzed by the same two researchers that conducted the focus groups using the open coding method (Kruger & Casey, 2009). Researchers independently read through each transcript to obtain an understanding of the focus group as a whole and then coded each line of each transcript. After each focus group was coded, the researchers met to discuss the coding, compare the codes to ensure the meaning of each code was consistent for both researchers, and to reconcile discrepancies. Major and minor themes emerged from the codes assigned to each line of the data and field notes were referenced to improve understanding of transcripts. Representative quotes were identified throughout the coding process.

Anthropometric assessment

Height and weight were taken for each child following standard procedures (Frisancho, 1990). Body mass index (BMI) in kg/m^2 was calculated and plotted on the corresponding CDC (CDC, 2010) growth chart and categorized into underweight (<5th % BMI-for-age), healthy weight (5-85th%), overweight (85-95th%), or obese (>95th%) (CDC, 2010).

Body image assessment

Body image assessment was completed for each child by giving them each the CBIS (Truby & Paxton, 2002; Saxton, Hill, Chadwick, & Wardle, 2009) and FRS (Collins 1991) gender-specific assessment instruments, each with seven figures. Previous research has found test-retest reliability with each instrument and neither set of instruments were created for a specific race or ethnicity (Collins, 1991; Truby & Paxton, 2002). Each figure was assigned a letter, A through G, and the same letter corresponded to the same figure size on both instruments. Children were asked to circle one silhouette/photo of “the boy/girl that looks the most like you” (perceived body image) and “the boy/girl that you would most like to look like” (ideal body image). For data entry, ‘A’ was coded as 1 and continued through ‘G’, coded as 7. Going forth, figures will be referred to as 1 through 7.

Data Analysis

Quantitative data were analyzed using the Statistical Package for the Social Sciences for Windows version 20.0 (SPSS, Chicago, IL). Frequencies, means, standard deviations and percentages were calculated for descriptive analysis. Body dissatisfaction score was calculated from the absolute value of the difference between ideal and perceived body size.

Results

Forty-six of the 51 children enrolled in the study completed both the focus group and survey, and 51 completed the survey data only (25 girls, 26 boys; 27 African American, 24 Native American) (Table 2). The sample size was deemed adequate because saturation was reached (Kruger & Casey, 2009). The average age was 10.4 years old and 2.0% were underweight, 29.4% were healthy weight, 27.5% were overweight, and 41.2% were obese.

Body Image perception

Half of all boys were satisfied with their current body size when using both instruments; 36% and 32% of girls were satisfied with their current size on the CBIS and FRS, respectively (Table 3). Both boys and girls chose smaller perceived body size than their actual body size on both instruments. Healthy weight children chose healthy weight images on both instruments; however, the figures chosen by obese and overweight did not correlate with their actual BMI. Boys chose the body size of 3.5 (CBIS) and 4.5 (FRS). Girls chose 3.8 (CBIS) and 4.3 (FRS) (Table 4). Girls did not choose the smallest figure (1) or the largest (7) on the either instrument. Boys chose all figures except for the largest figure (7) on the FRS, but with the CBIS they did not choose the smallest (1) or largest (7) figure (Table 5).

Ideal Body image

The mean ideal body size was 2.6 for boys and 2.9 for girls on the CBIS and 3.8 for boys and 3.5 for girls on the FRS. Over 60% of boys chose figures 2 or 3 as their ideal body size (Table 6) and the majority of girls chose figures 2-4 as their ideal body size on the CBIS. On the FRS, 92% of boys and 80% of girls chose figures 3 or 4 (Table 6).

Body Dissatisfaction

Half of the boys and approximately one-third of girls were satisfied with their current body size on both instruments. Approximately 50% of boys and 56% of girls chose a thinner ideal body on the CBIS and 46% of boys and 64% of girls chose a thinner ideal body on the FRS (Table 3).

Focus Group Results

Major themes that emerged across focus groups included a) preference towards FRS/silhouette body image instrument, b) external factors influencing body image, and c) attitudes towards body size. Quotes listed on Table 7.

Preference towards the FRS/silhouette body image instrument

Children described the FRS as cartoonlike, but detailed. Children identified the hair, facial features, clothing, and stomach definition on the FRS. They reported they were better able to identify with the figures that showed more detail. Girls preferred the FRS because the girl's bodies were fully covered, as one African American girl stated "The [FRS] it looks like it has on a bathing suit; it covers the person. The [CBIS] only has on some panties, and that's kind of disturbing." Also, children could see indicators of body size, including rib cage and legs, more clearly. They were "able to see the shape more clearly" on the FRS versus the CBIS.

Children reported they were less able to identify with the CBIS instrument because the facial features were missing and clothing was limited, but they also reported the CBIS was "more realistic". The color differences between the FRS (black and white) and the CBIS (shaded) deterred the children from the CBIS. They reported it was more difficult to differentiate between the body sizes in the figures and reported there were fewer "thin" figures on the CBIS than on the FRS.

External factors influencing body image

Subthemes relating to this theme were family and media.

Family

Family influenced children's perception of their body. Children discussed comments their parents made on body sizes and they were confused about their body size because the child's perception differed from their parents comments. To illustrate, a

Native American boy reported that he saw himself as ‘chubby’, but his dad told him he was ‘healthy’.

Media

Children were exposed to media and television programs, and commercials influence children’s body image. Girls were influenced by thin models presented in the media and reported commercials/infomercials that “tell you how you should look”. Children learned how to lose weight from infomercials and determined “the right size you should be is medium”.

Attitudes towards body size

Subthemes under attitude towards body size were attitudes towards self and attitude towards others.

Attitude towards self

Children included both physical and psychological characteristics when describing positive characteristics of themselves; examples included their stomach (‘6-pack’), hair, muscles, and ability to play video games well. Many children preferred their current body size, although some wanted to be taller, stronger, smaller, or bigger. For example, one African American boy wanted “bigger” legs and an African American girl wanted larger thighs. A Native American girl stated her ideal body is, “bigger for your muscles and smaller for your stomach.”

Overweight and obese children reported negative emotional factors related to their weight. An African American boy stated, “It’s not fun because people start teasing you because you’re fat and then you ask yourself: Why did you do that?” A child reported she coped with weight-related teasing with eating. A few healthy weight children reported wanting to avoid weight gain. One child stated, “Some people want to lose weight because they don’t want to get all fat and ugly.”

Attitude towards others

Children reported personality (being nice and helpful) and having a sense of style were the most important qualities when choosing a friend. Most children did not place importance on size of their friends, especially in the Native American groups. Instead, children chose friends that are protective, “care about you”, and “have courage for you”.

However, one girl did list size as an important characteristic in her friends because she needed her friends to “be able to walk”.

The children were aware of bullying towards overweight and obese children and depression in this group of children. Native American children with healthy weights discussed their responsibility to stop bullying and the importance of respecting others. Depression in overweight children was discussed. A Native American girl stated, “If they get really fat, they might just kill themselves... It just matters that you are alive and they just be who they want to be...size doesn’t matter; you are still in this world.” African American children did not discuss bullying or suicidal thoughts related to weight.

Discussion

This study investigated body image assessment tools and body image perspectives in Native American and African American boys and girls. It found that half of the boys and most of the girls were dissatisfied with their bodies. Findings from this study were: a) children preferred the FRS/silhouette to the CBIS/photo, b) family and media were the most influential on how children viewed their body, and c) children were aware of negative consequences related to overweight and obesity, including bullying and depression. Most body image research compares Caucasian children to minority groups, but this report focused on research related to African American and Native American children independent from the majority ethnic group.

Body Image Instruments

In the current study, regardless of gender or race/ethnicity children voiced their preference towards the FRS. The facial features and defined body parts made the body size of each FRS easier for them to see. Children may not be able to compare themselves to an image as easily as adults and may require the detail of certain body parts in order to identify with a figure. Also, children may have difficulty projecting their body size onto a ‘real’ photo of a person; therefore, they were better able to envision themselves as a ‘cartoon-like’ image on the FRS. The shading on the CBIS was distracting and may have made it difficult to determine the body size of the image on the CBIS. The lack of facial and body details and dark shading of images were the main barriers found by children in this study.

Ideal Body and Body Dissatisfaction

Both boys and girls reported dissatisfaction with their body size, but more girls (approximately 55%) than boys (approximately 40%) desired a thinner body size. Similar to our findings, Bernier, Kozyrskyj, Benoit, Becker, and Marchessault (2010), using silhouette and survey data, found 10-11-year-old girls were more likely to want a different body size than boys. Although body dissatisfaction was more prevalent among girls, body dissatisfaction was also present among Native American and African American boys. Story et al. (1994) using a survey, found Native American boys were dissatisfied with their bodies and had increased likelihood of weight control behaviors (vomiting, binge eating behaviors) when compared to other children in rural Minnesota. Another survey with African American boys found they were more likely to engage in potentially unhealthy weight control behaviors than Caucasian boys (Neumark-Sztainer et al., 2002).

The current study also found that African American and Native American children did not want to be obese and did not see themselves as obese, even if they were. This was shown by children choosing figures 1-5, but never figure 6 or 7 as their ideal body size on both instruments. Furthermore, children verbalized the fear of weight gain in focus groups, this was illustrated by an African American boy who stated, "I want to learn how big people get ... you know, F-A-T...it's my worst nightmare". Xanthopoulos et al., (2011) using a survey, also found weight status was the greatest predictor of body satisfaction in an ethnically diverse sample of children. In our study, a large percentage of overweight and obese adolescents were also dissatisfied with their bodies. Our results indicate body dissatisfaction is evident in Native American and African American children.

In this study, there were variations in ideal body between ethnic groups. Native American boys and girls chose a larger ideal body size than African American girls on the CBIS. This may be caused by Native American children having a larger actual body size and higher BMI, suggesting they have a better understanding of their body size. Previous research has shown Native American and African American children prefer larger body sizes overall when compared to Caucasian children (Lynch, Heil, Wagner, & Havens, 2007; Kelly, Bulik, & Mazzeo, 2011). To our knowledge, there has been limited

research regarding body satisfaction in pre-adolescent African American and Native American children of both genders that is not compared to Caucasian children. Our research supports that there are differences in ideal body size among ethnic groups and further research with minority children, especially those that are at high risk for obesity, is needed.

Factors influencing Body Image and Psychosocial Factors Related to Weight

In the present study, the children's body image was influenced by their parents. The children reported that their parents did not have concerns with their weight even though over 60% of children were overweight or obese. Research by Dammann, Smith, and Richards (2009) with a group of low-income African American, Caucasian, Native American, and Hispanic children also showed that mothers significantly underestimated the weight of their children, especially if their children were overweight or obese. Children also had an inaccurate view of their weight and saw themselves as healthy weight when, in fact, they were overweight or obese. For nutrition interventions with this population to be effective, care must be taken to consider the child's perception of their weight status, and a better understanding about weight perception and weight tolerance in minority groups is needed.

Also, children incorporated commercials and infomercials into their definition of ideal body size. Their media role models were actors in infomercials and 'medium' was the most acceptable body size. This reflects the larger ideal body size that has been found previously in Native American and African American children (Kelly, Bulik, & Mazzeo, 2011; Lynch, Heil, Wagner, & Havens, 2007).

When discussing body size, children were aware of the psychological effects of being overweight. The connection between body size and depression, bullying, and teasing has been found in a group of preadolescents (Brausch & Gutierrez, 2009). All children, regardless of body size, discussed depression and bullying in their overweight and obese peers. Some children reported a personal responsibility to protect others from bullying. This study demonstrated that body image concerns in children extend beyond weight and encompass psychological issues, and that healthy weight children are aware of these concerns.

Limitations

Research with children can be challenging, but every effort was made to minimize potential problems. While our sample size was relatively small for quantitative data, it was more than adequate for qualitative data. Data from focus groups achieved saturation point, thus indicating adequate sample size (Kruger, 2009). Furthermore, we understand the complexities of body image assessment, made the decision to focus our attention on obtaining information on just two types of instruments (CBIS/photo and FRS/silhouette), and complemented that with focus group discussions. Additionally, this sample targeted minority children, particularly Native American and African American youth, and data may not be generalizable to other groups of children.

Conclusions for Practice

The current study adds to the research on body image in Native American and African American children by gathering feedback on two assessment instruments and collecting qualitative data to better understand their beliefs on body image. This is important because these minority groups should be allowed to have viewpoints independent of Caucasian children. The children preferred a body image assessment instrument with facial features and detailed body parts that are easily seen. A two-piece swimsuit for girls may make the image more appropriate to look at. Also, the children experienced negative consequences related to poor body image including depression and bullying. The children in this study did not see themselves as overweight or obese and this lack of weight awareness may be important to consider when addressing childhood obesity in Native American and African American populations. The findings from this research highlight the importance of understanding body size perception and body image concerns in minority groups of children. Our research supports the use of multiple methods to understand body image and there is a continued need for research to develop culturally appropriate assessment instruments. The implications of our results suggest that outlined silhouette scale may be more acceptable to our minority children than the photograph scale. The shading and color of the photographs matter to children and this concern could be better controlled for when using the silhouettes that do not have any shading. More testing on the acceptability of figure rating scales with minority groups is

needed to determine if we can use one, single figure rating scale for all race/ethnic groups or if we need separate scales.

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Table 1. Focus group questions related to body image and instruments grouped by Social Cognitive Theory construct.

<p>Environmental:</p> <p>What influences how you think about your body?</p> <p>What does your family tell you about bodies or body size?</p> <p>What do your friends tell you about your body size?</p> <p>What do you think about shapes and sizes of people on television? Do these images influence you?</p>
<p>Behavior:</p> <p>What types of things do people do that effect their body shape?</p> <p>How does food influence your body shape/size?</p> <p>How does exercise influence your body shape/size?</p>
<p>Personal:</p> <p>How do you feel about your body?</p> <p>What do you like about your body? What would you like to change?</p> <p>Do you think it matters if someone is thin or fat? Why?</p> <p>How do you pick your friends? Is it based on body shape or size or other things?</p>
<p>Questions related to the body image instruments:</p> <ul style="list-style-type: none"> - Which pictures are easier to talk about, the photos or the figures? Why? - Which pictures are easier to identify with, the CBIS or the FRS? Why? - What do you like/dislike about the instruments (CBIS or FRS)? Why?

Table 2: Focus group youth participant demographic and weight characteristics

	All n=51 (%)		Boys (n=26)	% (51)	Girls (n=25)	% (49)
Ethnicity						
African American	27	53	14	54	13	12
Native American	24	47	12	46	12	48
Age						
8-10 y	30	59	14		16	
11-13 y	21	41	12		9	
CDC Weight Categories*						
Underweight (<5th %)	1	2	1	4	0	0
Healthy Weight (5th-85th %)	15	29	4	15	7	28
Overweight (>85-95th %)	14	28	7	27	11	44
Obese (>95th %)	21	41	14	54	7	28
Household size (n)						
2 people	4	8				
3 people	10	20				
4 people	11	22				
5 people	3	26				
6 people	12	24				

CDC = Centers for Disease Control

* Standardized procedures were used to measure weight and height to assign categories.

Table 3. Percentage of a sample of 51 African American and Native American youth who circled thinner, same, or larger body size on the photo and silhouette instruments compared with current perception of body size.^a

	Want to be thinner^{CBIS,b}	Want to be thinner^{FRS,b}	Satisfied^{CBIS,c}	Satisfied^{FRS,c}	Want to be heavier^{CBIS,d}	Want to be heavier^{FRS,d}
All Boys (<i>n</i> =26), %	50.0	46.1	50.0	50.0	0.0	3.8
Body mass index						
Underweight (<i>n</i> =1), %	0.0	0.0	100.00	100.0	0.0	0.0
Healthy, %	0.0	0.0	100.0	75.0	0.0	25.0
Overweight (<i>n</i> =7), %	28.6	28.6	71.4	71.4	0.0	0.0
Obese (<i>n</i> =14), %	78.6	71.4	21.4	28.6	0.0	0.0
Race/Ethnicity						
African American (<i>n</i> =14), %	35.7	28.6	64.3	64.3	0.0	7.1
Native American (<i>n</i> =12), %	66.7	66.6	33.3	33.3	0.0	0.0
All Girls (<i>n</i> = 25), %	56.0	64.0	36.0	32.0	8.0	4.0
Body mass index						
Healthy (<i>n</i> =11), %	45.5	54.5	45.4	45.5	9.1	0.0
Overweight (<i>n</i> =7), %	42.9	57.1	42.8	28.6	14.3	14.3
Obese (<i>n</i> =8), %	85.7	85.7	14.3	14.3	0.0	0.0
Race/Ethnicity						
African American (<i>n</i> =13), %	46.2	46.2	53.8	53.8	0.0	0.0
Native American (<i>n</i> =12), %	66.7	83.3	16.6	8.4	16.7	8.3

^a Percentages calculated within each age and race/ethnicity categories.

^b “looks most like you” > “want to look like”

^c “looks most like you” = “want to look like”

^d “looks most like you” < “want to look like”

CBIS = Children’s Body Image Scale

FRS = Figure Rating Scale

Table 4. Descriptive data analysis for body image perception, ideal body image, and body dissatisfaction by weight status and race/ethnicity on photo and silhouette assessment instruments for 51 African American and Native American children.

	Body-image Perception^a CBIS^b	Body Image Perception^a FRS^c	Ideal Body Image^a CBIS^b	Ideal Body Image^a FRS^c	Body Dissatisfaction^d CBIS^b	Body Dissatisfaction^d FRS^c
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
All Boys (<i>n</i> =26)	3.5 ± 1.2	4.5 ± 0.9	2.6 ± 1.0	3.8 ± 0.6	1.0 ± 1.2	0.8 ± 0.9
Body mass index						
Healthy (<i>n</i> =4)	2.8 ± 0.5	3.8 ± 0.5	2.8 ± 0.5	4.0 ± 0.0	0.0 ± 0.0	0.3 ± 0.5
Overweight (<i>n</i> =7)	3.0 ± 1.0	4.1 ± 0.9	2.3 ± 1.3	3.6 ± 0.8	0.7 ± 1.2	0.6 ± 1.0
Obese (<i>n</i> =14)	4.2 ± 1.1	4.9 ± 0.7	2.7 ± 1.0	3.9 ± 0.5	1.5 ± 1.0	1.1 ± 1.0
Race/Ethnicity						
African American (<i>n</i> =14)	3.2 ± 1.1	4.2 ± 0.9	2.5 ± 1.2	3.9 ± 0.5	0.7 ± 1.3	0.4 ± 0.6
Native American (<i>n</i> =12)	4.0 ± 1.2	4.8 ± 0.9	2.7 ± .8	3.6 ± 0.7	1.3 ± 1.2	1.2 ± 1.0
All Girls (<i>n</i> = 25)	3.8 ± 1.3	4.3 ± 1.1	2.9 ± 0.9	3.5 ± 0.9	1.2 ± 1.2	1.1 ± 1.0
Body mass index						
Healthy (<i>n</i> =11), %	3.3 ± 1.1	3.9 ± 1.1	2.6 ± 0.7	3.1 ± 1.0	0.9 ± 1.0	0.8 ± 0.9
Overweight (<i>n</i> =7), %	3.4 ± 1.1	4.1 ± 1.1	3.1 ± 1.1	4.0 ± 0.6	1.1 ± 1.3	1.0 ± 1.0
Obese (<i>n</i> =8), %	5.0 ± 0.8	5.1 ± 0.7	3.1 ± 0.9	3.6 ± 0.8	1.9 ± 1.0	1.6 ± 1.0
Race/Ethnicity						
African American (<i>n</i> =13)	3.7 ± 1.3	4.4 ± 1.0	2.8 ± 0.6	3.7 ± 0.5	0.8 ± 1.1	0.7 ± 0.9
Native American (<i>n</i> =12)	3.9 ± 1.3	4.3 ± 1.3	2.9 ± 1.2	3.3 ± 1.2	1.5 ± 0.9	1.7 ± 1.0

^a Photos were scored on an instrument from 1 (thinnest) to 7 (heaviest)

^bChildren’s Body Image Scale

^c Figure Rating Scale

^d Body dissatisfaction is the absolute value of “Want to look like” minus “Looks most like you”

Table 5. The percentage of boys and girls choosing “the boy that looks most like you” or “the girl that looks most like you” by weight status and race/ethnicity using the photo and silhouette instruments for 51 African American and Native American children.^a

	CBIS_A (thinnest)	FRS_A (thinnest)	CBIS_B	FRS_B	CBIS_C	FRS_C	CBIS_D	FRS_D	CBIS_E	FRS_E	CBIS_F	FRS_F	CBIS_G (heaviest)	FRS_G (heaviest)
All Boys (n=26), %	3.8	0.0	7.7	0.0	46.2	11.5	19.2	46.2	15.4	26.9	7.7	15.4	0.0	0.0
Body mass index														
Underweight (n=1), %	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Healthy, %	0.0	0.0	25.0	0.0	75.0	25.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0
Overweight (n=7), %	14.3	0.0	0.0	0.0	57.1	14.3	28.6	71.4	0.0	0.0	0.0	14.3	0.0	0.0
Obese (n=14), %	0.0	0.0	0.0	0.0	35.7	0.0	21.4	28.6	28.6	50.0	14.3	21.4	0.0	0.0
Race/Ethnicity														
African American (n=14), %	7.1	0.0	14.3	0.0	42.9	21.4	21.4	42.9	14.3	28.6	7.1	0.0	0.0	0.0
Native American (n=12), %	0.0	0.0	0.0	0.0	50.0	0.0	16.7	50.0	16.7	25.0	16.7	25.0	0.0	0.0
All Girls (n=25), %	0.0	0.0	16.0	8.0	28.0	12.0	28.0	32.0	16.0	36.0	12.0	12.0	0.0	0.0
Body mass index														
Healthy (n=11), %	0.0	0.0	18.2	9.1	54.5	27.3	18.2	36.4	0.0	18.2	9.1	9.1	0.0	0.0
Overweight (n=7), %	0.0	0.0	28.6	14.3	14.3	0.0	42.9	42.9	14.3	42.9	0.0	0.0	0.0	0.0
Obese (n=8), %	0.0	0.0	0.0	0.0	0.0	0.0	28.6	14.3	42.9	57.1	28.6	28.6	0.0	0.0
Race/Ethnicity														
African American (n=13), %	0.0	0.0	7.7	0.0	53.8	15.4	15.4	46.2	7.7	23.1	15.4	15.4	0.0	0.0
Native American (n=12), %	0.0	0.0	25.0	16.7	0.0	8.3	41.7	16.7	25.0	50.0	8.3	8.3	0.0	0.0

^aChildren could only choose one photo. Percentages were calculated within each row.

CBIS = Children’s Body Image Scale

FRS = Figure Rating Scale

Table 6. The percentage of boys and girls choosing “the boy that you want to look like” or “the girl that you want to look like” by weight status and race/ethnicity using the photo and silhouette instruments for 51 African American and Native American children.^a

	CBIS_A (thinnest)	FRS_A (thinnest)	CBIS_B	FRS_B	CBIS_C	FRS_C	CBIS_D	FRS_D	CBIS_E	FRS_E	CBIS_F	FRS_F	CBIS_G (heaviest)	FRS_G (heaviest)
All Boys (n=26),%	15.4	0.0	26.9	3.8	46.2	19.2	7.7	73.1	3.8	3.8	0.0	0.0	0.0	0.0
Body mass index														
Underweight (n=1), %	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Healthy, %	0.0	0.0	25.0	0.0	75.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Overweight (n=7), %	42.9	0.0	0.0	14.3	42.9	14.3	14.3	71.4	0.0	0.0	0.0	0.0	0.0	0.0
Obese (n=14), %	7.1	0.0	35.7	0.0	42.9	21.4	7.1	71.4	7.1	7.1	0.0	0.0	0.0	0.0
Race/Ethnicity														
African American (n=14), %	21.4	0.0	28.6	0.0	35.7	14.3	7.1	78.6	7.1	7.1	0.0	0.0	0.0	0.0
Native American (n=12), %	8.3	0.0	25.0	8.3	58.3	25.0	8.3	66.7	0.0	0.0	0.0	0.0	0.0	0.0
All Girls (n= 25),%	4.0	4.0	28.0	12.0	48.0	20.0	16.0	60.0	4.0	4.0	0.0	0.0	0.0	0.0
Body mass index														
Healthy (n=11), %	9.1	9.1	27.3	18.2	63.6	27.3	0.0	45.5	0.0	0.0	0.0	0.0	0.0	0.0
Overweight (n=7), %	0.0	0.0	28.6	0.0	42.9	14.3	14.3	71.4	14.3	14.3	0.0	0.0	0.0	0.0
Obese (n=8), %	0.0	0.0	28.6	14.3	28.6	14.3	42.9	71.4	0.0	0.0	0.0	0.0	0.0	0.0
Race/Ethnicity														
African American (n=13), %	0.0	0.0	23.1	0.0	69.2	30.8	7.7	69.2	0.0	0.0	0.0	0.0	0.0	0.0
Native American (n=12), %	8.3	8.3	33.3	25.0	25.0	8.3	25.0	50.0	8.3	8.3	0.0	0.0	0.0	0.0

^aChildren could only choose one photo. Percentages were calculated within each row.

CBIS = Children’s Body Image Scale

FRS = Figure Rating Scale

Table 7. Selected quotes related to body image from participants by theme

<p>Theme 1. Preference towards FRS body instrument</p>	<p>“You can actually see...what shape their stomach is to see if they are too big or not too big.” (African American boy)</p> <p>“You can tell if they are fat or not”(Native American girl)</p> <p>“It’s easier on the [FRS]... I don’t really know how big my stomach is... but I know my legs for sure”(African American girl)</p> <p>“Because [on] the [CBIS], you can’t tell.” (Native American girl)</p> <p>“The [FRS] it looks like it has on a bathing suit; it covers the person. The [CBIS] only has on some panties, and that’s kind of disturbing.”</p>
<p>2. External factors influence body image</p>	<p>“My mom is mad at me because I’m less weight than her.” (Native American girl, BMI-for-age 92nd)</p> <p>“People don’t eat to be skinny like models, but then they starve themselves.” (Native American girl)</p> <p>Child learns from commercials that “the right size you should be is medium” (Native American girl)</p> <p>Cookie Monster isn’t Cookie Monster anymore, he’s Veggie Monster because there is a lot of obese people and they’re trying to stop that.” (African American girl)</p>
<p>3. Attitudes towards body size</p>	<p>“I get sad when I get chubby.” (Native American boy)</p> <p>“People degrade them, make them feel bad about them and that’s where they get more stressed and then they eat those foods.”(Native American boy)</p> <p>“People do eat their feelings ’cause... if they are sad and lonely, then you eat.” (Native American girl)</p> <p>“I don’t want a perfect friend.” (African American girl)</p> <p>“Some people in my class they are big and they get bullied a lot, but I stop that bullying.” (Native American girl)</p>

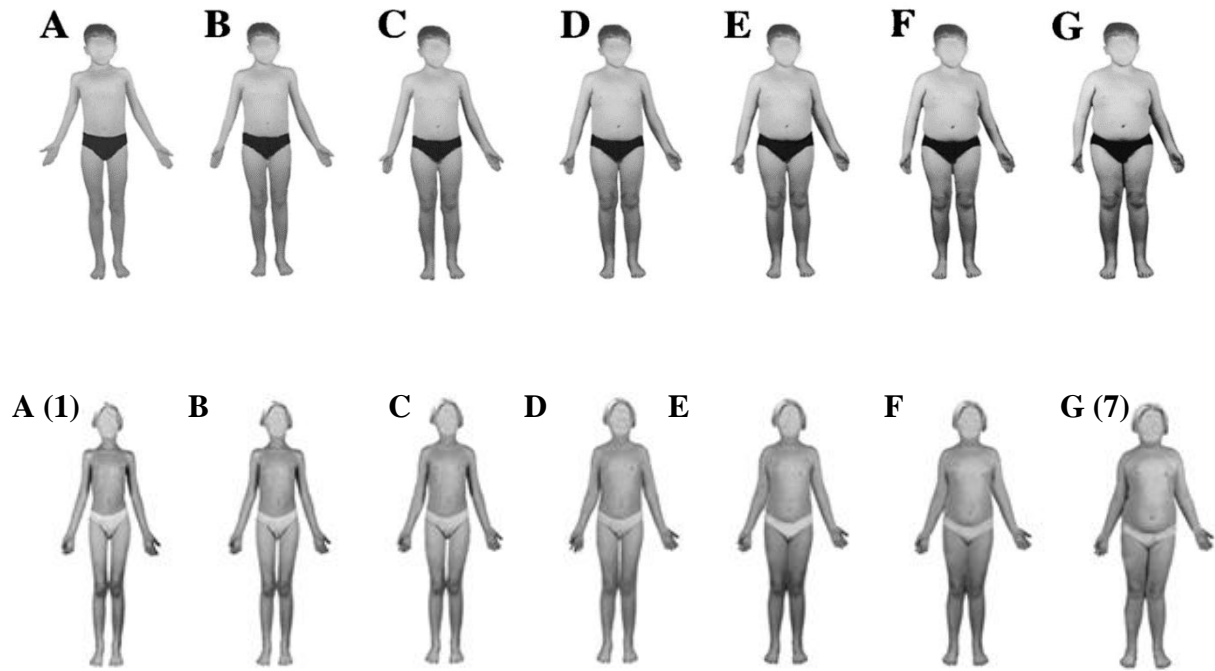


Figure 1. Children's Body Image Scale assessment tool used with a sample of 51 African American and Native American boys and girls.

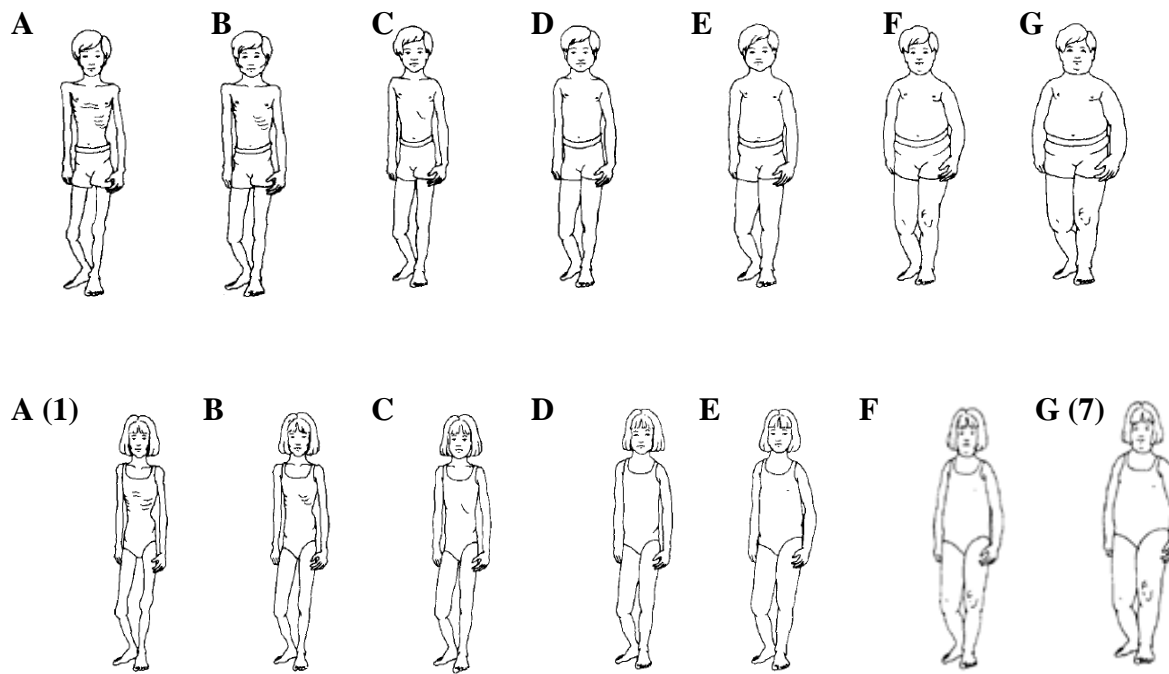


Figure 2. Figure Rating Scale assessment tool used with a sample of 51 African American and Native American boys and girls.

CHAPTER 7:

Dietitians' perspectives on integrating food and water system issues into professional practice.

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Summary

Background. Sustainable agriculture encompasses economic, environmental, and social aspects of the food system. Members of the Academy of Nutrition and Dietetics (AND) play an important role in promoting sustainable agriculture because they work in areas where they can influence the food purchasing decisions of food service operations and the public.

Objective. To investigate dietitians' behavior to incorporate issues relating to sustainable agriculture into professional practice using the Theory of Planned Behavior (TPB), and to compare the results from the 2013 survey to those from 2002.

Design. This study surveyed dietitians nationwide about their perspectives on incorporating sustainable agriculture issues into practice and compared results to a survey previously completed in 2002 by Minnesotan dietitians (n=147), thus incorporating both cross-sectional and longitudinal research methods.

Participants/setting. The 2013 sample (n=626) was drawn from a randomly selected, national sample of members of AND and compared to 2002 survey completed by Minnesotan AND members (n=147).

Statistical analyses performed. Data analysis included descriptive statistics, independent t-tests, Pearson correlations, and stepwise regressions.

Results. The sample was mostly Caucasian, female, and the average age was 45.4 ± 12.2 years. Dietitians are incorporating environmental issues into practice in 2013. Also in 2013, all four TPB variables correlated with behavior. Intention, perceived behavior control, and subjective norm were predictive of behavior to include sustainable agriculture issues into practice. Barriers to incorporate this topic into practice included lack of knowledge, ability, time, and employer support.

Conclusions. Registered dietitians are incorporating food and water system issues into practice in 2013. The AND can encourage undergraduate programs to emphasize sustainable agriculture in coursework, offer more continuing education opportunities on sustainable agriculture, and teach dietitians how to position themselves to be more influential in food purchasing decisions at work.

Key words: Sustainable Agriculture, Registered Dietitians, Practice Behaviors, Theory of Planned Behavior

Introduction

The Academy of Nutrition and Dietetics (AND) has called for dietitians and nutrition professionals to promote ecological practices that support a sustainable food system for the future.¹ Nutrition professionals and dietitians work in environments where they make decisions about food purchases and educate consumers about their decisions and, thus, play an important role in influencing the food system.¹⁻³ Dietitians' role in promoting sustainability through research and professional practice has been referred to as "civic dietetics".^{3,4} Civic dietetics assumes that sustainable agriculture and nutrient quality are of equal importance when making food choices. To better educate dietitians about issues related to sustainable agriculture and to be better equipped to help consumers make environmentally responsible food choices, the AND created the Hunger and Environmental Nutrition dietetic practice group (DPG)⁵ and publishes the *Journal of Hunger and Environmental Nutrition*.⁶

Sustainable agriculture encompasses economic, environmental, and social sustainability of the food system. According to the Farm Bill (USDA), the goal of sustainable agriculture is to meet human dietary needs while preserving the natural and nonrenewable resources needed for food production, supporting local farmers, advancing the quality of the community, and improving food security.^{7,8} Research has shown that consumers are interested in purchasing sustainably produced foods, but may have difficulty differentiating between sustainable and conventional agriculture.⁹⁻¹¹ Robinson et al.¹⁰ conducted an eight week intervention to improve consumer awareness of sustainably produced foods at a grocery store and found consumers (n=550) were interested in sustainably produced foods and the intervention was effective. Nutrition professionals can use their expertise to educate consumers about ways to support a sustainable food system, including partnering with farmers' markets, purchasing a share in community supported agriculture, choosing organically produced products, and purchasing foods from food cooperatives.

Previous research with dietitians about incorporation of food and water sustainability issues into professional practice is limited. Robinson & Smith¹² conducted a survey with registered dietitians (n=147) in Minnesota and found 43% of dietitians had heard of sustainable agriculture, but only 13% included environmental issues into their

professional practice. Hawkins et al.¹³ administered a survey to assess the attitudes, awareness, and practice-related behaviors related to climate change among registered dietitians (n=570) in the United States and found 75% of the sample viewed climate change as a major concern, however only 34% agreed that dietitians should have a role in reducing climate change and 38% engaged in activities that promoted diet as a factor affecting climate change. Using qualitative research methodology, Hawkins et al.¹⁴ explored how registered dietitians (n=17) made the connections between diet, environmental health, and climate change. The three themes that emerged to describe how the dietitians became concerned with climate change were authoritative knowledge, experiential knowledge, and environmental experiences during youth.¹⁴ The researchers concluded there is a need to support pro-environmental self-efficacy among dietitians. The results of the available literature support the need for further research into the factors that influence dietitians' perspectives about incorporating sustainable agriculture into their professional practice because, overall, the majority of dietitians are not doing so on a regular basis.

The purpose of this research was to: a) investigate dietitians' behavior incorporating issues relating to sustainable agriculture into professional practice using the Theory of Planned Behavior (TPB) (Ajzen, 1991); and b) to compare results from the 2013 survey to those from 2002 specifically related to the TPB variables and the importance dietitians place on having knowledge about agricultural issues. We used the TPB to test the hypotheses that a) attitude, perceived behavioral control (PBC), subjective norm, and intention correlate with behavior in 2013 and b) more dietitians incorporate issues related to sustainable agriculture into practice in 2013 than in 2002.

Materials and Methods

Subjects

The 2013 survey was sent electronically to a randomly selected sample of Academy of Nutrition and Dietetics (AND) members (n=4800) whose mailing addresses were equally distributed across four regions of the United States (Northeast, Midwest, South and West), using e-mail lists provided by the Commission for Dietetic Registration (CDR). The survey was administered and data were collected and managed using the REDCap (Research Electronic Data Capture v5.6.1, Vanderbilt University, Nashville,

TN) system hosted at Clinical and Translational Science Institute at Children's National Medical Center, a partnership with The George Washington University.¹⁵ The Institutional Review Boards at both universities approved this research protocol. Informed consent was obtained from participants prior to beginning the survey, and participation was encouraged by entering survey respondents in a drawing for a Kindle Fire HD (Amazon.com, Inc., Seattle, WA).

Survey Design

The survey used for this study was originally developed, administered, and validated in 2002 with members of the Minnesota Dietetic Association (n=147)¹² and repeated in 2013-2014. This survey was created to identify dietitian's perspectives on incorporating issues sustainable agriculture issues into their practice using the TPB as the theoretical framework. Developed by Azjen,¹⁶ the TPB states that intention is the major determinant of behavior, with subjective norms, PBC, and attitude influencing intention. This theory has previously been applied to research on food choice, dietary behavior, and dietitian behavior.¹⁷⁻²⁰ The initial 2002 survey¹² provided comparative data for the current project.

The survey included scaled variables based on the TPB (attitude, PBC, subjective norm, intention, and behavior) and importance of knowing about issues related to sustainable agriculture. All variables were scored from -3 to +3 with -3 representing the most negative score and +3 representing the most positive score. The survey also asked participants to provide data on demographic factors, including age, sex, race/ethnicity, education level, years in dietetics practice, political affiliation, professional affiliations, and area of dietetics practice.

To develop the original survey (2002), an elicitation survey was sent to a sample (n=19) of Minnesota Dietetic Association members who were all dietitians.¹² This information was used to create a preliminary survey that was completed by 20 dietitians in Minnesota to evaluate the content validity, readability, understandability, and ease of completion. Based on the pilot data, Cronbach alpha values for the variables ranged from 0.69 to 0.93¹² and these values are interpreted as "substantial" (0.61 to 0.80) to "almost perfect" (0.81-1.0).²¹ A second pilot survey was sent to a different sample of dietitians (n=19) throughout the United States in 2012, including a subsample from Minnesota, to

assess the internal reliability. The Cronbach alpha scores for the second pilot were similar to the first and the range was 0.67 to 1.0. Further, for the 2013 survey (n=626), Cronbach alpha scores ranged from 0.73 to 0.97 and the scores for the specific scales are presented in this paper.

The attitude variable examined the perception each dietitian had about incorporating issues related to sustainable agriculture into practice and whether they had a positive or negative opinion about the belief. Ten questions measured attitude on the survey: likelihood for the dietitian to improve client knowledge; likelihood of being viewed as unconventional by colleagues; educating about foods that may be healthier, too costly, difficult to access, are not clearly labeled; and educating about issues that coincided with their personal values, issues that were not based on science, were outside their personal scope of work, or that they were not in agreement with. Participants rated their belief about the possible outcomes for each belief (behavioral belief) as they related to integrating sustainable agriculture discussions into their practice and participants evaluated each outcome (outcome evaluation). Scores were calculated by multiplying the behavioral belief with the corresponding outcome evaluation, then summed. Internal reliability for the 10-item attitude scale was Cronbach alpha = 0.73.

PBC (control belief) reflected the dietitian's subjective belief about their control over whether or not they taught clients about sustainable agriculture. This variable was measured on the following nine conditions: personal interest, appropriateness, adequate budget, employer support, knowledge level, ability, time, level of interest, and clients' ability to understand sustainable agriculture and related issues. All scores were summed and the internal reliability for this scale was Cronbach alpha = 0.90.

Subjective norm examined dietitians' beliefs about eight sources of influence (employer, colleagues, dietitians, food industry, corporate executives, clients/patients, ADA (2002 survey)/AND (2013 survey), and the Society of Nutrition Education and Behavior and if each group would expect dietitians to teach about issues related to sustainable agriculture (normative belief). This variable also measured the dietitian's motivation to comply with each referent group. The scores were calculated by multiplying each subjective norm with the corresponding motivation to comply value,

then summed. The internal reliability for the 8-point subjective norm scale was Cronbach alpha = 0.79.

Intention was rated by the participant if they intended or planned to integrate issues related to sustainability into their practice in the next six months. Scores for intention were summed and internal reliability was 0.97. Behavior was rated using the variable, “Within the past six months, I have incorporated issues pertaining to sustainable agriculture into my professional practice”.

In addition to TPB variables, importance of knowing about issues associated with agriculture was also assessed. This was measured on an eight item scale that included agriculture’s effect on natural resources, the environment, the economic stability of farmers, animal welfare, water quality, soil quality, preservation of rural communities, use of antibiotics in livestock, and use of synthetic chemicals and pesticides. Similar to TPB variables, each response was scored on a 7-point scale from -3 to +3 with -3 indicating “extremely unimportant” and +3 indicating “extremely important” and scores were summed. Internal reliability for this scale was Cronbach alpha = 0.96.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows version 21.0 (SPSS, Chicago, IL). The final sample size met requirements for at least 80% power to detect a difference of 0.5 in Likert scale scores and non-responses. The statistical analysis was conducted using scale means for the non-missing data. Descriptive information is presented as means and percentages. Independent t-tests and Pearson correlations were used to compare selected demographic information to independent and dependent variables based on the TPB. Pearson correlations were used to compare subjective norm, attitude, and PBC to intention and subjective norm, attitude, PBC, and intention to behavior. Stepwise regression analyses were used to identify the demographic and psychosocial variables that predicted behavior. For analysis, age groups were 18-40 and >40. This was determined to be appropriate because there were no significant differences among TPB variables between 18-30 year olds compared to 31-40 year olds and so these two younger aged groups were combined for final analysis. Demographic information was compared to 2002 survey participants using independent samples t-tests. Statistical significance was set at the p value <0.05 .

Results

2013 Survey

A total of 626 respondents answered the TPB questions and were included in the final analysis. There was no statistically significant difference in region of residence between responders and non-responders. The final sample included dietitians from 48 states and 26 of 626 participants were from MN. Demographic characteristics of the sample are reported on Table 1. The majority of the sample was Caucasian (89%) and female (96%). The age range was 24-82 years with the mean age of 45.4 ± 12.2 years. According to the 2013 CDR data, 12.7% of practicing dietitians are non-white and 1.6% are male and this is comparable to our sample.²²

Of the sample, 89% of participants had heard of sustainable agriculture, 47% integrated this topic into their practice, and 93% reported that how and where food is produced influences health outcomes (Table 2). More than a third of dietitians (37%) reported that their clients asked questions about sustainable agriculture and related issues (Table 2). When rating client interest, 50% of dietitians said that less than 25% of their clients would be interested in issues related to sustainable agriculture, 22% said that 25-49% would be interested, 18% that 50-74% would be interested, and 10% that 75-100% of their clients would be interested (Table 1).

Age group, years of practice, and ethnicity were not associated with any of the TPB variables (Table 3). Non-clinical dietitians were more positive in regards to PBC ($p < 0.001$), intention ($p < 0.001$), and behavior ($p < 0.001$) about incorporating sustainable agriculture issues into their professional practice than clinical dietitians. Dietitians with an advanced degree had more positive PBC ($p < 0.001$), intention ($p < 0.001$), and behavior ($p < 0.001$) than dietitians with a bachelor's degree. Individuals who self-identified as democrats ($n = 131$) were significantly more likely to have incorporated sustainable agriculture into their work during the past 6 months than those who self-identified as republicans ($p = 0.009$).

PBC, subjective norms, and attitudes were correlated with intention and each of the three variables along with intention were correlated with behavior (Figure 1). PBC had the strongest correlation to intention. Results on the specific PBC items showed that dietitians were interested in issues related to sustainable agriculture and believed that this

topic is appropriate to their professional practice, however employer support, client's interest, the ability to understand the topic, and the lack of adequate time, knowledge, and budget negatively affected their ability to incorporate issues related to sustainable agriculture into their practice (Table 4). Further, dietitians reported that familiarity with issues associated with agriculture practices among dietitians was only somewhat important.

Stepwise regression with behavior as the dependent variable and the TPB constructs (attitudes, PBC, subjective norm, and intention) as independent variables indicated that intention predicted 49.0% of variance ($p < 0.001$), PBC predicted 4.1% of the variance ($p < 0.001$), and subjective norm predicted 0.4% of the variance ($p < 0.001$) in behavior (Table 4). Further, to determine the specific item(s) of each construct that was/were most predictive of behavior, all 48 questions that composed attitude, PBC, subjective norm, and intention were run as independent variables and behavior as the dependent variable. Two of the 48 questions accounted for 54.9% of the variance in behavior. *“Within the next six months I intend to incorporate issues pertaining to sustainably produced foods into my professional practice.”* (intention) explained 48.7% of variance ($p < 0.001$) and *“I am able to incorporate issues related to sustainably produced foods into my professional practice.”* (PBC) explained 6.2% of variance ($p < 0.001$). An additional seven items explained a combined 4.4% variance ($p < 0.001$ for each) were *“I am adequately informed about issues pertaining to sustainably produced foods.”* (PBC), *“The Academy of Nutrition and Dietetics would approve/disapprove of your incorporating issues of sustainability into professional practice.”* (subjective norm), *“My place of employment has an adequate budget to allow me to incorporate issues pertaining to sustainably produced foods.”* (PBC), *“I would have adequate time at work to incorporate issues pertaining to sustainably produced foods into my professional practice.”* (PBC), *“I would be educating about issues that are outside my scope of work.”* (attitude), *“I would be educating about foods which may not be clearly labeled as to how and where they were produced.”* (attitude), and *“Within the next six months I plan to incorporate issues pertaining to sustainably produced foods into my professional practice.”* (intention) (Table 4).

Comparison of 2002 and 2013 results:

When compared to the sample that completed the survey in 2002, the participants of the 2013 survey were significantly older, more educated, and had more years of practice (Table 1). Political affiliation also differed by survey, but it is important to note that ‘prefer not to answer’ was not an option on the 2002 survey. On the 2013 survey, more dietitians had heard of sustainable agriculture ($p < 0.001$), reported clients asked about this topic ($p < 0.001$), and integrated issues related to sustainable agriculture into their practice ($p < 0.001$) than in 2002 (Table 2).

Results from the 2002 survey showed that attitude did not correlate with behavior (Figure 2), but in 2013 attitude entered into the correlation model (Figure 1). Further, in 2013 there was a positive change in dietitian’s perceptions of the following facilitating conditions compared to 2002: interest, appropriateness, ability, adequate time, and adequate knowledge ($p < 0.001$ for each) (Table 4). When rating the topics that dietitians perceive as important for members of their profession to have knowledge on, there was a significant increase in the importance of knowing about agriculture’s effect on animal welfare ($p < 0.001$) and a decrease in the importance of knowing about agriculture’s use of antibiotics or hormones in livestock ($p < 0.001$) (Table 2).

Discussion

In this study, the TPB was used to identify the relationships of PBC, subjective norm, and attitude to intention and behavior to incorporate issues related to sustainable agriculture into dietetic practice. We hypothesized that all TPB variables (attitude, PBC, subjective norm, and intention) would correlate with behavior in 2013 and that more dietitians would incorporate environmental issues into practice in 2013 than in 2002. Each of these hypotheses were supported through data analysis. Additionally, this study revealed that intention was highly predictive of behavior to incorporate issues related to sustainable agriculture into practice followed by PBC and subjective norms. Other findings were as follows: a) attitudes entered into the TPB correlation model with behavior; and b) there were improvements in dietitians’ perceptions towards most of the facilitating conditions (PBC); these were improvements over observations with Minnesotan dietitians in 2002.¹² These findings suggest that dietitians lack knowledge, ability, time, and employer support to include sustainability issues in practice.

Our results show that the majority of dietitians heard of sustainable agriculture and most reported that how and where food is produced influences health outcomes in 2013. However, less than half (47%) of dietitians incorporated environmental issues in 2013. These findings are similar to those by Hawkins et al.¹³ who found that only 34% of dietitians reported that dietitians should play a role in reducing environmental issues that contribute to climate change. A study by Sulda et al.²³ with dietitians in South Australia found that dietitians believed that health issues (obesity, diabetes, etc.) were more important to their work than climate change. Research from the United Kingdom has shown that a healthy diet that focuses on local fruits and vegetables and minimizes animal products can reduce greenhouse gas emissions and the environmental cost of food.²⁴ This type of healthy diet can also decrease risk of health issues and comorbidities.²⁴ Dietitians can use this information in practice by educating clients on ways to select sustainable produced dairy and meat products.²⁵ Thus, nutrition education can coincide with sustainability issues.

Providing information to dietitians about how dietary changes towards a healthier diet can also be beneficial to the environment may improve their ability to incorporate environmental issues into their practice. This type of information may be a way to improve clinical dietitians' PBC related to incorporating sustainability into practice. Because many clinical dietitians work with secondary and tertiary care patients, that have more advanced illnesses such as cancer and renal disease, they may not see the value in discussing sustainable agriculture with their patients. It was evident that this higher level of patient care was a barrier for clinical dietitians in our survey through the comments they wrote. Many comments stated or implied that clinical dietitians worked with more advanced stage illnesses and sustainable agriculture would not be an important issue for their patients, yet many patients with advanced illnesses often seek out alternative health care options.²⁶ Clinical dietitians were less likely to incorporate this topic into their practice than non-clinical dietitians, thus education that targets this specific demographic may be useful.

The TPB variables that explained the greatest amount of variation in behavior were intention and PBC. This suggests that trainings geared to increasing intention and PBC could be the most effective way to get more dietitians to educate about

sustainability. Research using the TPB to determine American dietitians' beliefs about teaching fruit and vegetable safety also found that PBC was most predictive of intention.¹⁸ The specific PBC items that were predictive of behavior were ability, knowledge, employer has adequate budget, and adequate time. Improving dietitians' abilities and knowledge of sustainability, and providing them with guidance and support to advocate for increased budget and time from employers, could promote increased incorporation of sustainability into practice.

Possible ways to meet these education needs may be to include a course on food systems or sustainability into dietetic program required coursework. The Accreditation Council for Education in Nutrition and Dietetics (ACEND) determines the competencies that dietetic programs must teach and in the current standards (2012) there is one knowledge competency that includes food systems, "The food and food systems foundation of the dietetics profession must be evident in the curriculum. Course content must include the principles of food science and food systems, techniques of food preparation and application to the development, modification and evaluation of recipes, menus and food products acceptable to diverse groups".^{27(p.57)} Currently, many institutions may include environmental issues in the coursework (in a lesson or two) but not as a separate course. Adding a specific competency to provide more specific guidance to ACEND-accredited programs about how to integrate this important issue into their curriculum may be useful to ensure dietetic students gain food system knowledge while in an undergraduate program.

The 2013 survey also found that dietitians' attitudes about including sustainable agriculture into their work entered the correlation model with intention and behavior (Figure 1, 2). This is an improvement when compared to the 2002 survey with Minnesotan dietitians. The addition of Journal of Hunger and Environmental Nutrition (JHEN) and the Hunger and Environmental Nutrition Dietetic Practice Group (DPG) since 2002 may have contributed to the change in attitudes. Another possible explanation for improved attitudes may be that the public may be more aware of environmental issues and climate change that have been connected to conventional agricultural practices.²⁸ Our data also showed that dietitians perceived that more patients were aware of water and food supply issues in 2013 than they were in 2002 (Table 1).

Finally, the influence of AND/ADA was the only subjective norm that was predictive of behavior. This indicates that the AND is an important referent group for dietitians and therefore, their position on sustainability may influence whether or not dietitians include this topic in their practice. The position of the AND/ADA is supportive of a sustainable food system (position statement) and increasing dietitians' awareness of the position statement may promote more dietitians to include this topic in practice. The Hunger and Environmental Nutrition DPG, with guidance from the Academy of Nutrition and Dietetics Quality Management Committee, has recently developed and published the Standards of Professional Performance for Registered Dietitian Nutritionists (Competent, Proficient, and Expert) in Sustainable, Resilient, and Healthy Food and Water Systems²⁹ which Registered Dietitian Nutritionists can use to assess their current skill levels and to identify areas for further professional development related to sustainable food and water systems. The AND could offer continuing education opportunities focused on the subject, such as webinars, seminars, journal publications, etc., and to encourage dietitians to set a professional goal related to sustainable agriculture into their professional development portfolio. The Journal of the Academy of Nutrition and Dietetics may be another platform for the AND to educate dietitians and this could be done by publishing more articles about sustainable agriculture and environmental issues. Based on literature review, there were three articles on sustainability or environmental issues published in 2002 and only four articles in 2013.³⁰

Strengths/Limitations

There were many strengths to our research. First, our sample size was relatively large and included dietitians in 48 states. Second, our results suggest that dietitians' attitudes towards including environmental issues in practice have improved since 2002. Finally, dietitians with a strong sense of PBC tend to incorporate this topic into their professional work.

As with all studies, there were limitations. One limitation was that the participants for the 2013 survey were drawn from a nationwide sample and these data were compared to a statewide 2002 sample that may not reflect the national views. We included some dietitians from Minnesota in our nationwide sample, but we realize the two samples may not be completely congruent. However, a comparable national survey

does not exist. Another limitation was that the response rate was 13% despite two rounds of e-mail reminders sent to respondents to complete the survey. We did anticipate a low response rate, thus sending the survey out to a larger group. Our response rate was similar to the response rate of 14.6% that Hawkins et al.¹³ received from their sample of registered dietitians across the United States. The most common reason cited for the lack of responsiveness was the length of the survey (approximately 40 minutes to complete). Another limitation was the lack of ethnic and gender diversity in our sample, but the demographics of our sample were comparable to the dietetic profession.²²

Conclusions

The results of this study show that dietitians have heard of sustainable agriculture and include this topic into their professional practice. Furthermore, dietitians' attitudes towards incorporating issues related to sustainable agriculture appear to have improved and they are now more supportive of including this topic into practice. To integrate this topic into practice more consistently, dietitians need more knowledge, time, and employer support. The AND can play an important role in improving dietitians' knowledge on this topic by encouraging undergraduate programs to include a greater focus on sustainable agriculture in coursework, offering more continuing education opportunities such as webinars, lecture, and publications in JAND and JHEN on the topic of sustainable agriculture. Further, providing educational opportunities to dietitians about how to work with employers to teach them about the importance of sustainable agriculture and to help dietitians position themselves to be more influential in food purchasing decisions are needed because there is not enough time or employer support. The position of AND is that dietitians have an important role in preserving natural resources so an adequate food supply will be available for future generations. Future research to better address clinical dietitians' needs to include this topic in practice could be helpful to encourage this demographic to incorporate environmental issues more regularly into their practice. Also, research on collaborative opportunities with other healthcare professionals, the food industry, agriculture industry, and policymakers to better support a sustainable food system are needed.

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Table 1. Distribution of demographic characteristics of the registered dietitians that completed the survey on sustainable agriculture in 2002^a and 2013, in percentages using independent t-tests.

Demographic variables	MDA survey (n=147) ^{a,b}		2013 Survey (n=626) ^b	
	n	%	n	%
Gender				
Female	145	99	424	96
Male	2	1	14	3
Prefer not to answer ^c			3	1
Age				
18-30	23	16	49	14
31-40	38	27	84	24
41-50	49	34	74	22
51-60	22	15	102	30
61+	11	8	35	10
Mean age \pm SD ^d	42.7 \pm 11.6*		45.4 \pm 12.2*	
Race/Ethnicity				
White	143	98	394	89
Black or African American	0	0	7	1
Asian	2	1	12	3
Hispanic	2	1	12	3
Other	0	0	1	<1
Prefer not to answer ^c			18	4
Educational attainment*				
College degree	84	57	177	43
Advanced degree	59	40	232	57
Political affiliation				
Democratic	48	36	131	33
Republican	37	28	78	19
Independent/other	48	36	85	21
Prefer not to answer ^c			108	27

Years of practice				
<5	28	19	37	9
5-10	28	19	90	22
11-15	19	13	56	14
>15	71	49	228	55
Mean years practice \pm SD ^d	2.9 \pm 1.2*		3.2 \pm 1.1*	
Job classification				
Clinical setting	57	40	187	41
Non-clinical setting	84	60	268	59
Perceived client interest in sustainable agriculture				
<25% of clients	101	74	205	50
25-49.9% of clients	21	15	92	22
50-74.9% of clients	9	7	73	18
>75 of clients	5	4	41	10

^a 2002 data from: Robinson R, Smith C. Integrating issues of sustainably produced foods into nutrition practice: A survey of Minnesota Dietetic Association members. *J Amer Diet Assoc.* 2003;103(5):608-611.

^b Percent respondents rounded to the nearest whole number.

^c Not asked on 2002 survey.

^d SD=Standard Deviation

* p<0.001

Table 2. Dietitians’ perceptions of sustainable agriculture, the conditions facilitating the integration of sustainable agriculture and related issues into their professional practice and the importance of knowing about agricultural issues in 2002^a and 2013, using independent t-tests.

Participant perceptions and characteristics of sustainable agriculture^b	MDA survey^a (n=147)		2013 Survey (n=626)	
	Mean ± SD^c	N	Mean ± SD^c	n
Heard of sustainable agriculture prior to taking survey	0.43 ± 0.50*	147	0.89 ± 0.32*	586
Clients asked questions about sustainable foods	0.07 ± 0.26*	147	0.37 ± 0.48*	577
Integrated issues related to sustainable agriculture into practice	0.13 ± 0.34*	146	0.47 ± 0.50*	581
Believe that how/where food is produced influences health outcomes	0.88 ± 0.32	143	0.93 ± 0.25	577
Level of agreement with facilitating conditions that may influence the decision to integrate issues related to sustainably agriculture into the workplace^d				
Personal interest	0.71 ± 1.42*	147	1.14 ± 1.43*	566
Appropriateness	0.33 ± 1.48*	147	0.67 ± 1.46*	552
Employer support	-0.01 ± 1.45	147	-0.06 ± 1.68	549
Clients’ ability to understand	-0.39 ± 1.63	147	-0.53 ± 1.63	560
Clients’ interest	-0.44 ± 1.52	147	-0.46 ± 1.53	566
Personal ability	-0.46 ± 1.58*	147	0.17 ± 1.56*	560
Adequate time	-0.67 ± 1.53*	147	-0.21 ± 1.69*	562
Adequate budget	-0.86 ± 1.66	147	-0.85 ± 1.76	552

Adequate knowledge	-1.18 ± 1.51*	147	-0.17 ± 1.60*	565
Dietitians rated importance of knowing about the following issues related to agricultural practices^c				
Agriculture's use of antibiotics or hormones in livestock	2.03 ± 0.89*	147	1.77 ± 1.22*	590
Agriculture's use of synthetic chemicals and pesticides	1.97 ± 0.98	144	1.80 ± 1.25	589
Agriculture's effect on water quality	1.83 ± 0.99	147	1.75 ± 1.22	589
Agriculture's effect on natural resources and the environment	1.51 ± 1.18	146	1.67 ± 1.20	592
Agriculture's effect on soil quality	1.50 ± 1.18	145	1.62 ± 1.23	590
Agriculture's effect on the economic stability of farmers	1.30 ± 1.17	147	1.44 ± 1.30	590
Agriculture's effect on the preservation of rural communities	1.10 ± 1.41	145	1.33 ± 1.34	586
Agriculture's effect on animal welfare	0.99 ± 1.26*	147	1.28 ± 1.38*	592

^a2002 data from: Robinson R, Smith C. Integrating issues of sustainably produced foods into nutrition practice: A survey of Minnesota Dietetic Association members. *J Amer Diet Assoc.* 2003;103(5):608-611.

^b Participant characteristics scale: 0=no, 1=yes

^c SD=Standard deviation

^d Agreement scale range: -3=strongly disagree to +3=strongly agree

^e Attitude scale range: -3=extremely important to +3=extremely important

*p<0.001

Table 3. Relationship of demographic variables for AND members and TPB variables for the 2013 survey data, using independent t-tests.

	Group 1 (Mean +/- SD)	Group 2
Age ^a		
Attitude	35.5 ± 32.6	35.5 ± 37.8
Subjective Norm	25.1 ± 30.9	23.5 ± 26.3
PBC	-1.0 ± 10.0	0.46 ± 10.0
Intention	0.43 ± 3.3	0.86 ± 3.4
Behavior	-0.54 ± 1.9	-0.4 ± 2.0
Political Affiliation ^b		
Attitude	36.4 ± 35.1	35.7 ± 34.2
Subjective Norm	24.9 ± 26.9	29.0 ± 25.5
PBC	1.2 ± 10.5	-1.5 ± 9.3
Intention	0.9 ± 3.3	0.2 ± 3.2
Behavior	-0.2 ± 2.1*	-1.0 ± 1.9*
Clinical ^c		
Attitude	31.9 ± 35.9	36.8 ± 34.3
Subjective Norm	22.7 ± 29.5	26.5 ± 29.0
PBC	2.2 ± 9.4*	2.8 ± 10.1*
Intention	0.1 ± 3.2*	1.5 ± 3.1*
Behavior	-0.8 ± 1.9*	0.1 ± 1.9*
Education ^d		
Attitude	31.5 ± 35.4	35.0 ± 35.9
Subjective Norm	24.8 ± 28.3	24.6 ± 28.8
PBC	-2.0 ± 9.6*	1.5 ± 10.2*
Intention	0.1 ± 3.1*	1.2 ± 3.3*
Behavior	-0.9 ± 1.9*	-0.1 ± 2.0*
Ethnicity ^e		
Attitude	34.6 ± 36.5	32.8 ± 35.2
Subjective Norm	24.4 ± 28.8	25.5 ± 21.5
PBC	-0.1 ± 10.3	1.3 ± 10.4

Intention	0.64 ± 3.3	1.2 ± 2.95
Behavior	-0.4 ± 1.98	-0.29 ± 2.0
Years of Practice ^f		
Attitude	31.9 ± 35.2	33.5 ± 35.5
Subjective Norm	23.9 ± 28.7	25.7 ± 28.4
PBC	-0.52 ± 10.4	0.03 ± 9.9
Intention	0.64 ± 3.5	0.68 ± 3.1
Behavior	-0.53 ± 1.98	-0.4 ± 1.98

^a Group 1: ≤40 years old (n=133); Group 2: >40 years old (n=211)

^b Group 1: Democrat (n=131); Group 2: Republican (n=78)

^c Group 1: Yes (n=207); Group 2: No (n=191)

^d Group 1: Bachelor's degree or less (n=177); Group 2: Advanced Degree (n=233)

^e Group 1: White (n=396); Group 2: Non-white (n=49)

^f Group 1: ≤15 years (n=185); Group 2: >15 years (n=228)

*p<0.001

Table 4. Stepwise regression analysis for dietitians’ behavior to include issues pertaining to sustainability into their professional practice in 2013.

Variable	B	Standard Error	R Square	p-value
Dependent variable: Behavior ^a				
Intention	.293	.027	.490	.000
PBC	.063	.009	.531	.000
Subjective Norm	-.005	.002	.535	.038
Dependent Variable: Behavior ^b				
“Within the next 6 months, I intend to incorporate issues related to sustainable foods.” (intention)	.344	.127	.487	.000
“I am able to incorporate issues related to sustainable agriculture into my professional practice.” (PBC)	.300	.073	.549	.000
“I am adequately informed about issues pertaining to sustainable produced foods into my professional practice.” (PBC)	.171	.059	.559	.000
“The Academy of Nutrition and Dietetics would approve/disapprove of your incorporating issues of sustainability into practice.” (Subjective Norm)	-.150	.056	.564	.000
“My place of employment has adequate budget to allow me to incorporate issues pertaining to sustainably produced foods into my practice.” (PBC)	.157	.052	.570	.000
“I have adequate time at work to incorporate issues pertaining to sustainably produced foods into my professional practice.” (PBC)	-.149	.64	.577	.000

“Educating about issues that are outside my scope of work.” (Attitude)	-.113	.044	.582	.000
“Educating about attributes associated with particular foods, even though these foods may not be clearly labeled with the identifying attributes.” (Attitude)	.114	.050	.587	.000
“Within the next 6 months, I plan to incorporate issues related to sustainable agriculture into my professional practice.” (Intention)	.260	.125	.593	.000

^a Candidate variables in the equation: Intention, PBC, Subjective Norm, and Attitudes

^b Candidate variables in the equation: All TPB items (Attitude: 10 behavioral beliefs and 10 outcome expectations, PBC: 9 items, Subjective Norm: 8 normative beliefs and 8 motivation to comply items; Intention: 2 items)

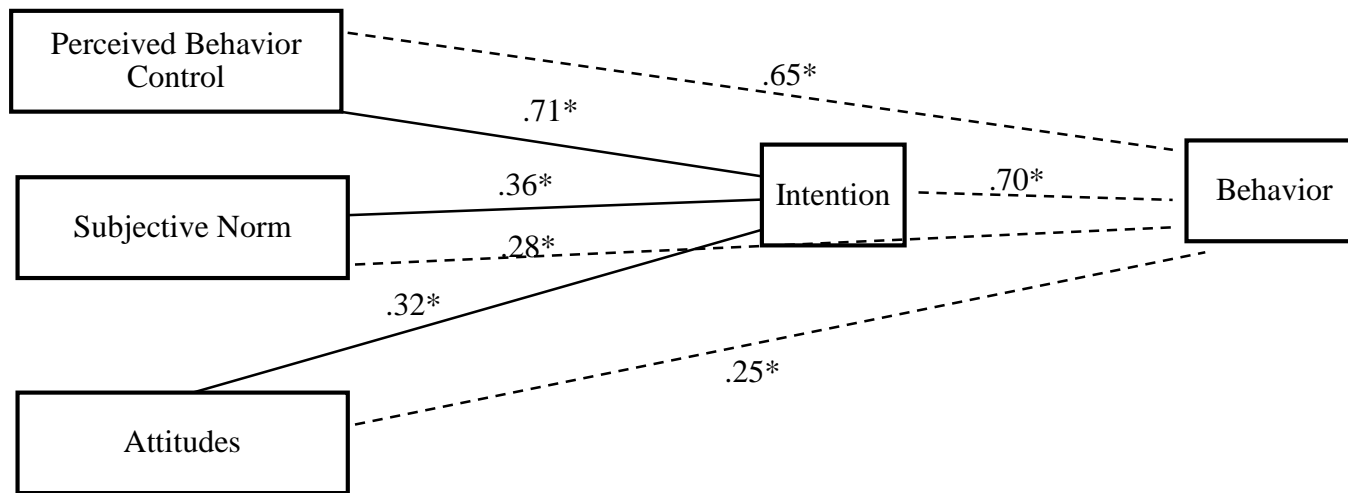


Figure 1. Pearson Correlations for the relationships between the TPB variables for 2013 survey data.

*p<0.01

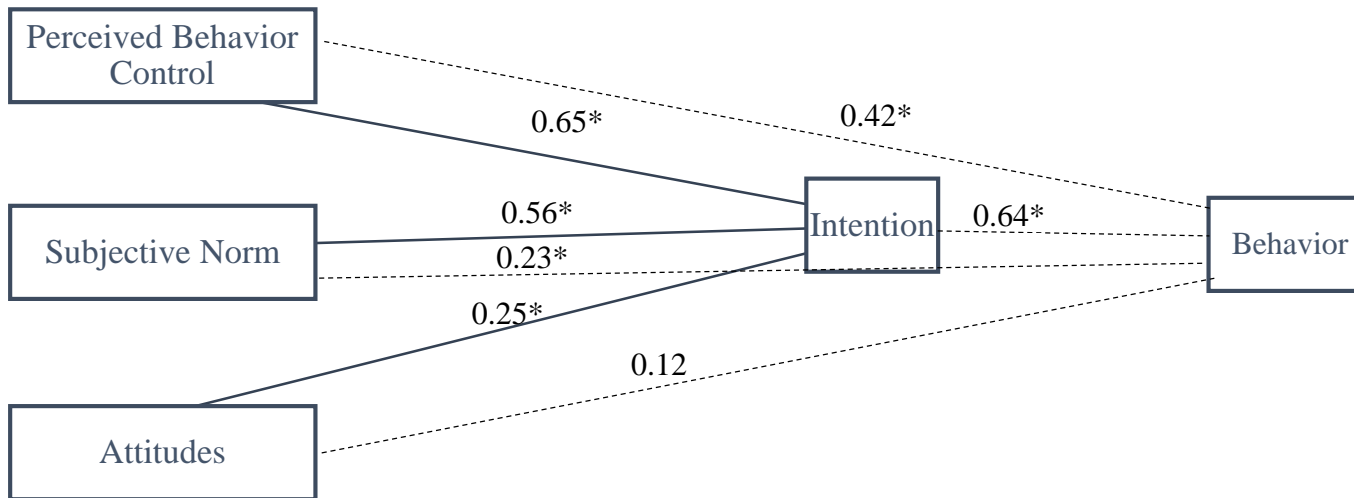


Figure 2. Pearson Correlations for the relationships between the TPB variables for 2002 survey data.

*p<0.01

CHAPTER 8:
Summary of Key Findings, Conclusions, and Implications

SUMMARY OF KEY FINDINGS

Phase 1: Focus Groups

The sample included 29 boys and 23 girls with a mean age of 10.4 years. The majority of the sample were Native American (44%) or African American (40%). Most caregivers were female (88.5%) and the average household size was 4.7 people with 3.2 children (**Chapter 2, Table 1; Chapter 3, Table 1**). The mean BMI-for-age percentile was 85% for African American and 91% for Native American children. Overall, 36.5% were normal weight, 21.2% overweight, and 42.3% obese (**Chapter 2, Table 2; Chapter 3, Table 2**).

The following results have been adapted from two manuscripts:

“Heidelberger LA, Smith C. A Child’s Viewpoint: Determinants of Food Choice and Definition of Health in Low-Income 8-to 13-Year-Old Children in Urban Minnesota Communities. *J Hunger Environ Nutr*. 2014;9(3):388-408”

“Heidelberger LA, Smith C. Physical activity beliefs and influences from inner city, low-income children’s perspectives: a qualitative study. *J Hunger Environ Nutr*. Under review.”

Major themes related to food choice and health were: 1) health beliefs, 2) food characteristics, 3) cooking ability, and 4) mealtime practices (**Chapter 2**). The major themes related to physical activity were: 1) community programs and school impact physical activity, 2) physical environment effects activity level, and 3) social factors influence physical activity (**Chapter 3**).

Focus Groups about Food Choice and Health (Chapter 2)

Theme 1: Health beliefs

Health was defined as an intermingling of dietary practices and physical ability. Health promoting dietary characteristics included practicing moderation, limiting fast foods, avoiding junk food, drinking water, and consuming fruit and vegetables frequently. A healthy person was described as strong, in-shape, exercised, played sports, and lived longer. However, many had misinformed ideas of how to be healthy. For example, children claimed rice and sugar promoted health, excess body fat is healthy, one must be skinny to be healthy, and children did not necessarily believe that food and health were connected.

The children's health beliefs were strongly influenced by their parents and culture. Parents taught their children how to be strong, healthy, fit, and to limit certain foods to make them healthier. Children also reported negative parental influences regarding health by planning physical activity around the television schedule, ignoring weight issues in children, and giving dietary misinformation. The Native American children discussed concerns with diabetes complications and African American children reported concerns with sodium intake and high blood pressure.

Other factors that influenced the children's view of health were the media and school. Children learned about food from commercials and incorporated this information into their health knowledge regardless of understanding or accuracy of the claim. Schools influenced health beliefs by teaching about the food guide pyramid, MyPlate, and showing the film *Super-Size Me*. From their experiences, children had many suggestions about how to teach children about health. Children wanted an intervention to be fun and include games, such as team sports, dance classes, a "Biggest Loser" type game, and food tasting games. They wanted their parents to exercise with them and keep them accountable to eating healthy foods. Children wanted to learn about basic physiology, including how to build muscles and how "big people get big", so that they could avoid getting too big.

Theme 2: Food characteristics

Children characterized their favorite foods as having a creamy, crispy, greasy, or juicy texture and either a salty or sweet taste. Examples of favorite foods were bacon, cheese, Hot Cheetos, Takis, tacos, pizza, fried chicken, Indian tacos, ice cream, chocolate, and fruit. Flavor enhancers such as ketchup, parmesan cheese, ranch, sour cream, and a variety of sauces were an important part of their favorite foods. Children reported that choosing healthy foods was a challenge because they were monotonous and boring with little or poor taste.

Despite the importance of healthy foods, children were "distracted" by junk food and ate it on a regular basis. Junk food tasted good, was mouthwatering, desirable, greasy, and had a lot of calories. Examples of junk food included many of their favorite foods, such as Takis, Hot Cheetos, Doritos, pizza, fast food, soda, candy, ice cream, and chocolate.

When the children were asked how to help other children decrease their junk food intake, they recommended hiding these foods. They also wanted their parents to purchase healthy foods, throw away junk foods, and punish them for eating junk food. Based on the children's report, the responsibility fell on parents and society to limit junk food intake in children, not on the children themselves.

Theme 3: Cooking ability

Children reported their parents, siblings, chefs, and social programs influenced their cooking knowledge and ability. In some cases, parents prepared meals and were present while children were cooking. Siblings were often more involved in cooking education than parents and often children cooked for their younger siblings.

Children learned cooking skills by observation and experimentation. When children were alone at home, hungry, and did not have someone else to prepare a meal for them, their own cooking ability determined their food choice. Individual cooking skill varied from simple, convenience foods, such as eggs, ramen, or cereal; to moderate skill such as baked goods, chicken, and hamburgers. Children learned to cook by observing a parent, mentor from a community program, or a chef at a restaurant. Also, hands-on experimentation with different ingredients, recipes or cooking skills, with little or no direction from an adult, was discussed.

Another important finding related to cooking ability was that gender did not dictate cooking ability or interest among the children. Both boys and girls reported basic cooking knowledge and ability, but reported that females taught them to cook. Also, both boys and girls were interested in cooking and requested cooking education to be included in an intervention. Children wanted to learn basic cooking skills and were especially interested to learn how to make healthy snacks to bring to school. They were also interested in making healthy snacks at home such as smoothies.

Theme 4: Mealtime practices

The dining environments in the children's households were both social and solo experiences. Meals were eaten in the kitchen, living room, bedroom, on the couch, or in front of the TV. Frequency of meals consumed with others varied from never to every night; "some" nights was most frequent. Mealtime rules centered on cleanliness (washing hands or dishes), politeness (avoid talking when others are, don't talk with a full mouth,

or reach over other's plates), and food intake. Some mealtime rules encouraged children to clean their plate and avoid food waste.

Because overweight and obesity are common among this population, children were asked to describe how they determined when to stop eating. Children identified fullness as a “weird” feeling in their stomach, soreness, or feeling that they had enough. Children frequently ate at buffets and ate large portion sizes there. Children did not connect overeating at buffets with their overall weight or health.

Focus Groups about Physical Activity (Chapter 3)

Theme 1: Community programs and schools impact physical activity

Community programs provided opportunities for children to be physically active. The community programs discussed in focus groups included YMCA, Boys and Girls Clubs, Boulder Options, Big Brother and Big Sister Program, and programs at local parks and pools. Children engaged in team sports (basketball, football, baseball), Zumba classes, kickball, and swimming at these locations. The programs provided the children with an outlet for exercise and an avenue for socializing.

The school environment also provided opportunities for physical activity (gym classes, recess). Schools gave the opportunity to learn new activities and create new games. Frequency of physical activity was strongly determined by access to community programs and opportunities provided in schools.

Theme 2: Physical environment effects physical activity level

The majority of children reported their activity was limited by weather constraints. The children resided in Minnesota and the cold temperatures, snow, and ice that characterize the winter months made outside activities unsafe. Playing in the snow can also be physically difficult. Children engaged in more sedentary behaviors (watching TV, movies, sitting inside, eating) during the winter and activities were limited to sledding and snowball fights. Children connected weight gain with the seasonal lack of activity.

To contrast the barriers of winter, summer was discussed as a “relaxing” time when they “get to go outside”. Activities reported included biking, swimming, and going to the beach, cabins, and parks. Team sports were also cyclical based on seasonality. For some children, the heat in the summer was difficult to adjust to.

The lack of safety and the urban environment were barriers to activity. Some children discussed the ‘hard ground’ and ‘hard grass’ common in urban areas as a challenge to activity. One child reported his favorite activity was running because, “it keeps me active in case...I’m trying to run away from something.”

Theme 3: Social factors influence physical activity

Family members played an integral role in shaping children’s activity habits. Parents and caregivers promoted activities such as team sports (basketball and football) and walking the dog. Walking was a common family activity. Some parents were not a model of activity themselves but encouraged their children to be active.

Although family activity was reported, most behaviors were sedentary (eating, watching television or movies). Other parents were uninvolved in children’s activities. Overall, parents encouraged children to be active, but modelled low-intensity (walking) and sedentary activities.

Children reported their peers increased their enjoyment of physical activity. Biking was a social or solo activity that allowed children “freedom”. Peers encouraged skill development and competition, but misinformation about healthy and activity were often shared between children. A few children believed physical activity determined height, thus a physically active person was taller.

Gender was an important factor in determining the activities children engaged in. Boys were taught muscle building activities, including weight lifting, by their older siblings. Also, all of the boys and the African American girls reported team sports, dancing, gymnastics, hip hop, and step as frequent forms of activity. To contrast, Native American girls engaged in more sedentary and solo activities, including reading, math, drawing, and singing. Native American children also reported learning cultural dances and songs and regularly engaged in powwows.

Abbreviated Results: Phase 2

Twenty-nine children (20 male, 9 female) completed the Photovoice project about their food environment. Children were in 3rd through 8th grade and the average household size was 5 people and 3 children. Mean BMI-for-age percentile for males was 62.4% and for females was 86.0%, and approximately half of the children were overweight or obese (**Chapter 4, Table 1**). Of the 482 pictures taken, 345 were usable (**Chapter 4, Table 2**).

Approximately a quarter of the pictures were discussed and 128 pages of transcription were recorded from the interviews.

For the physical activity portion of the project, 24 children (15 male and 9 female) completed the project. The average age of the children was 10.9 years-old and the average BMI-for-age percentile was 72% (**Chapter 5, Table 1**). Children took a total of 377 pictures and 339 photos were usable (**Chapter 5, Table 2**). Sixty-eight pages of transcription were collected from interviews and approximately one quarter of the usable photos were discussed.

The feedback that we received from the children about their experience with Photovoice was positive. When we asked children their opinion on the project, they reported that they enjoyed taking pictures and wanted to keep a copy of their photos. The results presented below have been adapted from two manuscripts:

“The food environment through the camera lens of a 9-13 year old living in an urban, low-income, Midwestern household: A Photovoice Project. *J Nutr Educ Behav.* 2015;47(5):437-445.”

“Heidelberger L, Smith C. Low-income, Urban Children’s Perspectives on Physical Activity: A Photovoice Project. *Matern Child Health J.* 2015. Epub ahead of print. DOI:10.1007/s10995-015-1898-4.”

Major themes from Photovoice about the food environment were: 1) food characteristics, 2) social environment, 3) kitchen, cooking, and dining environments, and 4) food insecurity (**Chapter 4**). The major themes from Photovoice about physical activity were: 1) types of activity, 2) social environment, and 3) physical environment (**Chapter 5**).

Photovoice about the Food Environment (Chapter 4)

Theme 1: Food characteristics

Of the 345 photos, 79 photos represented healthy foods, 54 represented unhealthy foods, and 92 depicted a mixture of healthy and unhealthy foods. The healthy foods photographed included foods from all food groups (bread, sticky rice, strawberries, bananas, broccoli, chicken, milk, and cheese). Unhealthy foods photographed included cakes, cupcakes, Doritos, Takis, Cheetos, ramen noodles, ice cream, bacon, chicken nuggets, candy, and soda. Flavor enhancers such as mayonnaise, salad dressing,

barbecue sauce, and hot sauce were also photographed. Foods with multiple ingredients that were categorized as mixed foods included macaroni and cheese, peanut butter and jelly sandwiches, cold cut sandwiches, and pizza.

Children photographed certain foods because it was a favorite food, typical meal or snack, a special food to them, their favorite food, or a food they ate often. Children photographed foods that represented their ethnic backgrounds such as sushi, spring rolls, fried rice, meatball subs (Italian), and fried chicken.

Theme 2: Social Environment

Most photographs of an adult were of the child's parent. Children ate with their parents, ate foods prepared by them, and their parents determined the foods that were available in the household based on what they purchased at the store or chose at the food shelf (food pantry). Parents determined where children ate their meals and many family meals took place while watching television.

Parents also influenced children's cooking ability and introduced new foods to their children. One child reported his dad taught him to grill, another stated she prepared macaroni and cheese with her mom, and a Native American child described preparing a turkey with his parents.

In addition to parents, peers and siblings also influenced children's food environment. Eighty-five photos captured a peer or sibling both at home and at the community programs. At home, children reported they ate with their siblings more often than with their parents. Children received cooking education from their siblings and peers.

Theme 3: Kitchen, Cooking, and Dining Environments

In their home environments, children took 92 photos of their kitchen and 58 photos of their dining environment. Kitchen environment photos were of their appliances and food storage areas. Food in the refrigerator included meats, fruits, and beverages. Photos of vegetables were limited to carrots and tomatoes. Cupboards and pantries ranged from empty to very full and held cereal, bread, and ramen noodles. Children also photographed their cooking appliances, including the microwave, stove top, oven, a George Foreman grill, and an outdoor grill. Examples of food children prepared were eggs, ramen noodles, hot dogs, bacon, burgers, egg rolls, sushi, and meatloaf. All

children had basic cooking equipment available except one child who was residing in a shelter. The dining environments that children photographed included a dining room table, an eat-in kitchen, their bed, and a countertop.

Children also consumed meals at the community programs. Fifty-eight photos were taken of children dining outside of their home and the majority were taken at the afterschool program. Boston Market was the only restaurant that was photographed. In interviews, children reported they ate at Wendy's, Old Country Buffet, Chinese buffets, and pizza restaurants. At the after school program, children consumed food prepared at the program and dined at tables in groups. They ate with friends and frequented the ice cream truck in the summer. Children also attended summer school and ate lunch there. They also reported snacking on foods such as Doritos on the school bus.

Theme 4: Food Insecurity

Food insecurity was apparent in the interviews and photographs. The amount of food stored in refrigerator, freezer, and pantry were in various states of fullness. Most of the food storages spaces were half-full based on the photo data, but some were nearly empty. Children also reported that their families used food assistance programs, specifically food shelves and "food stamps" (SNAP) on a regular basis. The availability of food dollars impacted the children's food environment. Children also reported avoiding food waste at the after school program. Another child described taking food from a buffet to be eaten at a later time. Children who did not have a refrigerator or freezer in their household used alternative forms of food storage, such as coolers.

Photovoice about Physical Activity (Chapter 5)

Theme 1: Types of Activity

Of the 254 photos that represented some level of physical activity, 99 represented sedentary activities, and 155 showed moderate or vigorous activity. Sedentary activities included playing board games, reading, playing instruments, and doing homework. Children viewed both eating and sleeping as activities. More physically engaging activities included walking, stretching, sit-ups, biking, swimming, jumping jacks, dancing, playing on the playground, tennis, skateboarding, jogging, basketball, baseball, and football. Children enjoyed team sports and biking. The physical activities that were

most representative of the children's normal activities were team sports, playing outside, riding bike, reading, and playing tennis.

The majority of sedentary photographs taken were of media related activities and included watching television and movies, playing video games, and looking on the computer. Boys engaged in these media activities more than girls and did so on a regular basis. Media was used for entertainment, especially when children were alone or bored, and it was used for educational purposes.

Theme 2: Social Environment

Families influenced influence activity. Ten photos captured adults and 175 captured siblings, cousins, or friends. Parents were involved mostly in sedentary activities except for walking. Children reported their parents walked with them, played board games, or went to the park with them. One child photographed her family using public transportation as the most frequent activity she did with her parents. She discussed this when talking about the family walking to the train station or bus stop every Sunday to go to church.

Children engaged in more strenuous activities with their siblings, cousins, and friends. Activities included weight lifting and team sports such as basketball, football, and baseball. A pet in the house provided children with more physical activity opportunities. Peers also influenced physical activity levels at the community programs. Children took 121 total photos of physical activity at the after-school program. Sedentary activities included video and computer games and movies. More active play included skateboarding, swimming in the pool, playing on the playground, and organized team activities.

Theme 3: Physical environment

Outdoor and indoor environments provided opportunities for different types of activities. Children took 131 photos of outdoor activities such as biking, skateboarding, playing at the park, team sports, and swimming. Outdoor activities were limited by the weather and most children preferred not to engage in outdoor activities during the winter. Sledding and skiing were the only outdoor activities children reported engaging in during the winter time.

Indoor activities were more sedentary than outdoor activities and children took 100 photos of indoor activity. The most frequently reported indoor activities were media related. Children also read books and played board games indoors. At the Boys and Girls Clubs, children played basketball on a regular basis. The researchers noted the computer lab and gym were open for the children, and both were used by children during the day at the Boys and Girls Clubs. The other after-school program served fewer children and both sedentary (i.e. drawing and art) and moderate intensity activities were offered.

Phase 3: Body Image

A total of 51 children participated in the study (25 girls, 26 boys), 27 children were African American and 24 were Native American and the average age of 10.4 years. There was an average of 4.6 people living in the household with an average of 3.1 children. Of all the children, 2.0% were underweight, 29.4% were healthy weight, 27.5% were overweight, and 41.2% were obese (**Chapter 6, Table 2**).

The following results have been adapted from a manuscript:

“Low-income, African American and Native American children's viewpoints on body image assessment tools and body satisfaction: A mixed methods study. *Maternal and Child Health Journal*. Under Review” (**Chapter 6**).

Body Image perception

Half of all boys were satisfied with their current body size when using both instruments; 36% and 32% of girls were satisfied with their current size on the CBIS and FRS, respectively (**Chapter 6, Table 3**). Both boys and girls chose smaller perceived body size than their actual body size on both instruments. Healthy weight children chose healthy weight images, but obese and overweight children did not chose figures that correlated with their BMI. Boys chose the body size 3.5 (CBIS) and 4.5 (FRS). Girls chose 3.8 (CBIS) and 4.3 (FRS) (**Chapter 6, Table 4**). Girls did not choose the smallest figure (1) or the largest (7) on the either instrument and the boys chose all figures except for the largest figure (7) (FRS), but with the CBIS they did not choose the smallest (1) or largest (7) figure (**Chapter 6, Table 5**).

Ideal Body Image

The mean ideal body size was 2.6 for boys and 2.9 for girls on the CBIS and 3.8 and 3.5 on the FRS (**Chapter 6, Table 4**). Over 60% of boys chose figures 2 or 3 as their ideal body size and the majority of girls chose figures 2-4 as their ideal on the CBIS. On the FRS, 92% of boys and 80% of girls chose figures 3 or 4 (**Chapter 6, Table 6**).

Body Dissatisfaction

Half of the boys and approximately one-third of girls were satisfied with their current body size on both instruments (**Chapter 6, Table 3**). Approximately 50% of boys and 56% of girls chose a thinner ideal body on the CBIS and 46% of boys and 64% of girls chose a thinner ideal body on the FRS.

Focus Group Themes about Body Image

Major themes included: a) preference towards FRS body image instrument, b) external factors influencing body image, and c) attitudes towards body size.

Theme 1: Preference towards Figure Rating Scale (FRS) body image instrument

Children described the FRS as cartoonlike, but detailed. The specific details that children identified on this instrument included hair, facial features, clothing, and stomach definition. Children reported they were better able to identify with the figures that showed more detail (the FRS), including facial features and clothing. Girls preferred the FRS because the girls' bodies were more covered. Also, children could see indicators of body size, including ribcage and legs, more clearly. The color differences between the FRS (black and white) and the CBIS (shaded) deterred the children from the CBIS and the darker shading on the CBIS was associated with race by some children. Children of both races reported the photos were darker and difficult to identify with. They also reported the options for thinness were limited on the CBIS compared to the FRS. Every child preferred the FRS over the CBIS.

Theme 2: External factors influence body image

Child reported their family and the media influenced their perception of their body. Children noted their parents made comments on their child's body size. Media exposure also influenced children's body image and girls reported they were most influenced by thin models presented in the media. Children's television programs also provided diet and obesity knowledge.

Theme 3: Attitudes towards body size

Children described their attitudes towards their own body size and shape. When asked to describe the positive characteristics of themselves, they reported their stomach (“6-pack”), hair, muscles, feet, and ability to play video games well. Many children preferred their current body size, although some wanted to be taller, stronger, smaller, or bigger; for example, one African American boy wanted “bigger” legs and an African American girl wanted larger thighs. Children did not want to be overweight.

When children were asked what characteristics were most important when choosing a friend, they reported personality (being nice and helpful) and having a sense of style. Most children did not place importance on the size of their friends, especially in the Native American groups. One girl listed size as an important characteristic in her friends.

Although most children did not place importance on the size of others, they were aware that depression and bullying affected overweight and obese children. Native American children discussed their responsibility to stop bullying and the importance of respecting others. Children also discussed depression in overweight children. The Native American children discussed the psychosocial issues that stem from weight concerns, but the African American children did not.

Phase 4: Dietitians Perspectives on Sustainable Agriculture

2013 Survey

The sample (n=626) included dietitians from 48 states and 26 of the participants were from MN. The age range was 24-82 years old, and the mean age was 45.4 ± 12.2 -years-old. Most were Caucasian (89%) and female (96%) (**Chapter 7, Table 1**).

The results presented below have been adapted from a manuscript:

“Heidelberger L, Smith C, Robinson R, Earthman C, Robien K. Dietitians’ perspectives on integrating food and water system issues into professional practice. *J Acad Nutr Diet*. Under review.”

Of the sample, 89% of participants had heard of sustainable agriculture, 47% integrated this topic into their practice, and 93% reported that how and where food is produced influences health outcomes. More than a third of dietitians (37%) reported that their clients asked questions about sustainable agriculture and related issues (**Chapter 7, Table 2**).

Dietitians that worked in a non-clinical setting and those with an advanced degree had more positive PBC, intention, and behavior to include environmental issues into practice than clinical dietitians and those with a bachelor's degree, respectively (**Chapter 7, Table 3**). Individuals that self-identified as democrats (n=131) were significantly more likely to have incorporated sustainable agriculture into their work during the past 6 months than those who self-identified as republicans.

PBC, subjective norms, and attitudes were correlated with intention and each of the three variables along with intention were correlated with behavior (**Chapter 7, Figure 1**). PBC had the strongest correlation to intention. The barriers to integrating environmental issues into practice included a lack of time, knowledge, ability, budget, and employer support. Also, dietitians reported that clients weren't interested or able to understand the topic (**Chapter 7, Table 2**).

Of the TPB variables, intention predicted 49.0%, PBC predicted 4.1%, and subjective norm predicted 0.4% of the variance in behavior (**Chapter 7, Table 4**). Of all of the questions that composed the TPB constructs, two of the questions accounted for 54.9% of the variance in behavior: "*Within the next six months I intend to incorporate issues pertaining to sustainably produced foods into my professional practice.*" (intention) explained 48.7% and "*I am able to incorporate issues related to sustainably produced foods into my professional practice.*" (PBC) explained 6.2% of variance in behavior. Seven items explained a combined 4.4% the variance were "*I am adequately informed about issues pertaining to sustainably produced foods.*" (PBC), "*The Academy of Nutrition and Dietetics would approve/disapprove of your incorporating issues of sustainability into professional practice.*" (subjective norm), "*My place of employment has and adequate budget to allow me to incorporate issues pertaining to sustainably produced foods.*" (PBC), "*I would have adequate time at work to incorporate issues pertaining to sustainably produced foods into my professional practice.*" (PBC), "*I would be educating about issues that are outside my scope of work.*" (attitude), "*I would be educating about foods which may not be clearly labeled as to how and where they were produced.*" (attitude), and "*Within the next six months I intend to incorporate issues pertaining to sustainably produced foods into my professional practice.*" (intention) (**Chapter 7, Table 4**)

Comparison of 2002 and 2013 results:

The participants of the 2013 survey were significantly older, more educated, and had more years of practice than the 2002 sample (**Chapter 7, Table 1**). In 2013, more dietitians had heard of sustainable agriculture, reported clients asked about this topic, and integrated issues related to sustainable agriculture into their practice than in 2002 (**Chapter 7, Table 2**). Another change since 2002 was that attitude entered into the TPB correlation model in 2013 (**Chapter 7, Figure 1 and Chapter 7, Figure 2**). Also in 2013, there was a positive change in dietitians' perceptions of the following facilitating conditions compared to 2002: interest, appropriateness, ability, adequate time, and adequate knowledge (**Chapter 7, Table 2**).

CONCLUSIONS AND IMPLICATIONS

This study used qualitative and quantitative methodology to examine food choice, physical activity habits, and body image perspectives of a predominantly African American and Native American sample of youth that lived in low-income, urban households using the SCT as the theoretical framework. This research also used quantitative methodology to investigate dietitians' perspectives on including environmental issues into their practice using the TPB. Our findings from focus group and photography data analysis with children suggested that our sample experienced personal and environmental (both physical and social) barriers to consuming a healthy diet and engaging in regular physical activity. Additionally, the researchers received positive feedback from the children about the Photovoice methodology, indicating this is an acceptable form of research to use with this population. Further, tailoring the figures used in body image assessment instruments to specific ethnic groups may help researchers more accurately measure body image perceptions among African American and Native American children. Our findings from the dietitian survey indicated that intention and PBC were the most predictive TPB components of dietitians' behavior to educate clients about sustainable agriculture and the barriers were lack of knowledge, ability, time, and employer support.

Many children reported that their food choice, activity level, and view of health were influenced by their social environment, especially their peers and family members. Children incorporated information from their peers, family, and the media to determine how to define health. However, there were many misconceptions that children had related to how food and activity effected their body. Also, children looked to their parents to limit children's junk food intake. Parents influenced the types of activities children were interested in and our research suggested that parents should be involved in activities with their children. These results show that it may be important to involve family members, especially parents and peers, when designing interventions to promote a healthy diet and physical activity among low-income Native American and African American children. Also, there is a need to correct health-related misconceptions by providing more education about how food and activity influence health.

In addition to the social environment, the physical environment also influenced food choice, meal practices, and physical activity levels. Photovoice data revealed that the children's food supply was sometimes limited. Further, functioning appliances were not always available and children did not necessarily have a designated place to eat their meals, so they would eat on a bed, on the couch, or use a cabinet as the table. Thus, having a designated place for mealtimes (dining tables and chairs instead of couches and beds) could improve the mealtime experience for these children. The aspects of the physical environment that influenced activity level included the weather (especially in the winter), the availability of community programs near their house, and the safety of their neighborhood. Community programs and schools provided a safe place for the children to play year-round. These results suggest that there are opportunities in the community to improve activity levels by improving park safety or enhancing bike and walking paths in urban areas. Photovoice data also showed that the children regularly engaged in church activities with their families. Thus, there may be an opportunity to work with churches to provide health education for children.

Although environmental factors impacted diet and activity, personal factors also played an important role. Children preferred high fat, high sodium foods such as Takis and Hot Cheetos and reported that healthy foods were boring and flavorless. Their cooking knowledge was limited and children wanted to learn how to cook healthy foods that are tasty. Therefore, interventions geared towards low-income, Native American and African American children could include cooking classes that teach children how to cook and incorporate spices and flavors from a variety of cultures. Personal factors also influenced activity choice, and some children preferred sedentary activities such as video games and playing on the computer. Native American girls also favored sedentary activities more than boys or African American girls. It may be important to work with the African American and Native American communities to determine what types of exercise opportunities would be culturally appropriate and best fit in their communities.

Further, body image data with Native American and African American children indicated that both groups preferred a silhouette body assessment instrument (the FRS) over a photograph instrument (CBIS) because the body was more covered and had more detailed facial features and body parts. Additionally, most of the overweight and obese

children perceived their body size to be at a healthy weight. The social factors that helped form their body image were their parents and the media. The psychological consequences of being overweight and obese were discussed by the children and included bullying, disordered eating habits, and depression. These results support the continued need for research to develop culturally appropriate body image assessment instruments because body dissatisfaction is present in Native American and African American youth.

Finally, the fourth phase of this research examined dietitians' perspectives on including sustainable agriculture into dietetics practice and their perceived barriers to doing so. In 2013, more dietitians had heard of sustainable agriculture and they had a more positive attitude towards including this topic into their practice than in 2002. Also, more dietitians included environmental issues in their practice in 2013 than in 2002. Clinical dietitians and those with a bachelor's degree were less likely to incorporate environmental issues into their practice than non-clinical dietitians and those with an advanced degree, respectively. The main barriers to include this topic in practice were lack of knowledge, ability, time, and employer support. The AND can help minimize these barriers by providing more educational opportunities (in undergraduate programs and as continuing education courses) and including more publications in JAND and JHEN on sustainable agriculture.

Based on the findings from this study, future research directions related to Native American and African American children living in low-income communities include: 1.) community-level assessments to identify possible areas for children living in urban communities to have a safe place to play, especially during the winter (for example, converting run-down buildings and houses into green space or recreation centers; expanding programs for low-income children to include middle-income families); 2.) address the gender differences in physical activity practices, especially with Native American girls, to determine what they want in a physical activity program separate from the boys and if there are exercises or activities that may be more culturally acceptable; 3) use Photovoice with low-income, minority children to identify their favorite foods, flavors, and activities and apply this information to an intervention to teach the children how to prepare their favorite foods in a healthier way and have more opportunities to engage in fun activities; 4) evaluate the feasibility of partnering with church-based

organizations to implement child-focused nutrition education classes; 5) apply the suggestions from the African American and Native American children to create culturally specific body image assessment tools that can be used with these ethnic groups, and then validate the tools and test for reliability. Our findings with registered dietitians support future research directions that include: 1) identifying the barriers that make it difficult for clinical dietitians to include environmental issues into their practice and use this information to create education tools geared specifically to this population, and 2) evaluating methods to teach dietitians how to be more proactive and to inform their bosses about ways to support sustainable agriculture in the workplace.

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APPENDICES

PARENTAL CONSENT FORM

This focus group is being conducted by Chery Smith, PhD, MPH, RD and a graduate student, Lindsay Heidelberger, RD, LD. Both researchers are from the Department of Food Science and Nutrition at the University of Minnesota.

Your child has been invited to be part of a group talk that will discuss what they eat and what types of activities they do. Your child has been asked to be part of this because he/she is between 9-13 yrs old and living in a household that is eligible for the SNAP program (food stamps), the WIC program or the School Lunch Program. Please read this consent form and ask any questions you have before agreeing to let your child be part of this group talk. During the discussion, we will be asking your child about the foods they eat, why they choose to eat these foods, and what their beliefs are about diet and physical activity. We will also be discussing body size and self esteem with your child. We will also measure your child's height and weight. There will be 6-8 children in the group and it will last for 60-90 minutes. You will be asked to fill out a demographic form about your gender, race, household size, income and a few basic health and diet questions.

Risks and Benefits:

There are no benefits for you or your child in taking part in this research study. However, what your child says will help us create a nutrition intervention for children. The risks involved with this study are that we will be asking your child personal questions such as what they like to eat and their thoughts on body shapes and sizes, which may possibly cause some embarrassment.

Compensation:

Your child will be reimbursed \$10 for their time.

Confidentiality:

All information from this project, including surveys, forms, and measurements, will be kept private. We will be tape recording the discussion so that we don't miss anything and only your child's first name will be attached to this transcript. All of this information will be in a locked cabinet in Dr. Smith's office, only project staff will have access to this information. While information from this project may be published, no individual information will be released and you and your child will not be identified in any way.

Voluntary Nature of the Survey:

Your decision to allow your child to take part (or not take part) in this discussion group will in no way affect any current or future relations with the University of Minnesota or any public community program. If you and your child decide to participate in this discussion, you are free to withdraw at any time. Also, your child can choose not to answer any questions or withdraw at any time.

Contacts and Questions:

Those conducting this research project are Dr. Chery Smith and Lindsay Heidelberger. If you have any questions now, you may ask them. If you have any questions later, you may contact Chery Smith at (612) 624-2217 (email: csmith@umn.edu) or Lindsay Heidelberger at (612) 669-6721 (gulli072@umn.edu). A copy of this form will be given to you to keep for your own records. If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Fairview Research Helpline at telephone number 612-672-7692 or toll free at 866-508-6961. You may also contact this office in writing or in person at University of

Minnesota Medical Center, Fairview Riverside Campus, 2200 Riverside Avenue,
Minneapolis, MN 55454.

By signing below, you are indicating that you understand what this focus group is about,
agree to allow your child to participate and have had all of your questions answered. You
can have a copy of this form for your records.

Signature of Parent of Guardian: _____

Date:

Signature of Investigator: _____

Date:

IRB Code # 1210S22424
Form Version 12/3/2012

Children's Assent form

A small group talk with 6-8 children will meet today with Chery Smith, PhD, MPH, RD and a graduate student, Lindsay Heidelberger, RD, LD from the Department of Food Science and Nutrition at the University of Minnesota. We asked you to be part of this group of children because we want to learn more about why kids eat what they eat and what they think about body shapes and sizes. We will ask you to look at pictures and tell us about what you think of them. If you agree to be a part of this group, we will be asking to you and other kids about what you eat, who buys your food and what helps you choose what you will eat. We will also talk about what you like to play and how often you play. At the end, we will take your height and weight in an area away from the other children.

You can ask questions at any time. If you decide you do not want to finish, you may stop whenever you want. Remember it's not a test and there are no right or wrong answers. We want to know what you think and what you believe.

You will get \$10 if you stay for this group today.

No one else will know that you were in this talk today. The group talk will be tape recorded. If we tell other people about this group, we will not use your name, so no one will know who we are talking about. We do ask that you keep what the other kids say private too.

Your parents or guardian also have to say that it's okay for you to be a part of this group. If they say it's ok, then you get to decide if you want to be part of this talk. If you sign this paper that means that you read this or you had someone read this to you and you would like to be a part of this group talk. If you do not want to be part of the group talk, then do not sign the paper. It's up to you if you want to be a part of it, if not, no one will be mad at you if you do not sign the paper or if you change your mind later on.

Signature: _____ **Date:** _____

Signature of Investigator: _____ **Date:** _____

PARENTAL CONSENT FORM
(For the photography portion of the study)

This project is being conducted by Chery Smith, PhD, MPH, RD and a graduate student, Lindsay Heidelberger, RD, LD. Both researchers are from the Department of Food Science and Nutrition at the University of Minnesota.

Your child expressed an interest to be of a project where we will have your child take pictures of what they like to eat (where, food prep, etc) and the physical activities that they engage in. Your child has been asked to be part of this because he/she is between 9-13 yrs old and living in a household that is eligible for the SNAP program (food stamps), the WIC program or the School Lunch Program. Please read this consent form and ask any questions you have before agreeing to let you child be part of this project. The first time we meet with your child, we will provide a disposable camera for child to take pictures of what they eat throughout the day, their favorite foods, what their kitchen and refrigerator look like and how food is made in your home. They may even take pictures of meal time. We will collect these cameras after one week and give your child a second camera. With this camera, we will ask your child to take pictures of what they do for physical activity and what makes it difficult for them to get activity. We will collect this camera after one week as well and have a group talk about both of these activities. We will also measure your child's height and weight. As a parent, you will be asked to fill out a demographic form about your gender, race, household size, income and a few basic health and diet questions.

Risks and Benefits:

There are no benefits for you or your child in taking part in this research study. However, what your child says will help us create a nutrition intervention for children.

Compensation:

Your child will be reimbursed \$10 for the 1st and 2nd visits and \$15 for the 3rd visit. Visits #1 and #2 will be brief (about 30 minutes) but visit #3 will last one hour.

Confidentiality:

All information from this project, including information forms, pictures, and measurements, will be kept private. All of this information will be in a locked cabinet in Dr. Smith's office, only project staff will have access to this information. While information from this project may be published, no individual information will be released and you and your child will not be identified in any way.

Voluntary Nature of the Survey:

Your decision to allow your child to take part (or not take part) in this project will in no way affect any current or future relations with the University of Minnesota or any public community program. If you and your child decide to participate, you are free to withdraw at any time. Also, your child can choose to withdraw at any time.

Contacts and Questions:

Those conducting this research project are Dr. Chery Smith and Lindsay Heidelberger. If you have any questions now, you may ask them. If you have any questions later, you may contact Chery Smith at (612) 624-2217 (email: csmith@umn.edu) or Lindsay Heidelberger at (612) 802-9401 (gulli072@umn.edu). A copy of this form will be given to you to keep for your own records. If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you are encouraged

to contact the Fairview Research Helpline at telephone number 612-672-7692 or toll free at 866-508-6961. You may also contact this office in writing or in person at University of Minnesota Medical Center, Fairview Riverside Campus, 2200 Riverside Avenue, Minneapolis, MN 55454.

By signing below, you are indicating that you understand what this focus group is about, agree to allow your child to participate and have had all of your questions answered. You can have a copy of this form for your records.

Signature of Parent of Guardian: _____ **Date:** _____

Signature of Investigator: _____ **Date:** _____

IRB Code # 1210S22424
Form Version 12/3/2012

Children's Assent form
(For the photography portion of the study)

Today you will meet with a group of children and Chery Smith, PhD, MPH, RD and a graduate student, Lindsay Heidelberger, RD, LD from the Department of Food Science and Nutrition at the University of Minnesota. We asked you to be part of this group of children because we want to learn more about why kids eat what they eat and what they do to play. We will meet with you three times over the next three weeks. The first time we meet with you, we will give you a disposable camera to use to take pictures of what you eat every day. We would like you to take pictures of your favorite foods, your kitchen and your refrigerator. We would like you to use all of the pictures on the camera. We will meet again in one week and we will have you bring your camera to give to us. Then we will give you another camera to use to take pictures of what you do when you play. We would like you to use the whole camera to take pictures of you playing and who you play with. We will have you bring these cameras back to us after one week. Also, we will take your height and weight in an area away from the other children.

You can ask questions at any time. If you decide you do not want to finish, you may stop whenever you want. Remember it's not a test and there are no right or wrong answers. We want to know what you think and what you believe.

You will get \$10 for the first and second visit and \$15 for the third visit. You will have to stay for the whole visit to get this.

No one else will know that you were part of this group or that you took pictures. If we tell other people about this group, we will not use your name, so no one will know who we are talking about. We do ask that you keep what the other kids say private too.

Your parents or guardian also have to say that it's okay for you to be a part of this group and to take pictures for us. If they say it's ok, then you get to decide if you want to be part of the group. If you sign this paper that means that you read this or you had someone read this to you and you would like to be a part of this group. If you do not want to be part of this or to take pictures, then do not sign the paper. It's up to you if you want to be a part of it, if not, no one will be mad at you if you do not sign the paper or if you change your mind later on.

Signature: _____ **Date:** _____

Signature of Investigator: _____ **Date:** _____

Dietitians' perspectives on integrating food and water system issues into professional practice

Consent form

This research project is being conducted by Chery Smith, PhD, MPH, RD (University of Minnesota); Ramona Robinson-O'Brien PhD, RD (Project Manager, Minneapolis Medical Research Foundation); Carrie Earthman, PhD, RD (University of Minnesota); and Kim Robien, PhD, RD, CSO, FADA (George Washington University). You are being asked to complete a dietitian survey. We are interested in learning more about dietitian attitudes and behaviors with regard to integrating issues of food and water systems into professional practice. Your participation is important to us. Please read this form carefully and ask any questions you may have before agreeing to this project.

Risks and Benefits

There are no risks involved with being in this project. While all participants will not receive gifts, each person completing the survey receives a chance for a gift. Upon completion of the survey, the subject's name will be entered into a drawing and those selected can win a free iPad or select to donate the cash to a charity (either UNICEF or Feeding America). Furthermore, you will be assisting us in learning about dietitian's knowledge and behavior base regarding food and water sustainability. It has been proposed that registered dietitians have the potential to develop and define their role within the framework of "civic dietetics" by considering the economic, ecological, and social sustainability of the food system.

Confidentiality

The records for this project will be kept private, in a locked file in Dr. Robinson-O'Brien's office. Only project staff will have access to that file. If the information becomes published, your identity will remain confidential.

Voluntary nature of the project

Your decision to participate (or not) is voluntary and will not affect any present or future relations with the College of St. Benedict or University of Minnesota. If you agree to participate in this project, you are free to withdraw at any time.

Contacts and Questions

Those conducting the survey are Ramona Robinson-O'Brien, Chery Smith, Kim Robien, and Carrie Earthman. You may ask any questions you have now, and if you have questions later you may contact Ramona Robinson-O'Brien at 320-363-5781. You may keep a copy of this form to keep for your records.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

Statement of Consent

I have read the above information. I have asked questions and received answers. I consent to this project.

By returning this survey, you have implied consent. You may keep this form for your file.

*****THANK YOU FOR YOUR PARTICIPATION*****

**Changing eating and exercise behavior among low-income, SNAP-eligible children,
while maintaining/improving self-esteem and body image**

Focus Group Questions

- First, we would like to start with introductions, if you could please tell us your first name and your favorite activity.

Diet:

1. Can you tell us what your favorite food is? Why is this your favorite? Do you eat this often?
2. What is a usual meal like for you? What is a typical breakfast? Snack?
3. Who prepares the foods you eat? Tell me about any special or ethnic foods that you eat. Do you eat what foods you want? Are there any rules about food at your house? Are there any rules at meal time?
4. How do you decide when you are done eating? Do you ever eat past the time that you feel full? Why?
5. What foods do you think are good for your body? Do you like to eat these foods?
6. What foods do you think might not be good for your body? Do you like to eat these foods? Do you think these foods that are not good for your body are okay for you to eat? Why?
7. Is it easy or difficult to eat that are good for you? Why? If it is difficult, what would make it easier?
8. Where do you learn about foods that are good or bad for you?

Health:

9. Think of someone you know that you think is a healthy person. What makes them healthy? What do you think would make a person seem like they aren't healthy?

Physical Activity:

10. How often do you play? What do you like to play? What kinds of activity would you like to do? When do you play with a team? When do you play by yourself? With your family?
11. Why do you think people exercise? Do you think exercise makes people bigger or smaller? Why?

Body Image:

12. Now, let's talk about body shape. What makes someone taller, shorter? Heavier or thinner?
13. How do you feel about your body? What is your favorite part of your body? What would you like to change? What affects what you think? Tell me about what makes you feel really good about your body.
14. Does your family tell you anything about bodies or body size? Do your friends? What are things they say?
15. Do you think it matters if someone is thin or fat? Why? Is there pressure to be a certain shape?
16. Take a minute to look at these pictures (show body image tool with pictures versus silhouettes). Which pictures are easier to talk about, the top row or bottom row? Why?

There are questions at the bottom of this picture, are there any other parts of your body that you have concerns about?

Closing:

Before we finish, is there anything else you want to say? Did we miss anything?

We will get everyone's heights and weights before you leave. Thank you for talking with us today.

Parent Information Sheet for _____

Relationship to child: _____

Please circle the best choice or fill in the blank.

1. Your age: _____ Your child's age: _____
2. Your gender:
 - a. Male
 - b. Female
3. Your race:
 - a. Caucasian (white)
 - b. African American (black)
 - c. American Indian
 - d. Hispanic
 - e. Asian
 - f. OtherYour child's race:
 - a. Caucasian (white)
 - b. African American (black)
 - c. American Indian
 - d. Hispanic
 - e. Asian
 - f. Other
4. Your Highest Education Level completed:
 - a. Less than high school school
 - b. Some high school vocational school
 - c. Completed high school or GED professional school
 - d. Some college, technical or vocational school
 - e. Completed college, technical or vocational school
 - f. Completed graduate or professional school
5. Annual Income:
 - a. Less than \$10,000
 - b. \$10,000-\$19,999
 - c. \$20,000-\$39,999
 - d. \$40,000-\$59,999
 - e. Greater than \$60,000
 - f. Unemployed
6. Is anyone in your household currently on any of these programs?
 - a. School Meals (Free/reduced lunch) (SNAP)
 - b. Minnesota Food Assistance Program
 - c. Women, Infants & Children Program (WIC)
 - d. Food Stamp Program
 - e. Food Bank/Food shelves
 - f. Other:
7. What grade is your child in now? _____
8. Total number of people live in your household: _____
9. Total number of children in your household: _____
10. Are you homeless?
 - a. No
 - b. Yes. If so, how long have you been homeless?

11. In general, would you say YOUR DIET is:
- a. Excellent
 - b. Very Good
 - c. Good
 - d. Fair
 - e. Poor
12. In general, would you say your CHILD'S DIET is:
- a. Excellent
 - b. Very Good
 - c. Good
 - d. Fair
 - e. Poor
13. In general, would you say YOUR HEALTH is:
- a. Excellent
 - b. Very Good
 - c. Good
 - d. Fair
 - e. Poor
14. In general, would you say your CHILD'S HEALTH is:
- a. Excellent
 - b. Very Good
 - c. Good
 - d. Fair
 - e. Poor
15. What affects what foods you buy?
- a. Cost
 - b. Transportation
 - c. Coupons
 - d. Appearance of food
 - e. Availability at the store
 - f. What my child(ren) wants
- Other: _____
16. How often does your child play?
- a. Daily
 - b. 2-3 times per week
 - c. 1 time per week
 - d. 2 times per month
 - e. 1 time per month
 - f. Other: _____
17. What activity does your child do most? (Check all that apply)
- a. Walk
 - b. Swim
 - c. Team sports
 - d. Bike
 - e. Other: _____
18. How would you describe your child's activity level?
- a. Inactive
 - b. Active
 - c. Sedentary
19. What would you say YOUR current height and weight are:
- a. Height: _____feet _____ inches
 - b. Weight: _____lbs
20. What would you say YOUR CHILD'S current height and weight are:
- a. Height: _____feet _____ inches
 - b. Weight: _____lb

Thank you for completing this information. Please give the form to the researchers.

Child's actual measurements: Height: _____inches _____inches
 Weight: _____lbs _____lbs

CAMERA PROJECT: Food Environment Photo Ideas

- Please take your pictures and bring the camera back on _____.
- Lindsay will meet with you that day to collect your camera.

- What your breakfast looks like
 - At home
 - At school
- What your lunch looks like
 - At home
 - At school (if you pack your lunch or if you get school lunch)
 - Out to eat
- What your dinner looks like
 - At home
 - Out to eat
- At least 2 different snacks that you eat
- Your refrigerator at home
- Your cabinets or cupboards where food is kept
- Take pictures of what food you have for choices
- The plate you put your food on at home
- Your kitchen or where people prepare food
- Where you eat your meals
 - What the room looks like
 - What the table looks like
- If the table is set, take a picture of that
- Who cooks at home (make sure it's okay with them)
- Who you eat with (make sure it's okay with them)
- Favorite meals or snacks
- What you drink at a meal or in between meals
 - Take a picture of what you pour into a cup or if it's in a can, take a picture of that
- What you have at home to drink
- Do you shop with your Mom, Dad, Grandma or Grandpa?
- Favorite restaurant or store.
- Have someone else take a picture of you cooking or eating.

CAMERA PROJECT: Physical Activity Photo ideas

- Please take your pictures and bring the camera back on _____.
- Lindsay will meet with you that day to collect your camera.

Picture ideas:

- Your top 3 favorite activities
- Your favorite inside activity
- Your favorite outside activity
- Activity with a team
- Activity by yourself
- Activity with your family
- Your favorite thing to do with your family
- Your favorite thing to do by yourself (have a parent or friend take it for you)
- Where you do most of the activity
- Who you are active with
 - Family
 - Friends
- The activity you do most often inside
- The activity you do most often outside
- Who influences what you do with your spare time
- What your play area/room/environment looks like
- Where you like to hang out

Interview Questions for Photovoice Project

Food Environment Interview Questions:

1. What is this picture of?
 - a. Tell me some background about what was happening when you took this picture
 - i. Who are you with, where are you, what food is in the picture.
 - b. Is (what's in this picture) typical of what you eat?
2. Why did you take this picture?
3. How does this picture represent the food you eat (your food environment)?
4. After asking about all pictures:
 - Is there anything else that is important about the food you eat that isn't shown in these pictures?
 - Which of these pictures best shows us what your food environment is like?

Physical activity Interview Questions:

1. Tell me about what you are doing in this picture?
 - a. Who are you with, what are you doing, is this something you do often?
2. Why did you take this picture?
3. What does this picture tell about what you do for physical activity?
4. After asking about 3-4 pictures:
 - Is there anything important about the activities you do that aren't shown in any of these pictures?
 - Which of these pictures best shows us about your physical activity?

Dietitians' perspectives on integrating food and water system issues into professional practice

We would like to begin the survey by asking you some questions regarding your beliefs about your work as a registered dietitian (*If you are currently unemployed, please refer to your most recent position as an RD*)

1. If you were to perform the following generalized behaviors as a registered dietitian, would you view them as favorable or unfavorable? Range: Extremely Unfavorable (-3) to Extremely Favorable (+3)

Helping people become more knowledgeable about their food choices	-3, -2, -1, 0, 1, 2, 3
Educating about attributes associated with particular foods, even though these foods may be too costly to purchase	-3, -2, -1, 0, 1, 2, 3
Educating about attributes associated with particular foods, even though these foods may be difficult to access	-3, -2, -1, 0, 1, 2, 3
Educating about attributes associated with particular foods, even though these foods may not be clearly labeled with the identifying attributes	-3, -2, -1, 0, 1, 2, 3
Educating about issues that coincide with my values	-3, -2, -1, 0, 1, 2, 3
Educating about issues that are outside my scope of work	-3, -2, -1, 0, 1, 2, 3
Educating about issues that are not based in science	-3, -2, -1, 0, 1, 2, 3
Educating about foods that are healthier than other foods	-3, -2, -1, 0, 1, 2, 3
Educating about issues that I do not agree with	-3, -2, -1, 0, 1, 2, 3
Being viewed as unconventional or controversial by my colleagues	-3, -2, -1, 0, 1, 2, 3

2. With regard to your professional work in general, how strongly are you influenced by these people or groups? Range: Not at all (-3) to Very Strongly (+3)

My Employer	-3, -2, -1, 0, 1, 2, 3
Other registered dietitians	-3, -2, -1, 0, 1, 2, 3
Food Industry corporate executives	-3, -2, -1, 0, 1, 2, 3
The people I serve (clients/patients/students/others)	-3, -2, -1, 0, 1, 2, 3
My colleagues at work	-3, -2, -1, 0, 1, 2, 3
The American Dietetic Association (ADA)	-3, -2, -1, 0, 1, 2, 3
The Society for Nutrition Education (SNE)	-3, -2, -1, 0, 1, 2, 3
Faith-based organizations to which I belong	-3, -2, -1, 0, 1, 2, 3
Other, please indicate:	-3, -2, -1, 0, 1, 2, 3

3. In your opinion, how important is it that registered dietitians know about the following issues related to agricultural production practices? Range: Extremely-Unimportant (-3) to Extremely Important (+3)

Agriculture's effect on natural resources and the environment	-3, -2, -1, 0, 1, 2, 3
Agriculture's effect on the economic stability of Minnesota farmers	-3, -2, -1, 0, 1, 2, 3
Agriculture's effect on animal welfare	-3, -2, -1, 0, 1, 2, 3
Agriculture's effect on water quality	-3, -2, -1, 0, 1, 2, 3
Agriculture's effect on soil quality	-3, -2, -1, 0, 1, 2, 3

Agriculture's effect on the preservation of rural communities	-3, -2, -1, 0, 1, 2, 3
Agriculture's use of antibiotics in livestock	-3, -2, -1, 0, 1, 2, 3
Agriculture's use of synthetic chemicals and pesticides	-3, -2, -1, 0, 1, 2, 3

4. Prior to receiving this survey, were you familiar with the term sustainable agriculture? (Y or N)

5. Have clients ever asked you questions about sustainably produced foods? (Y or N)

6. Have you ever integrated issues pertaining to sustainably produced foods into your professional practice? (Y or N)

7. Do you believe that how and where food is produced influences health outcomes? (Y or N)

8. Rate your level of agreement with the following statements regarding sustainably produced foods. Range: Strongly Disagree (-3) to Strongly Agree (+3)

I am interested in incorporating issues pertaining to sustainably produced foods into my professional practice.	-3, -2, -1, 0, 1, 2, 3
I am adequately informed about issues pertaining to sustainably produced foods	-3, -2, -1, 0, 1, 2, 3
I am able to incorporate issues pertaining to sustainably produced foods into my professional practice.	-3, -2, -1, 0, 1, 2, 3
I would have adequate time at work to incorporate issues pertaining to sustainably produced foods into my professional practice.	-3, -2, -1, 0, 1, 2, 3
Most of the people I provide services to would be able to understand issues pertaining to sustainably produced foods.	-3, -2, -1, 0, 1, 2, 3
Most of the people I provide services to would be interested in issues pertaining to sustainably produced foods.	-3, -2, -1, 0, 1, 2, 3
It is appropriate to incorporate issues pertaining to sustainably produced foods into my professional practice.	-3, -2, -1, 0, 1, 2, 3
My place of employment has an adequate budget to allow me to incorporate issues pertaining to sustainably produced foods.	-3, -2, -1, 0, 1, 2, 3
My employer would support me if I have an interest in incorporating issues pertaining to sustainably produced foods into my practice.	-3, -2, -1, 0, 1, 2, 3

9. At present, please indicate whether you believe the following people or groups would approve or disapprove of your incorporating issues of sustainability into professional practice Range: Strongly Disapprove (-3) to Strongly Approve (+3)

My Employer	-3, -2, -1, 0, 1, 2, 3
Other registered dietitians	-3, -2, -1, 0, 1, 2, 3
Food Industry corporate executives	-3, -2, -1, 0, 1, 2, 3
The people I serve (clients/patients/students/others)	-3, -2, -1, 0, 1, 2, 3
My colleagues at work	-3, -2, -1, 0, 1, 2, 3
The American Dietetic Association (ADA)	-3, -2, -1, 0, 1, 2, 3
The Society for Nutrition Education (SNE)	-3, -2, -1, 0, 1, 2, 3
Faith-based organizations to which I belong	-3, -2, -1, 0, 1, 2, 3
Other, please indicate here:	-3, -2, -1, 0, 1, 2, 3

10. If the people you served expressed an interest in identifying ways to include sustainably produced foods in meal planning and assuming you decided to integrate issues pertaining to sustainably produced foods into your professional practice, how

likely that the following would occur? Range: Extremely Unlikely (-3) to Extremely Likely (+3)

I would be helping them to become more knowledgeable about their food choices	-3, -2, -1, 0, 1, 2, 3
I would be educating about foods which may be too costly.	
I would be educating about foods which may be too difficult to access.	-3, -2, -1, 0, 1, 2, 3
I would be educating about foods which may not be clearly labeled as to how and where they were produced.	-3, -2, -1, 0, 1, 2, 3
I would be educating about issues that coincide with my values	-3, -2, -1, 0, 1, 2, 3
I would be educating about issues that are outside my scope of work	-3, -2, -1, 0, 1, 2, 3
I would be educating about issues that are not based in science	-3, -2, -1, 0, 1, 2, 3
I would be educating about foods that are healthier than other foods	-3, -2, -1, 0, 1, 2, 3
I would be educating about issues that I do not agree with	-3, -2, -1, 0, 1, 2, 3
I would be viewed as unconventional or controversial by my colleagues	-3, -2, -1, 0, 1, 2, 3

11. I believe that incorporating issues pertaining to sustainably produced foods into my professional work would be:

Extremely Foolish (-3) to Extremely Wise (+3)	-3, -2, -1, 0, 1, 2, 3
Extremely Bad (-3) to Extremely Good (+3)	-3, -2, -1, 0, 1, 2, 3
Extremely Harmful (-3) to Extremely Beneficial (+3)	-3, -2, -1, 0, 1, 2, 3
Extremely Unenjoyable (-3) to Extremely Enjoyable (+3)	-3, -2, -1, 0, 1, 2, 3
Extremely Unpleasant (-3) to Extremely Pleasant (+3)	-3, -2, -1, 0, 1, 2, 3

12. Please provide us with any reasons why you would or would not integrate issues pertaining to sustainably produced foods into your professional work.

13. Please indicate your past and future behaviors as they relate to your work.

Within the past six months I have incorporated issues pertaining to sustainably produced foods into my professional practice. Range: Strongly Disagree (-3) to Strongly Agree (+3)	-3, -2, -1, 0, 1, 2, 3
Within the next six months I intend to incorporate issues pertaining to sustainably produced foods into my professional practice. Range: Extremely Unlikely (-3) to Extremely Likely (+3)	-3, -2, -1, 0, 1, 2, 3
Within the next six months I plan to incorporate issues pertaining to sustainably produced foods into my professional practice. Range: Extremely Unlikely (-3) to Extremely Likely (+3)	-3, -2, -1, 0, 1, 2, 3

Background Information

14. What is your present occupation?	
15. What are your professional affiliations?	
16. What practice groups do you belong to?	
17. What is your age?	
18. Sex	Male; Female
19. What is your height and weight ?	

20. Ethnicity	Caucasian (white)-American; African (black) American; Hispanic-American; Asian American; American Indian; Other
21. Personal Annual Salary Range	Less than \$10,000; \$10,000-19,999; \$20,000-34,999; \$35,000-49,999; \$50,000-74,999; \$75,000-100,000; More than \$100,000
22. Education	Assoc/Vocational Degree; Bachelor's Degree; Advanced Degree
23. How many years have you been practicing	< 5 years; 5-10 years; 11-15 years; 15+ years
24. Political Affiliation	Democrat; Republican; Independent; Other (please indicate)
25. In your opinion, what percentage of the people you serve might be interested in learning more about sustainably produced foods?	None, _____ % (please indicate percent)
27. Was information provided to you as part of your coursework?	Yes; No
28. Would you like to learn more about this topic?	Yes; No
29. How would you prefer to learn about this topic?	In-service; Email; Annual Conference; Pamphlets; Newsletters; Video; Other (please indicate)
30. Do you routinely purchase sustainably produced foods for your household?	Yes; No

31. We would like to ask you a few questions about how you see yourself.

Using a 5 point Likert scale (Strongly agree=2; agree=1; unsure=0; disagrees=-1; strongly disagrees=-2), self-identity will be assessed with responses to the following questions:

- I consider myself a health conscious consumer
- I consider myself a meat and potato consumer
- I consider myself a whole grains consumer
- I consider myself a sweets consumer
- I consider myself a fried foods consumer
- I consider myself a salty snack foods consumer
- I consider myself a bread and carbs consumer
- I consider myself a dieter
- I consider myself a weight conscious consumer
- I consider myself a refrained eater
- I consider myself a fast foods eater
- I consider myself a vegetarian
- I consider myself a vegan
- I consider myself a tap water consumer
- I consider myself a filtered tap water consumer
- I consider myself a bottled water consumer
- I consider myself a sustainable foods consumer
- I consider myself an organic foods consumer

32. Please indicate how recently patients/clients have asked for the following information, and your rate level of confidence in your ability help your patient/client find the answer their question Very Confident (2); Somewhat Confident (1); Unsure (0); Somewhat Unconfident (-1); Very Unconfident (-2)

Patients/clients have asked me for information on:	Within the past week	Within the past month	Within the past year	Never have asked	Confidence Level (-2,- 1, 0, 1, 2)
1. the quality of our municipal water supply					
2. where to buy organic produce					
3. what type of produce is grown in our local area					
4. whether our local farmer's market accepts Supplemental Nutrition Assistance Program (SNAP, formerly known as the Food Stamp Program) EBT.					
5. how to establish a composting system in your backyard					
6. how to implement a reduce, reuse, recycle program in the workplace					
7. what are the differences between 'free-range' and 'cage-free' eggs					
8. how is organic beef raised, in contrast to conventional beef					
9. what is community-supported agriculture (CSA), and how might it work for individuals and/or in the workplace					
10. safety of genetically modified foods					
11. how to identify genetically modified foods					
12. safety of plastic food packaging					
13. nanotechnology use in the food industry					
14. antibiotic use in livestock					
15. safety of Bisphenol A and how to identify it in packaging					
16. safety of imported food vs local food					
17. how to assess pesticide residue on food					
18. resources on how to plan a garden					
19. recombinant bovine growth hormone					
20. increasing healthful locally sourced foods in schools					
21. affordability of fresh healthful food					
22. how to interpret food labels (eg: fair trade, natural, organic, etc)					

23. nutritional value of organic food					
24. safety of organic food					
25. safety of seafood and freshwater fish					
26. concerns about overfishing and sustainable seafood choices					
27. concerns about impact of agricultural practices on water quality					

33. Please indicate how often you have engaged in the following activities?

0-Not performed, 1-Rarely performed (1-2 times per year), 2-Sometimes performed (monthly),

3-Often performed (weekly), 4-Constantly performed (daily)

I have engaged in the following activities	0	1	2	3	4
1. Met with staff at a local food bank or homeless shelter to educate them about the benefits of providing local, seasonal, and/or sustainably produced food.					
2. Communicated with restaurants and/or grocery stores that I frequent about my interest in eating local, seasonal, and/or sustainably-raised food.					
3. Made a presentation to a professional or lay public group on any topic related to: the health, social and environmental benefits of eating local, seasonal, and/or sustainably-produced foods; how to safely prepare and preserve fresh, seasonal food; food labeling regulations and definitions for organic and related terms					
4. Offered cooking classes on preparation and preservation of fresh, locally produced foods.					
5. Written an article or blog about the benefits of eating local, seasonal, and/or sustainably-raised food.					
6. Accessed or communicated with school food service directors and/or					

teachers about accessing local, seasonal, and/or sustainably-raised food.					
7. Considered food origin and production practices when ordering food for a facility					
8. Considered issues relating to water quality and conservation					
9. Considered increased efficiency and energy use with regard to food production					

34. We have a few questions to assess current knowledge about food and water systems.

1. The acronym CAFO stands for:
 - a. Controlled agricultural foraging operation
 - b. Concentrated animal feeding operation
 - c. Certified agricultural fertilizer operator
 - d. Committee on Agriculture, Food and Organics

2. The following federal programs are funded by the Food, Conservation and Energy Act of 2008, also known as the 2008 Farm Bill:
 - a. Direct and counter-cyclical payments for commodity food production (also known as farm income stabilization or subsidies)
 - b. Supplemental Nutrition Assistance Program (SNAP, formerly known as the Food Stamp Program)
 - c. Rural Energy for America Program
 - d. Healthy Urban Food Enterprise Development Center
 - e. a and b
 - f. all of the above

3. The Safe Drinking Water Act authorizes which federal organization to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water.
 - a. The Food and Drug Administration
 - b. The Department of Agriculture
 - c. The Environmental Protection Agency
 - d. The Department of Health and Human Services

4. The National Organic Program administered under USDA:
 - a. Forbids tail docking of pigs
 - b. Forbids debeaking egg laying hens
 - c. Requires that animals have outdoor access
 - d. Does not require farm inspections

5. The acronym GMO stands for:
 - a. Green model organization
 - b. Green manure only

- c. Genetically modified organism
 - d. Genetic modeling organization
6. Government agencies that set tolerance levels for pesticides first identify those foods commonly eaten in large quantities by
- a. children.
 - b. adolescents.
 - c. adults.
 - d. elderly.
7. The FDA monitors pesticides by sampling
- a. all food shipments for all pesticides.
 - b. all food shipments for some pesticides.
 - c. some food shipments for all pesticides.
 - d. some food shipments for some pesticides.
8. What is the name of the federal program that continuously determines levels of various contaminants (including pesticides) in commonly consumed foods in order to estimate the usual dietary intake of these contaminants by the US population?
- a. Total Diet Study
 - b. Toxicant Monitoring Program
 - c. Food Safety and Health Program
 - d. Diet and Market Analysis Report
9. According to the USDA National Organics Program, food producers are allowed to label a food product as “organic” if it:
- a. has been irradiated.
 - b. contains genetically engineered ingredients.
 - c. was made with at least 95% organic ingredients.
 - d. was grown with fertilizer made from sewer sludge.
10. Which of the following statements about pesticide residues on foods is true?
- a. There are the same type and amount of pesticide residues on organically produced foods as conventionally produced foods.
 - b. There are the same type and amount of pesticide residues on all conventionally grown produce.
 - c. It is never possible to decrease the amount of pesticide residue on your food prior to consumption.
 - d. In a research study of children who had been eating a conventional diet, a statistically significant decrease in urinary pesticide metabolites was observed after the children were switched to an organic food diet for 5 days.
11. Which of the following is a feature of bovine growth hormone use in the United States?
- a. It decreases udder infections in cows
 - b. None can be detected in meat or milk of cows receiving it
 - c. If consumed from foods, it is denatured by enzymes in the GI tract
 - d. If consumed from foods, it could potentially stimulate receptors for human growth hormone
12. Which of the following is a characteristic of antibiotic use in livestock?
- a. Development of antibiotic-resistant organisms is very rare

- b. Proper cooking of the meat destroys any traces of antibiotics
- c. Farmers use more than 5 times more antibiotic in livestock than physicians use in people
- d. Because the antibiotics have a short half-life, the FDA permits slaughter of the animals at any time.

13. Which of the following is considered a threat to natural resources and the food system?
- a. Soil erosion
 - b. Decreased availability and quality of water supplies
 - c. Erratic weather patterns and increasing temperatures
 - d. Shrinking biodiversity
 - e. All of the above

14. What is the minimum amount of time required for one inch of topsoil to form naturally?
- a. 1 week
 - b. 1 year
 - c. 50 years
 - d. 100+ years

15. Of the more than 7,000 species plants that are available for food, what three foods account for more than 60% of the total caloric intake of the global human diet?
- a. Wheat, rice and sugar
 - b. Wheat, rice and corn
 - c. Rice, corn and soybeans
 - d. Corn, soybeans and potatoes

Final Questions:

1. Do you think defining the role of the dietitian in food system sustainability is a priority for the American Dietetic Association?
2. Do you think the American Dietetic Association advocates for dietitians as having expertise to contribute to discussions and decisions around food system sustainability?

*Thank you for your time.
Please feel free to offer additional comments below.*

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17. General: Neither party shall be liable for failure, default or delay in performing its obligations under this Licence, caused by a Force Majeure event which shall include any act of God, war, or threatened war, act or threatened act of terrorism, riot, strike, lockout, individual action, fire, flood, drought, tempest or other event beyond the reasonable control of either party.

17.1 In the event that any provision of this Agreement is held to be invalid, the remainder of the provisions shall continue in full force and effect.

17.2 There shall be no right whatsoever for any third party to enforce the terms and conditions of this Agreement. The Parties hereby expressly wish to exclude the operation of the Contracts (Rights of Third Parties) Act 1999 and any other legislation which has this effect and is binding on this agreement.

17.3 To the fullest extent permitted by law, this Licence will be governed by the laws of England and shall be governed and construed in accordance with the laws of England. Any action arising out of or relating to this agreement shall be brought in court situated in England save where it is necessary for BMJ Group for enforcement to bring proceedings to bring an action in an alternative jurisdiction.