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Using community-based participatory research to identify potential interventions to overcome barriers to adolescents' healthy eating and physical activity

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Abstract

Using a community-based participatory research approach, we explored adolescent, parent, and community stakeholder perspectives on barriers to healthy eating and physical activity, and intervention ideas to address adolescent obesity. We conducted 14 adolescent focus groups (n = 119), 8 parent focus groups (n = 63), and 28 interviews with community members (i.e., local experts knowledgeable about youth nutrition and physical activity). Participants described ecological and psychosocial barriers in neighborhoods (e.g., lack of accessible nutritious food), in schools (e.g., poor quality of physical education), at home (e.g., sedentary lifestyle), and at the individual level (e.g., lack of nutrition knowledge). Participants proposed interventions such as nutrition classes for families, addition of healthy school food options that appeal to students, and non-competitive physical education activities. Participants supported health education delivered by students. Findings demonstrate that community-based participatory research is useful for revealing potentially feasible interventions that are acceptable to community members.

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Keywords

Adolescent; Nutrition; Obesity; Physical activity; Community-based participatory research

Introduction

Childhood obesity, a current public health problem, is associated with a complex web of ecological and psychosocial factors that can impede healthy diet and physical activity (Koplan et al. 2005; Levi et al. 2007). Some of these factors, including cultural norms, neighborhood characteristics, and school environment, can vary considerably across different communities and can be challenging to address unless community perspectives are recognized and genuine community engagement is established (Jones and Wells 2007; Wallerstein 2006). Most prior research, however, has not elicited a broad range of community views on barriers to healthy eating and physical activity or intervention design. In the present research, we examined multiple stakeholder perspectives utilizing community-based participatory research methods, with the goal of developing effective interventions that directly address community priorities.

Prior research has revealed several barriers to healthy eating, including convenience and low cost of less nutritious fast food (Croll et al. 2001; Cullen et al. 2007; Drewnowski and Specter 2004), lack of availability and high cost of healthier food (Harrison 2005; McKinley et al. 2005; Monsivais and Drewnowski 2007), and perceived need by school staff to provide tastier, less healthy food to maintain student participation in cafeteria programs (Bauer et al. 2004; Nollen et al. 2007). Youth have cited a preference for unhealthy food (including fast food) due to the perception that healthy food looks less appealing and tastes worse (Evans et al. 2006; Harrison 2005; Shepherd et al. 2006). In schools, staff and students note easy vending machine access (Cullen et al. 2007; Nollen et al. 2007) and inadequate funding for food services to provide healthier food (Cullen et al. 2007). Social pressure, such as peers' teasing, may prevent students from eating healthy foods at school, including meals served through the National School Lunch Program, the federally subsidized program with nutritional content standards (Bauer et al. 2006; Cullen et al. 2007; Nollen et al. 2007), and food brought from home that may potentially be healthier than some other options (Croll et al. 2006; Evans et al. 2006).

Barriers to youth physical activity include the high cost of equipment (Hesketh et al. 2005; Kubik et al. 2005), low accessibility or availability of space and facilities such as playgrounds (Allison et al. 2005; Cohen et al. 2006; Kipke et al. 2007), and unsafe location of facilities for physical activity (Bauer et al. 2004; Cohen et al. 2006; Gordon-Larsen et al. 2004). Lack of peer and parental support for physical activity can also pose a significant barrier (Bauer et al. 2004; Mabry et al. 2003; Taylor et al. 1999). Parents have described lack of time or motivation to exercise with their children (Gordon-Larsen et al. 2004; Harrison et al. 2005; Hesketh et al. 2005). Adolescent girls have said that they prefer not to exercise due to concerns about appearance during and after physical activity (Alm et al. 2008; Leslie et al. 1999; Robbins et al. 2003; Zabinski et al. 2003). Sedentary activity can be a barrier, since youth may preferentially engage in technology-related activities (TV, Internet, video games) rather than physical activity (Allison et al. 2005). Schools may provide insufficient physical activity opportunities (Bauer et al. 2006; Hohepa et al. 2006; Kubik et al. 2005; Young et al. 2007), and poor physical activity facilities and low levels of adult supervision in middle schools have been associated with low levels of student physical activity on campus (Sallis et al. 2001).

Prior literature also supports the need for interventions that target young people. Early adolescents who are less physically fit may have higher rates of adult obesity (Kvaavik et al. 2009; Novak et al. 2006), and higher BMI during early adolescence is associated with increased

risk of coronary heart disease in adulthood (Baker et al. 2007). Overweight in childhood is a predictor of type I and II diabetes in young adulthood (Al Maumun et al. 2009).

Rigorous evaluations of obesity interventions for school-age children and adolescents have mostly shown small or nonsignificant effects (Austin et al. 2005; Baranowski et al. 2000; Birnbaum et al. 2002; Conklin et al. 2005; Cranage et al. 2006; Cullen et al. 2007; Dishman et al. 2004; French et al. 2004; Gortmaker et al. 1999; Lytle et al. 2004; Neumark-Sztainer et al. 2003; Sallis et al. 2003; Wojcicki and Heyman 2006). Most interventions use schools as the primary setting (Reynolds and Spruijt-Metz 2006), with a mix of different strategies, including classroom education (Caballero et al. 2003; Davis et al. 2000; Flores 1995; Gortmaker et al. 1999; Lytle et al. 2004; Stolley and Fitzgibbon 1997), dance classes (Flores 1995; Robinson et al. 2003), school food environment changes (Cullen et al. 2007; Donnelly et al. 1996; Foster et al. 2008; French et al. 2004), physical education changes (Gortmaker et al. 1999; Neumark-Sztainer et al. 2003), reduction in television or computer use (Epstein et al. 2008; Robinson 1999), parental involvement (Baranowski et al. 2000; Birnbaum et al. 2002; Davis et al. 2000; Lytle et al. 2004), and marketing healthy school food options (Baranowski et al. 2000; Davis et al. 2000; Foster et al. 2008; French and Stables 2003; Perry et al. 1998; Reynolds et al. 2000). A subset have included middle school age youth (Birnbaum et al. 2002; Cullen et al. 2007; Foster et al. 2008; Gortmaker et al. 1999; Lytle et al. 2004; Sallis et al. 2003).

The purpose of the present study was to conduct community-based participatory research that would lead to the design and implementation of an effective school-based intervention to address obesity in middle schools. A growing body of community-based participatory research suggests that community involvement in intervention development and testing is essential for program effectiveness and sustainability (Bauer et al. 2006; Lytle and Perry 2001; Koplan et al. 2005; Nollen et al. 2007; Reynolds and Spruijt-Metz 2006; Summerbell et al. 2005). Community-based participatory research equitably involves community representatives and researchers at every stage; all partners share responsibilities and contribute their respective expertise to investigate and intervene with a health problem (Israel et al. 2005; Jones and Wells 2007). Researchers have used the term “community” to describe a unit of identity, created through social interactions, by individuals with a common interest (Israel et al. 2005). For this study, we defined the community as individuals—including adolescents, parents, and other adults—with a common interest in eating and physical activity behaviors among middle school youth. This community included (but was not limited to) the local schools that participated in the pilot research and the central school district administrators who make decisions that affect middle school students. We used formative qualitative research methods to explore the range of participant views on barriers to and possible interventions for healthy nutrition and physical activity. We included a wide variety of people to allow for the examination of patterns and priorities by community member type (i.e., student, parent, or other adult key stakeholder).

Methods

Study context

The main community partner for this study was the Los Angeles Unified School District, the second largest school district in the U.S. The district’s population of more than 690,000 students is 73% Hispanic, 11% Black, 9% White, and 6% Asian and Pacific Islander. Forty-two percent of elementary and secondary school children in the district are obese or overweight (measured in 5th, 7th, and 9th grades), with the prevalence varying by race/ethnicity: Latinos (45%) and Blacks (41%) show higher prevalences than do Whites (29%) and Asians/Pacific Islanders (27%) (California Department of Education 2005; Slusser et al. 2005). As determined by family income level, 77% of students qualify for the National School Lunch Program offering free or reduced-price lunch, and 43% of all students participate. Similar to many other school districts

in the nation, administrators faced mandates to improve cafeteria operations and food, including school board motions passed in 2003–2005 to ban soft drinks and implement nutritional standards. These standards included limiting sodium content to less than 1,100 mg per meal (weekly average), eliminating trans fats, limiting fat content to less than 35 g per entree, reducing availability of entrees with greater than 15% of calories from saturated fat, and limiting added sugar to 7 g per ounce of cereal (Canter et al. 2005). However, the actual translation of policy into practice proved challenging due to school district resource constraints (limited school cafeteria staff and funding to implement school cafeteria changes), and resulted in a request for community-academic partnership.

The impetus for this study originated in discussions with community stakeholders of the Los Angeles Unified School District. Academic researchers from the UCLA/RAND Center for Adolescent Health Promotion (the "Center") had been partnering with two community advisory boards on youth health issues prior to this study. One of the boards, with which the Center had a partnership since its inception in 1998, included local representatives of the Los Angeles Unified School District (principals and staff), Los Angeles County Department of Health Services, parent groups, foundations, businesses, health care providers, and youth-serving organizations from a geographic region in Los Angeles. The other, in place since 2003, was comprised of high school students. Board members identified the problem of childhood obesity and, during the grant proposal stage for the present research, suggested that we focus on improving nutrition and physical activity for middle-school students to address district needs and priorities. Once grant funding was obtained for the present research, a Healthy Living Advisory Board was formed that consisted of central school district administrators, administrators from the Los Angeles County Department of Health Services and the Department of Public Health, and representatives from other organizations in the county that address youth obesity issues.

The core research team was led by the Los Angeles Unified School District Student Medical Director and two Center researchers. The Medical Director was the primary liaison with the school district and facilitated communication with school officials. Weekly leadership team meetings and quarterly community advisory board meetings provided an ongoing forum for idea exchange and community input. Community advisory board members assisted in the development of study instruments, participated in data interpretation, and helped to identify community members to participate in the research (i.e., individuals in the school district or Los Angeles region with a shared interest in child healthy eating and physical activity, including administrators, teachers, parents, and youth). All study protocols were fully vetted with community advisory board members, who also collaborated on the interpretation and dissemination of results. Approval was obtained from both the school district and RAND human subjects review boards.

Focus groups

We conducted 22 focus groups of 8–10 participants each at two middle schools in Carson, CA, for a total of 119 7th and 8th grade students and 63 parents. Recruitment was conducted by researchers at the middle schools during lunch periods. Students who approached the researchers received information about the study and parent consent forms. Students were also encouraged to sign up their parents to participate.

Six male student groups, eight female student groups, five English-language parent groups, and three Spanish-language parent groups were conducted. Eighty-four percent of parents were female, 75% Latino, 60% married, and 82% overweight or obese (based on self-reported height and weight). Of student participants, 61% were female, 58% Latino, and 52% overweight or obese (based on self-reported height and weight); the average age was 12 years. Male and female students were placed in separate focus groups because community advisory board

members suggested and prior literature indicated that students might be more open in discussions of eating and physical activity in same-sex groups (Alm et al. 2008; Leslie et al. 1999; Mabry et al. 2003; Robbins et al. 2003; Taylor et al. 1999; Zabinski et al. 2003).

Focus group discussions (~60–90 min) were facilitated by trained members of the data collection team, who followed semi-structured protocols (see Table 1). Prior to the start of each focus group, participants completed a brief survey with socio-demographic questions. Informed consent was obtained from parents, and informed assent was obtained from students. All focus groups were audiotaped, transcribed, and, if in Spanish, translated.

Two sets of focus groups were conducted. In the first set (7 groups; May 2006), participants were asked to discuss barriers to healthy eating and physical activity, and possible interventions to address barriers. Because saturation of topic categories was obtained (i.e., no new concepts were elicited), the protocol for the second set of 14 focus groups (October 2006) was designed to elicit in-depth discussion of potential intervention components derived from the first set of focus groups, key stakeholder interviews, community input, prior literature, and school board policy (Denzin and Lincoln 2000; Flick 1998; Morse 1995). The categories of intervention components were: improving school food and physical education, reducing access to unhealthy food and beverages, improving home environments through healthier parental choices, and reducing sedentary activity and media use. Because school-based intervention emerged as a key theme in the first set of focus groups, this topic was addressed more extensively in the second set of focus groups.

Key stakeholder interviews

We interviewed 28 key stakeholders from February to May 2006. Key stakeholders are defined in the qualitative methodological literature as individuals who are experienced with the local setting and issue under study, and who have sufficient information and knowledge about the situation to design effective social change processes. Key stakeholders were identified by community partners, including community advisory board members, and through telephone calls and internet searches for relevant community groups. We also used snowball sampling by asking recruited individuals to recommend additional potential participants (Patton 2002). We interviewed five or more stakeholders in each of the following four groups: school district central administrators (e.g., health services, food services, physical education, health education), local school staff (e.g., principals, teachers), county government employees (e.g., nutrition and child health agencies), and staff in community-based organizations that address youth and/or obesity issues (e.g., after-school programs). To conduct qualitative analytic comparisons within and across stakeholder categories, previous research suggests including at least five stakeholders per category (Patton 2002; Sandelowski 1995).

One researcher conducted all interviews using a semi-structured protocol covering perceptions of obesity as a health problem for middle school students, barriers to physical activity and nutrition, and ideas for intervention (Table 1). To enable comparisons across interview and focus group data, a subset of interview protocol topics was designed to align with topics covered in the focus groups. Open-ended questions were asked before closed-ended questions, per the interviewer protocol, to avoid biasing a respondent's answers, and probes were used if needed to elicit more details about a topic (Bernard 1994;Spradley 1979). Interviews ranged from 40 to 90 min and were audiotaped and transcribed. At the request of the stakeholders, three of the interviews were conducted jointly with 2–3 of their colleagues (all of whom were stakeholders from the same category); all others were individual.

Data analysis

We used qualitative analysis methods to identify topics (general domains of information covered) and themes (groups of similar ideas found within topics) from the focus groups and key stakeholder interviews. Transcript texts were loaded into the data analysis software ATLAS.ti, 5.0, which was used to organize the transcript text for coding (i.e., labeling each quote with a code, and sorting and comparing quotes) (Muhr 2004). Two researchers reviewed the transcripts and identified topics and themes to build preliminary codebooks (Miles and Huberman 1994; Miller and Crabtree 1992; Willms et al. 1990). Codes were exhaustive and exclusive (Bernard 1994; Spradley 1979). The researchers independently identified discrete units of text (phrases, sentences, short paragraphs) that corresponded to specific codes. They compared their coding and resolved any differences through discussion. A third, senior researcher independently reviewed the transcripts and codes. The codebooks were refined through this process of assignment, discussion and resolution, which resulted in a total of 1,740 coded quotes. Two independent raters assigned a code to each quote based on descriptions provided in the finalized codebooks. Kappa values ranged from 0.82 to 0.90, indicating excellent consistency between raters based on accepted standards (Cohen 1960; Landis and Koch 1977).

Analysis included comparing findings within and across the three different participant groups (i.e., parents, youth, key stakeholders). For the focus groups, responses from Spanish-speaking parent groups were compared to English-speaking parent groups. For the interviews, responses were compared across the four stakeholder categories.

Results

The findings are summarized by the four major protocol topics: perceived healthy eating barriers (Table 2), possible intervention components to address healthy eating barriers (Table 2), perceived physical activity barriers (Table 3), and possible intervention components to address physical activity barriers (Table 3). Little variance in themes emerged across the four key stakeholder interview categories or across English- and Spanish-speaking parent focus groups. However, the congruence or variance in findings among the three participant groups —students, parents, and key stakeholders—is emphasized in the following subsections. Participants' responses are also described in the context of four ecological or psychosocial categories of influence on the adolescent: community, school, family, and individual.

Perceived barriers to healthy eating

Many barriers to healthy eating were consistently stated across all three types of participant groups. Youth, parents, and key stakeholders all identified a community level barrier—that easy access to unhealthy fast food contributed significantly to unhealthy food choices. Some examples of this barrier were that students frequently purchased snack food and soda before and after school at convenience stores, and that parents often chose fast food for family meals because of ease and low cost. Participants from all categories also cited barriers at the family level, specifically, parents' unhealthy eating habits and lack of nutritional knowledge. They indicated that parents did not know about district nutrition standards or that fresh fruit was offered daily in school. Students, parents, and stakeholders also stated that at the individual level, middle school students lacked knowledge, awareness, and motivation to eat in a healthy manner.

Participants from all categories, except School Food Services stakeholders, emphasized school-level barriers and described school food as unhealthy and unappealing. In contrast, food services administrators and dietitians said that school food met district nutrition standards and hence was likely to be healthier than other foods students consumed. Students voiced awareness

that fruits and vegetables were healthy but believed that current school food was “greasy” and unhealthy. They were dissatisfied with drinking water options at school and described the water fountains as dirty and the bottled water as expensive. Many parents, youth, and key stakeholders also felt that individual-level barriers were significant in schools, including stigma and negative peer pressure related to eating the cafeteria lunch, which they believed impeded student participation in the school food program. Both stigma and dislike of school food were thought to lead to unhealthy student eating patterns. For example, participants in all categories stated that many students skip lunch during the school day and eat junk food immediately before or after school instead.

Possible interventions to address healthy eating barriers

Nutrition intervention themes that emerged across all participant categories involved changes at the community- and school-levels. Participants proposed community-level interventions to decrease access to unhealthy foods (e.g., limiting fast food outlets near schools) and increase access to healthy food (e.g., providing inexpensive, high quality produce at grocery stores). Participants suggested school food improvements (e.g., better taste, healthfulness, appearance). Parents and students felt that salad bars, fresh vegetables, and sliced fruits would be appealing to students. They wanted more healthy choices at school, and suggested items such as fresh or Subway® sandwiches, which students consistently regarded as healthy. They thought schools should get more input from students and parents on menus through surveys and taste tests. Parents and youth also supported family-level interventions, emphasizing that parents must take responsibility for changing their children’s diets at home and for calling for improvements in school food. They also stated that parents should improve communication with their children about healthy eating.

Key stakeholders, in contrast, emphasized changes to school policy and systems: providing more funding to improve food services, giving schools more flexibility on menu planning, and increasing participation by eligible students in the National School Lunch Program. They felt that increasing the number of students who eat healthy school lunches would result in decreased consumption of less healthy alternatives immediately before or after school. Marketing or branding school food was suggested by key stakeholders as a way to increase participation in the lunch program. Key stakeholders felt that the current ticket system used for the free or reduced lunch program should be changed to an electronic card system that would make school lunch program participation anonymous, thereby reducing the associated stigma.

Students had unique suggestions for improving the school cafeteria that were not offered by parents or other adults: labeling healthier food choices with a consistent, easily recognized symbol and improving cafeteria signage for currently available salads and sandwiches, of which many students were unaware. Students stated a preference for bite-sized or sliced fruits instead of unpeeled or whole fruit. They indicated that students with dental braces could not eat items such as raw carrots or whole apples. They repeatedly stated that clean, cold water should be available at school for free or at low prices, in contrast to the perceived dirty, warm fountain water or expensive bottled water.

Parents and key stakeholders both proposed family and individual level interventions that would provide obesity-prevention education to parents and youth in school and community settings. Suggestions included media literacy education, greater focus on nutrition in the school health curriculum, and weekend cooking classes for families. Parents and stakeholders felt students would be more receptive to health messages from other students than from adults. Many stated that nutrition education should begin in elementary school. Boys were the only group who were unenthusiastic about nutrition education, because they did not think it would affect students’ eating habits.

A proposed intervention to post school lunch nutrition content information, based on a new school board policy, received mixed responses. Several parents thought that students, especially boys, would disregard this information. Other parents, in contrast, thought children would be interested in the nutrition information because of exposure to family members with medical problems, including obesity. In general, girls were more positive about posting nutrition information than were boys. Some boys did think that students who were athletes would be interested in using the nutrition information to make dietary decisions.

Perceived barriers to physical activity

Across participant categories, two physical activity barriers were most frequently stated: poor quality and insufficient quantity of physical education in schools, and excessive media use at home. Problems with physical education included lack of personal attention due to large class size, unqualified teaching staff, inadequate facilities, and "boring" activities. Parents and youth described peer pressure against participating in physical education, girls' discomfort with changing in locker rooms, and student lack of motivation. All participant groups blamed parents for not making exercise a priority in families and allowing excessive media use. At the community level, participants described a lack of safe places to exercise and a need for accessible, inexpensive, and organized physical activities.

Possible interventions to address physical activity barriers

The solution most commonly suggested by parents, and echoed by students and stakeholders, was at the family level. Parents stated that they should take responsibility for their own children by making physical activity a priority and setting limits on sedentary activities like watching television, playing video games, and using computers. However, parents also felt that a multi-stakeholder intervention was necessary, inclusive of students, teachers, and the school system.

Parents, students, and stakeholders all recommended various improvements to physical education in schools, such as adding alternative or non-competitive activities to engage more students (e.g., dance, yoga, tai chi, swimming, obstacle courses). Some students and stakeholders felt physical education time should be increased, or recess time added to the school day. Several stakeholders emphasized that most schools do not meet state requirements for instructor credentialing or minimum quantity of physical education, and suggested bringing schools into compliance. However, stakeholders felt that severe resource and time constraints would make a school-based physical education intervention unfeasible, and that any opportunity for intervention would be at the state or national policy level.

In addition to proposing physical education improvements, participants suggested increasing access to physical activities both in the community and at school. Ideas included creating more local parks, more community-organized activities, and a school-based teen center with physical activities other than competitive sports. Students wanted more access to better facilities and equipment during recess, lunch, or after school. Parents and students suggested a school competition with team activities that would motivate students to be active.

Intervention design elements

Several stakeholders commented on the importance of tailoring an intervention to account for differences in knowledge, attitudes, and interests of girls versus boys and of students from diverse cultural or socioeconomic backgrounds. Many stakeholders emphasized issues of stigma and social acceptance. It was suggested that an intervention should be sensitive to overweight youth by promoting healthy behaviors for all students, and by focusing on positive behaviors instead of negative ones. Stakeholders were supportive of the community-based approach, and recommended involving students in program development. They believed in both environmental change as well as student education, and felt that working with certain

teachers or administrators who were already well-liked by the students would be particularly effective.

Discussion

By eliciting information from parents, students, and other community stakeholders, we gleaned new knowledge related to barriers to healthy eating and physical activity and interventions to address these barriers. The themes presented in the "Results" section related to barriers and interventions at four levels of influence on the adolescent (i.e., community, school, family, and personal factors) consistent with ecological models (Koplan et al. 2005). Six themes are further discussed below because they were especially notable for having direct implications for intervention design.

One theme that emerged from key stakeholder interviews was that schools may have difficulty complying with state and district policies intended to reduce childhood obesity. While the Los Angeles Unified School District has been at the forefront of policy change, other school districts in the U.S. are facing similar barriers to identification and implementation of interventions to support policy change. Such barriers are evident in Los Angeles, where many eligible students do not participate in the National School Lunch Program and schools often lack resources to meet physical education policy standards (for example, physical education class sizes may be too large for each student to receive sufficient instruction). In these cases, interventions to help schools meet physical education standards or increase student lunch participation could be far-reaching in affecting student health. Obesity-related interventions should be relevant to the policy context in which schools operate.

Another theme that emerged was that intervention opportunities exist regarding students' and parents' perceptions, some accurate and some inaccurate, about the school system. Students and parents reported a lack of information about school food menus and of easily accessible, free filtered water in school. School district policies requiring cafeterias to post nutritional information had not been implemented due to cafeteria understaffing and cost (Patel et al. 2009). Moreover, our observations, which were consistent with stakeholder perceptions, found that students' choices for water were often limited to bottled water sold in vending machines or drinking fountains that dispensed warm discolored water (Patel et al. 2009). In another instance, most students and parents were unaware of new policies to improve the school food environment, and they even cited poor nutritional quality as a reason for non-participation in the lunch program. In actuality, the food in the cafeteria and school store was compliant with improved, district-wide nutrition standards, and student and parent perceptions of food quality were inaccurate.

Drawing on student and parent perceptions in the present research, we identified the theme that a school-based intervention to improve healthy eating should aim not only to improve food and beverage offerings (including free palatable water), but also to improve the nutritional labeling and marketing of cafeteria food to increase parent and student awareness. Effective school interventions that have shown positive effects on healthy eating or physical activity have included both of these components (i.e., school food environment improvements paired with student and parent education about those changes) (Austin et al. 2005; Baranowski et al. 2000; Birnbaum et al. 2002; Davis et al. 2000; French et al. 2004; Lytle et al. 2004; Sallis et al. 2003; Wang et al. 2003). The belief that school food is unhealthy, even when nutrition standards are in place, is likely to impede healthier student eating in other school communities that implement similar nutrition policies. The use of community-based participatory research in developing an intervention may reduce parent and student mis-perceptions through increased community involvement.

Consistent with prior research (Kinsman et al. 1998; Latkin et al. 2003), peer influence as a powerful intervention tool was a theme that emerged across all participant groups. Health interventions relating to other areas of adolescent behavior, such as substance use, sexual risk, and smoking reduction, have successfully involved adolescents as agents for change (Botvin et al. 1990; Mellanby et al. 2000; Valente et al. 2003). The effectiveness of peer leaders in eliciting norm, attitude, and behavior change in other areas supports our findings that peer leadership and education may be an important intervention component to address obesity.

Another prominent theme was that parents readily expressed guilt and blame for failing to model and enforce healthy behaviors for their children. Although parents in all groups discussed this topic at length, they did not offer concrete intervention suggestions besides parent cooking classes or education on limiting media use. It appears that although parents acknowledge their role in childhood obesity, they may lack the skills, tools, or motivation to make changes to improve family lifestyles. Previously tested interventions have had fairly small parent components, such as sending home informational newsletters (Baranowski et al. 2000; Birnbaum et al. 2002; Davis et al. 2000; Lytle et al. 2004). An intervention with a larger component to address parental knowledge, skills, and motivation, and to alter environmental factors to facilitate parental change, may improve intervention effectiveness.

A final overarching theme was that school-based interventions may be more effective if they account for parents' and students' preconceptions and existing knowledge about nutrition and physical activity. Students and parents readily identified behaviors that can contribute to obesity and voiced strong beliefs that certain commercial brands of food were healthy, based on media marketing. Focus group participants indicated that student knowledge about obesity was acquired from a variety of sources: school curricula, media messages, and counseling by health care providers. Stakeholders stated that the amount and content of formal classroom nutrition education varied greatly by the individual teacher. An education-based intervention, therefore, should supplement and reinforce the school curriculum, and correct misconceptions acquired through the popular media.

This study is subject to limitations applicable to all qualitative research. Qualitative research is exploratory, and is not designed to formally test hypotheses. However, it provides information that enables intervention design that is based on the understanding of community concerns and dynamics, which can result in more sustainable programs that are tailored to community cultures and contexts (Farquhar et al. 2006). Qualitative research also provides in-depth and detailed descriptive information on a range of topics, and is crucial for designing valid and feasible interventions that can then be tested with other methodologies. Thus, we have outlined our methods in detail to provide an example of conducting community-partnered research with the goal of intervention design. In addition, although our findings are specific to the study population, they provide insight on the range of possible barriers and interventions for adolescent nutrition and physical activity, especially when corroborated by other results in the literature.

Community-based participatory research is a cyclical and iterative long-term process that requires a mutual commitment to sustainability, and can result in beneficial outcomes for community partners and researchers (Israel et al. 2005). As a part of this process, we met with school district food services administrators, local school administrators, and cafeteria staff to discuss potential interventions based on the study findings. Our continued community-academic partnership led to the development, pilot testing, and evaluation of SNaX (Students for Nutrition and eXercise), a peer-led intervention to improve healthy eating and physical activity among middle school students. This intervention and its evaluation may not have been possible without a committed, long-term partnership that is unique to community-based participatory research.

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Table 1

Protocol topics for focus groups and key stakeholder interviews

Question topic	Protocol question
Overview	Do you think that there are problems related to kids not getting enough exercise or proper nutrition?
Barriers	What do you think causes kids to not get proper nutrition?
	What do you think causes kids to not get enough exercise?
Interventions: general	What do you think needs to be done to solve these problems? Think about things that could be done at home, in school, or in the community as a whole to help improve middle school students' physical activity and nutrition.
Interventions: healthy eating[a]	What can be done about students' access to junk food both on and off the school campus?
	How would you change the school cafeteria food program?
	What about posting nutrition information in the cafeteria? Do you think students would read it?
	What would make it easier for parents to prepare healthy foods at home and to set limits with children about eating fast food and junk food?
Interventions: physical activity[a]	Do you think that the school physical education program could be improved?
	What about classroom programs that teach students about the negative effects of watching TV, playing videogames, and using the Internet too much?
	What about programs for parents, to show them how to set limits with their kids about watching TV, playing videogames, and using the Internet too much?
Interventions: potential methods[a]	What do you think about a program during class or school?
	What about involving students in the intervention (like peer social marketing)?
	What do you think about a program involving the whole family at home?
	What do you think about an after-school program for students? For students and parents together?
Additional questions (key stakeholders only)[b]	What are some characteristics of your community that might facilitate or hinder an intervention addressing obesity?
	If we sponsored a program to address adolescent well-being and healthy living, how could we make it attractive to parents and students?
	Should interventions be different for middle schoolers of different backgrounds in your community?

[a] Intervention probes were asked in the second set of focus groups

[b] The interview format allowed for additional questions for key stakeholders

Table 2

Representative quotes on perceived barriers to and interventions for healthy eating

	Quote (s = student, p = parent, k = key stakeholder)
Barrier theme	
Community barrier: easy access to fast food	"Kids go across the street before school to Jack In The Box." (s)
School barrier: unhealthy school food	"My doctor asked me if I buy her fast food…but she didn't ask me what they feed them at school…where she eats junk every day…that stuff has too much grease."(p)
School barrier: unappealing school food	"My kids…they'll tell me mom, you know what, we didn't eat today because there was like some nasty food that did not taste good." (p)
School barrier: lack of clean, inexpensive water	"Those nasty water fountains, it's like it comes from the sewers." (s)
Parent barrier: unhealthy parent behavior	"In this country the parents that work are always in a hurry…we parents are guilty that our children don't eat properly…we buy them fast food because it's getting late." (p)
Youth barrier: lack awareness, knowledge, or motivation	"Kids don't see [obesity] as a problem…most of the kids think, 'oh it will never happen to me."' (k)
Youth barrier: negative peer pressure and stigma	"Yeah because I've heard my daughter say, 'Oh that's for the poor people'…that's what the kids say and that's what they think [about school lunch]."(p)
Intervention theme	
Community intervention: decrease access to unhealthy food/increase access to healthy food	"They should sell more healthy stuff in liquor stores and fast food places." (s)
School intervention: improve school food to be healthier	"We need water." (s) "Give more healthier food, like Subway!" (s)
School intervention: improve school food to look more appealing	"They could make the food look a little bit more appetizing… I don't wanna eat it cause it looks nasty." (s)
School intervention: nutrition information posting	"After my father had open heart surgery and he had to read everything that he was eating, it woke up my girls …they'll all look at the back to see how many calories, and…if they see high sodium they put it back…" (p)
Parent intervention: mobilize and take responsibility for children's lifestyles	"Education should always start from the home…So if my child is big, is overweight, I feel guilty because I didn't feed her correctly. And I don't blame the school for it. But…that discipline should also be enforced while she is at school."(p)
Youth intervention: nutrition education	"[In] health class they're supposed to address nutrition but there's nobody actually making sure they [do] …there's no kind of testing…So if we were serious about nutrition we would ask that embedded into the assessment." (k)
Youth intervention: peer advocacy/empowerment	"Tell [other students], "It's your choice, you get to choose, you're the person that chooses…"' (s)

Table 3

Representative quotes on perceived barriers to and interventions for physical activity

	Quote (s = student, p = parent, k = key stakeholder)
Barrier theme	
Community barrier: inadequate or inaccessible environment	"Some nights the neighborhood is dangerous and there's nothing else to do but just sit in the house and watch TV." (s)
School barrier: inadequate quality and/or quantity of physical education	"Right now the schools are using physical education in secondary [school] as a warehouse…they have huge class sizes…the largest class last year was 120 kids with one teacher, at a high school—120 kids!" (k)
Parent barrier: inability or unwillingness to make physical activity a priority	"I think we all know what we need to do but we don't implement it because we're so busy, we're working you know… fitness doesn't fit in." (p)
Youth barrier: media use	"They don't go out with their friends and have fun…Yeah they just sit [with] their games, and Play Station and their computer… Myspace.com and all this stuff." (p)
Youth barrier: lack of motivation	"…there's some kids that don't want to put in any effort cause they don't think that the grade matters." (s)
Intervention theme	
Community intervention: increase access to physical activity	"We need to make more clubs or a place where youth can hang out and play different types of sports…more of YMCA type of facilities, but…affordable or even free to youth." (p)
School intervention: improve physical education	"Hire credentialed physical education teachers in the elementary schools, one for every 300 students." (k)
School intervention: add non-competitive activities	"We should like make sports more fun instead of competitive." (s)
Parent intervention: set limits on sedentary activity	"I think we should have more communication with our children… we should set limits… there has to be three or four days at minimum that they need to exercise." (p)
Parent intervention: take responsibility for initiating physical activity	"We can't put all the responsibility on after-school programs; as parents you have got to get involved and especially as a parent it has to start with you." (p)
Youth intervention: increase youth awareness and empowerment	"The doctor [said to] my son, 'You're a couple pounds from being obese.' And I looked at him and I looked at my son and I said, 'Okay, what are you going to do about it?"' (p)