Original Article

Child and parental perspectives on diet and physical activity decisions: implications for childhood obesity prevention in China

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Background and Objectives: Obesity has become a global epidemic. In China, 42% of adults and about one-fifth of children are overweight or obese. In major cities, about one-third of boys are overweight or obese. This study aimed to understand how children and parents in China make eating and physical activity (PA) decisions, considering individual, family, community, social, and environmental factors, and to collect parents' recommendations for interventions to promote healthy eating and physical activity. **Methods and Study Design:** Children (n=41, aged 10-15 years) and their parents (n=41) participated in eight semi-structured focus groups (FGs) in Beijing (in North China) and Nanjing (South China). Each site conducted two FGs with children and two FGs with parents. A framework analysis of FG data was conducted with NVivo. **Results:** Three main themes were identified: Children chose food based on flavor, and consumption of unhealthy snacks was prevalent; there were inconsistent standards and practices of school lunch services across schools; students had limited PA time due to academic demand. Students favored high-calorie snacks over fruits or vegetables. Students' and parents' perceptions of school lunch services varied among schools in terms of operation, price, quality, nutritious options, and food taste. Most students reported enjoying PA but spent little time in PA, due to study burdens. Parents made recommendations for improving school food services and increasing PA during and after school. **Conclusions:** These findings will help develop family- and school-targeted health promotion interventions. Intervention framing must consider the unique Chinese social and cultural context.

Key Words: childhood obesity, nutrition, physical activity, school lunch, focus group study

INTRODUCTION

Obesity has become a global epidemic.[1-3] China has caught up with the West in its prevalence of overweight and obese individuals in a remarkably short period of time.[4,5] As China has become more urbanized, with increased consumption of high-calorie foods and sedentary lifestyles, the prevalence of childhood obesity (including overweight) has risen from a relatively low 8.8% in 2000 to 17.1% in 2011.[6] Most recent national data report that in China, 42% adults and about one-fifth of children are overweight or obese,[7] with the rate in boys about two times that of girls.[8] In major cities, about one-third of boys are overweight or obese.[9] Childhood obesity is associated with many serious physiological, psychological, and social consequences. Overweight children are likely to remain overweight as adults.[2,10] Childhood obesity also confers long-term effects on mortality and morbidity.[11] Therefore, childhood obesity prevention has become a public health priority worldwide.

Several leading health organizations and expert panels, including the WHO, have recommended comprehensive

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interventions to combat childhood obesity.[3,12] A Social Ecological Model,[13] which is transdisciplinary and multilevel by nature, is recognized as a well-suited and promising framework for examining this problem. Children's eating and physical activity (E&PA) behaviors are not only affected by the individual influences and choices that lead to energy imbalance, but are also influenced by complex systems that involve reciprocal interactions at multiple levels, including intrapersonal, interpersonal, community, social, and governmental levels. An in-depth understanding of the factors that affect child E&PA will help in the development of effective interventions.

China offers an unprecedented opportunity for pediatric obesity research considering its large population size; area and regional contextual variation; rapid economic growth; and many social and environmental transformations during the last two to three decades, including dramatic changes in its food systems and a steep increase in obesity among children. Although an increasing number of intervention studies have been conducted in China, most were exclusively focused on PA and diet health education.[6] Limited research has examined the multilevel factors, such as school and family, which would be the basis for deciding on environmental and structural interventions. A better understanding of how multiple levels of factors influence Chinese children's diet and PA behaviors is needed.

Using the social-ecological framework (Figure 1), this study aimed to understand how children and parents in China make E&PA decisions, considering individual, family, community, social, and environmental factors. We also assessed how different groups (e.g., parent versus children) might perceive school nutrition and PA environment differently. The ultimate goal was to inform the development of school- and family-targeted health promotion interventions that fit the Chinese social, cultural, and economic context.

METHODS

We used a qualitative approach (i.e., focus group (FG) discussion).[14] FG discussion can help obtain rich information about a range of perspectives and experiences, including group members' similarities and differences.[15]

Study design

We collected data from 41 children (ages 10–15) and their parents (n=41) in Beijing (in North China, the capital) and Nanjing (in South China, the former capital before 1949), two large, key cities in China. FG discussions were held until saturation of new information was reached.[16] In each site, we conducted two FGs with children and two FGs with parents for a total of eight FGs. Each FG included 9 to11 people, resulting in a total of 82 participants. FG discussions were conducted among children and parents separately. Each FG discussion was led by two research team members. Informed consent was obtained from all study subjects. Study protocols were approved by the Institutional Review Board (IRB No. 3128).

Subject recruitment

Beijing, which is China's capital, has an urban population of 16.4 million, according to the 2010 census.[17] Nanjing is one of the largest commercial centers in China and has an urban population of 6.55 million. In both cities, people have been experiencing rapid social economic developments and lifestyle changes. However, there can be regional differences between them with regard to people's lifestyles and social norms.

We recruited participants (students and their parents, one parent per child) using a multilevel recruitment process to ensure an adequate and heterogeneous sample, i.e., in each site, we recruited the students from two schools, but from different classrooms, an elementary school and a middle school.[18] In order to maximize effectiveness in recruiting students, we focused recruitment at four levels:

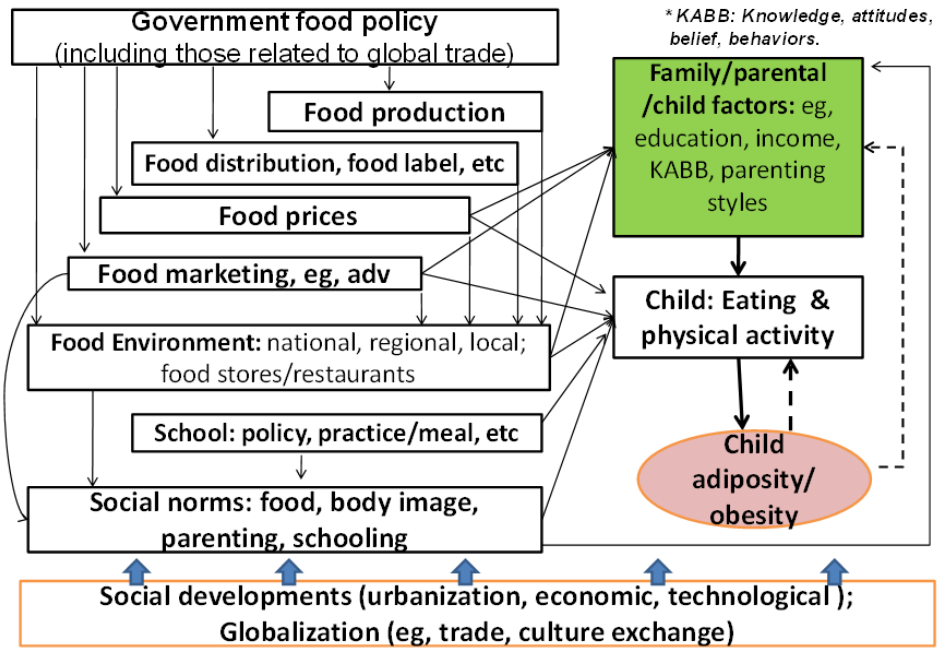

Figure 1. Multi-level influences on childhood obesity.

district, school, classroom teachers, and individual students. Study staff contacted district officials with a vested interest in promoting health and preventing obesity. District advocates targeted school principals and contacted each principal individually to promote the project and encourage participation. At participating schools, teachers were informed about the study's purpose, and their support and cooperation were solicited. At student/parent-level recruitment, individual families were given a consent form with a cover letter that explained the importance of the study and expressed the teacher's approval and support for the project. Recruitment flyers were also distributed to students in the classes.

Data collection

Data included transcripts of the FG discussions, short surveys, and direct anthropometric measurement. The 41 students participated in four audio-recorded FG discussions (9–10 participants each) conducted in December 2014 by four trained moderators (two males and two females). Two moderators co-facilitated each FG discussion. Each FG was held in a small conference room and lasted approximately 60 minutes. A standardized group discussion guide was used. Each FG included: 1) completion of a short survey, 2) anthropometric measurement, and 3) a semi-structured focus group discussion (Table 1). The short survey questionnaire was administered separately for children and their parents. The survey collected demographic and weight-related information on children and parents, as well as household status and neighborhood safety. The FG discussion aimed to solicit students' and parents' perceptions and to identify individual-, family-, community-, social- and environmental-level factors that influenced students' E&PA decisions. The FG discussions also collected parents' recommendations for school-based efforts to promote healthy E&PA among students.

Anthropometric measurements of height, weight, and body mass index (BMI) were obtained for each student by well-trained school nurses who followed a reference protocol. Weight was measured to the nearest 0.10 kg with a balance-beam scale. Height was measured to the nearest 0.10 cm with a portable stadiometer. The BMI was calculated, and unofficial age- and gender-specific Asian cut-offs in the Extended International (IOTF) BMI Cut-Offs[19,20] were used to define normal weight, overweight, and obesity for boys and girls at different ages.

Data analysis

Translation and back-translation techniques (e.g., data was collected in the original Chinese and the findings are presented in English) were used.[21] The procedures are summarized as: (1) There was a verbatim transcription of the content in the original language (Chinese) and then content analysis; (2) Two bilingual translators, who have extensive experience in obesity research, were used to translate the emerging concepts and categories into English; and (3) A committee of experts in childhood obesity was involved in reaching final agreement on the translation.

Qualitative data analysis procedures were based on "framework analysis" methodology.[22-25] The focus group audio recordings were transcribed verbatim and verified with moderator input and co-facilitator notes. The analysis was an iterative process involving constant comparison.[26] Two trained coders coded the transcripts independently, using NVivo qualitative analysis software (version 10); the principal investigator reviewed the coding. During the coding process, the research team held regularly scheduled meetings during which codes were

Table 1. Examples of focus group discussion topics and specific questions (for student participants)*

Topic area	Sample Questions
Eating behaviors	1. What key factors will you consider when you decide what to eat at home? How do these factors affect your final decision? 2. What key factors will you consider when you decide what to eat at school? How do these factors affect your final decision? 3. How would the social-environmental factors (e.g., what food you can find in places near to your home or school; food prices; other children's opinions) affect your decisions? Why? 4. Tell me more about how you decide what you want to eat at home/school? 5. What might make you change the way you eat?
Physical Activity (PA) behaviors	1. What key factors will you consider when you decide what and how much exercise you'll do at home? How do these factors affect your final decision? 2. What key factors will you consider when you decide what and how much exercise you'll do at school? How do these factors affect your final decision? 3. How would the social-environmental factors (e.g., what PA facilities you can find in places near to your home or school; the cost; other children's opinions) affect your decisions? Why? 4. What prevents you from being physically active at home/ after school? 5. What other forms of physical activity do you like to do after school? Weekends?
Sedentary behaviors (SB)	1. What key factors will you consider when you decide what and how much SB you'll do at home? And how do these factors affect your final decision? 2. How would the social-environmental factors (e.g., other children's opinions) affect your decisions? Why? 3. What is the first thing you do when you go home? 4. How often do you watch TV/play with computer?

*The similar topics and specific questions were covered in focus group discussions with the students' parents.

collapsed into themes that were then organized into matrices. Once all themes were identified, final matrices included themes that occurred across at least four of the eight focus groups. If a theme appeared in two groups, and seemed of practical significance to study objectives, it was retained for the results. Based on the final matrices of collapsed themes, the research team wrote summary statements to describe the results. Consistency between the two coders was assessed with the formula number of agreements/total number of agreements plus disagreements.[26] Inter-rater reliability was 90%. Further discussion resulted in overall agreement (100%) among the two coders.[27]

All quantitative analyses were conducted using SPSS version 20. General descriptive statistics were generated for sample characteristics.

RESULTS

Participants' characteristics

The students' and their parents' demographic and weight-related information are shown in Table 2. The average age for the student participants was 11.8 and 12.7 for the Beijing (n=21) and Nanjing (n=20) sites, respectively. Their average body mass index (BMI) was 22.8 (24.7 for boys and 21.4 for girls) in Beijing; in Nanjing, it was 20.6 (20.7 for boys and 20.6 for girls). There were no site differences among demographic variables except that there were more overweight/obese male students in Beijing than in Nanjing.

Focus group findings

Three main themes related to E&PA behaviors and school food environments and policies emerged from the focus group discussions: (1) factors that influenced students' food choices, (2) inconsistent standards (i.e., quality and quantity) of school lunch services across schools, and (3) limited PA time due to overemphasis on academic performance.

Theme 1: Factors that influenced students' food choices

Subtheme 1. Children chose food based on food flavors

In our sample, students reported choosing food based on flavors and actual taste, while parents were concerned about food safety and nutrition. When asked what factors determined their choices regarding food at home, students unanimously voiced that "flavor" is the no.1 factor that influences their decisions about what to eat.

"I like meat because it tastes good . . . I only eat food that tastes good." (Male student)

Food taste is also a factor affecting participants not wanting to eat fruits and vegetables. For example, some expressed dislike of eating fruit and vegetables due to their "nasty" taste.

"My mom always forced me to eat something I don't like, such as green vegetables. She said it's good for my health, but I don't want to eat it. . . . I hate steamed vegetables, they taste nasty." (Male student)

Parents, unlike their children, were concerned about food safety.

"If in the farmer's market, we buy food that looks fresh. If in the supermarket, we look at the place of origin. Some food is best quality from certain areas. I look if there are food additives and date when produced. The

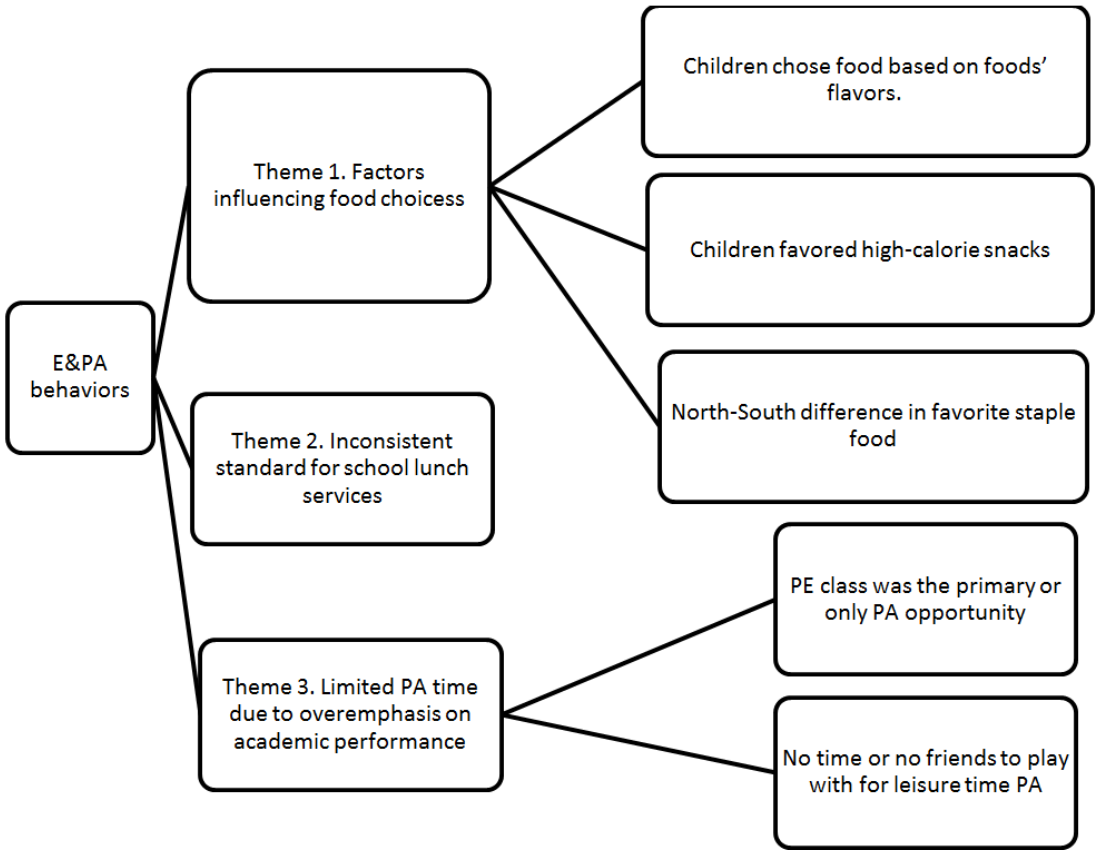

Figure 2. Themes and subthemes related to E&PA behaviors and school food environments and policies

Table 2. Characteristics of focus group participants: elementary and middle students and their parents (n=82) in Beijing and Nanjing, China

	Beijing (n=21)	Nanjing (n=20)	*p*-value
Children (n=41)			
Age (years)	11.8	12.7	0.120
Gender			0.647
Boys	9 (43)	10 (50)	
Girl	12 (57)	10 (50)	
Body mass index (BMI)			
All	22.8	20.7	0.087
Boys	24.9	20.8	0.021*
Girl	21.2	20.6	0.723
Weight status using Extended International (IOTF) BMI cut-off in children (%)			
Overweight or obese (boys)	9 (100)	6 (60)	0.033*
Normal weight (boys)	0 (0)	4 (40)	
Overweight or obese (girls)	6 (50)	5 (50)	1.00
Normal weight (girls)	6 (50)	5 (50)	
Parents (n=41)			
Father's highest level of education attainment (%)			0.082
Elementary or below	0 (0)	0 (0)	
Middle school	2 (10)	0 (0)	
High school	7 (35)	6 (30)	
Some college or two-year degree	3 (15)	0 (0)	
Four-year college or more than four-year college degree	8 (40)	14 (70)	
Mother's highest education degree (%)			0.196
Elementary or below	0 (0)	0 (0)	
Middle school	4 (20)	0 (0)	
High school	3 (15)	5 (25)	
Some college or two-year degree	3 (15)	4 (20)	
Four-year college or more than four-year college degree	10 (50)	11 (55)	
Father's self-reported weight status (%)			0.614
Overweight	10 (47.6)	10 (50)	
Normal weight	10 (47.6)	10 (50)	
Not sure	1 (4.8)	0 (0)	
Mother's self-reported weight status (%)			0.614
Overweight (%)	13 (61.9)	13 (65)	
Normal weight	7 (33.3)	7 (35)	
Not sure	1 (4.8)	0 (0)	
Household			
Living condition (%)			0.068
Rent	4 (19)	1 (5)	
Own (apartment)	11 (52.4)	18 (90)	
Own (single house)	5 (23.8)	1 (5)	
Live with relatives	1 (4.8)	0 (0)	
Other arrangement	0 (0)	0 (0)	
Neighborhood safety (%)			0.343
Not safe at all	5 (25)	5 (25)	
Somewhat unsafe	15 (75)	13 (65)	
Safe or very safe	0 (0)	2 (10)	

*p <0.05

quality, safety, health, and nutrients . . ."

Parents were also interested in learning how to cook "balanced meals" for children. In order to convince their children to eat vegetables, some parents made efforts to try different ways of cooking.

"My mom often changes the ways she cooks. She knows I dislike carrots, so she put a little carrot in the spicy Kung Pao chicken. The actual taste of carrot changes then and the carrot tastes good." (Female Student)

"I think it's very difficult to change kids' eating habits, such as preferring meat and not eating spicy. It's just not easy to change. Sometimes, I think what we can do is to change the "flavor" while cooking. Cook the meals he loves in his disliked flavor, so he eats less." (Parent)

Subtheme 2. Children favored high-calorie snacks

Most children usually consume high-calorie snacks, such as chips, puffed snacks, fried food, and sugary drinks or sweets (i.e., ice cream, chocolate) at home or away from school. Interestingly, even realizing that these energy-dense snacks are unhealthy, the majority of the parents still choose to buy them at the request of their children. It seems there is limited parental control of purchasing snacks.

"All my kid eats is snacks other than three meals. My wife buys anything our kid asks for, healthy or unhealthy. She stocks them. For example, chips, puffed snacks, many different sugary drinks, milk tea. My kid never voluntarily asks for fruits. My kid can eat any snack, as long as there is a snack at home."

Accessibility is another factor in purchasing decision of students. Students all voiced that high-calorie snacks were very accessible around school or home.

"Just right outside my school there is a supermarket. All kinds of snacks, and the prices are very reasonable."

Subtheme 3. There were North-South differences in favorite staple foods

The distinct style of cooking and the ingredients used in the food vary by geographic locations. In Northern China, wheat is eaten more than rice as a staple food. Food with wheat as its main ingredient, such as noodles and dumplings, is frequently mentioned as a favorite staple food by participants from the North (Beijing). On the other hand, China's Southern cuisine uses far more rice.

"I am a Northerner, I like noodles, and I hope my mom and dad let me eat noodles every day." (Male participant from Beijing)

"In terms of meals at home, we Southerners seldom eat noodles or steamed bread. I don't like noodles." (Parent from Nanjing)

Theme 2: Inconsistent standards for school lunch services across schools and mixed perceptions among students and parents toward school meals

Subtheme 1. There were mixed perceptions toward school meals

Students' and parents' perceptions toward school lunch services varied significantly among schools in terms of price, quality, nutrition options, taste, and program transparency. The school lunch services reported as providing satisfying lunch meals usually had their own facilities for meal preparation, and some provided weekly online menus with a wide variety of healthy options with reasonable pricing. Overall, parents had more concerns about school meals than their children did.

About half the students complained that their school lunch was always the same and lacked variety. Participants described school meals as "fried food" every day; cabbage" and "potato" every week. Many students described school meals as unappealing due to the appearance of the food.

"The lunch meal my school provides looks horrible and tastes nasty. The green vegetable leaves look yellowish. My classmates and I just put the meals into our mouth directly without looking at them." (Male student)

"My school meal? Hummm . . . three-fifths of one piece of meat is fat. It is disgusting looking at the fat." (Female student)

School meal prices range from about $1.02 USD to $2.36 USD. Students who complained about poor quality or bad taste unanimously reported that school meals were "expensive" and "not worth it." The other half of the students voiced that their school lunch was acceptable or good. Those who reported good quality or nutritious school meals also mentioned that their school meals provided fruit at least three days per week.

"I think my school meal is pretty good. School usually will provide six to seven different dishes for us to pick up from. We have our own meal purchase card. We usually choose one meat dish and one vegetable dish. Everyday school also provides some fruits, milk, or yogurt, or sometimes fried food. Overall, it's good." (Female student)

Parents also had mixed perceptions toward school meals, and their perceptions varied among schools. Some considered school meals to be good, while others saw some major problems. Their major complaints about school lunch indicated that there was a lack of variety and healthy options, such as fruits and vegetables. Parents wanted more transparency in school lunch program operations. When being asked if the students could take photos of what they were eating, using their mobile phones (mobile phones are very prevalent) to show their parents, many parents reported that this was not allowed.

"My kid attends the boarding school, so he eats three meals at school. I have never heard him say good things about school meals. His school always gives kids potatoes and cabbage and the fatty braised pork. When he is at school, his face is full of pimples. We, as parents, have nothing to do with it. Because he resides in school, we have no control over the situation."

"As parents, we have an online group to share opinions. We asked the school to put the weekly menu online, but the school does not listen to us. I think those schools are for profit…we have nothing to do with them."

Subtheme 2. Parent gave their' perspective and recommendations for school meals

Many parents suspected that the imbalanced school lunch might be a contributing factor to students overeating at dinner. The parents made several key recommendations for improving school food service: 1) improve the nutritional quality of meals, which should combine various meats and fresh vegetables and fruits; 2) decrease the fried food provided to students. A parent mentioned that his child's school meal has fried food, such as "fried chicken, fish fry," at least three days per week; 3) make the school lunch service program more transparent and allow parents to monitor a variety of food environments, including food safety (i.e., sanitation process of all food service plates, date of manufacture, origin of food), food production, and the process of food preparation and distribution within the school, as well as the meal pricing.

Theme 3: Limited PA time due to overemphasis on academic performance

Most students reported enjoying PA but spent little time in organized sports or outdoor play, due to their heavy study burden. As the students enter middle school, they face an increased academic burden to excel in the high school entrance examination (i.e., commonly known as "Zhongkao" in Chinese), a burden imposed by teachers and parents. Physical education class was reported as the primary or only PA opportunity offered to participants. PA participation also decreases with age/grade as participants enroll in middle schools and report engaging in less PA than those in primary schools.

Subtheme 1: I exercise only during the physical education (PE) class, and I exercise primarily to pass the high school entrance examination, commonly known as "Zhongkao."

Almost all students specifically reported that physical education (PE) class was the primary or the only oppor-

tunity in which they engaged in PA. Most voiced that the purpose of their participation in PA was to pass the high school entrance examination (i.e., Zhongkao). This notion seems to be reinforced by their teachers.

"We have a morning recess. Usually we start with group rhythmic gymnastics and then jump roping. We have PE class, and each class content is arranged by teachers for us to run or do items for Zhongkao. We are not given free play time during PE class. I like playing badminton, but my PE teacher said I can only play badminton after I am capable of receiving full credits for all Zhongkao-tested items" (Female student)

Subtheme 2: I have no time or peers to play with me for leisure time exercise

Students were busy with too much homework during weekdays. The weekend was filled with either homework or participating in weekend cram school. In addition, participants reported having no friends with whom to play. These were identified as the major barriers to leisure time exercise by students and their parents.

"I do not have time for leisure time exercise at all from Monday to Friday. I came home late from school in the evening, and when I finish my homework, it's time to sleep. I just don't have time to exercise at all." (Male student)

Subtheme 3: Parents give their perspective and recommendations for PA

Parents believed that the energy imbalance underlay the development of childhood obesity. Although parents wanted their children to have an active and happy childhood, the "academic-focused" school environment seemed to be a major barrier for PA participation.

"I personally think the childhood obesity nowadays is due to the fact that kids eat too much and move too little. The environment now is so different from the environment of my childhood. My kid is sitting there all day studying and no time for exercise. It seems that he does not like exercise at all, and when he has spare time, he watches TV."

Similar to students, parents mentioned that PE seems to be the only PA opportunity offered to students.

"It is only during that PE class that he exercises. No other time. I ask him to do jump rope with friends for an hour. He doesn't even have the physical strength to jump rope for that long. (Sigh) . . . no time and no space."

When asked how their children spent the weekends and whether children engaged in any leisure time exercise, parents reported that weekends are usually occupied with a variety of "cram schools" (mainly education classes paid for by parents as an addition to the regular school teaching) aimed to improve the students' academic achievements, leaving no time for leisure time exercise.

"Weekend? There is weekend school. My kid has three weekend schools; after that, he has no time left for exercise. I feel sorry for kids nowadays. They just don't have time to play. Yes, we live very close to the recreation center but we have no time to go there. . . . They (kids) have no peers to play with during the weekend. My kid's friends all live far away. You know, as parents, we are so tired also after work. We do not have energy to play with kids after work."

Although parents did not really know what to do to change the "bigger environment," they called for more school-based obesity prevention interventions. Their recommendations included: 1) create a PA-friendly environment at school; 2) do not further decrease PE and PA time in school; 3) target both nutrition and PA for school-based obesity prevention; and 4) provide fun PA programs that allow students to practice collaboration skills.

DISCUSSION

To our knowledge, this is the first study that has systematically examined E&PA-related behaviors from both children's and parent's perspectives in China. In urban China, schools are a primary venue for improving student health behaviors. The majority of children are enrolled in schools, and they spend a large proportion of their time there. Therefore, determining how to empower schools and parents to help children have healthy diets and adequate PA is critical to controlling the childhood obesity epidemic.[28-30] There is a scarcity of information on school E&PA environment and the perspectives of key stakeholders, including students' and parents' perceptions of such environments in China. In order to develop effective, school-based interventions that are culturally appropriate, formative research before the actual intervention implementation is key to program success.[31]

We identified three emerging themes related to E&PA behaviors and school services. The students reported several key factors that influenced their food choices. For example, they often chose food based on flavors, and their consumption of unhealthy snacks was prevalent. There were inconsistent standards (i.e., quality and quantity) and practices in school lunch services across schools in the two cities. The students had limited PA time due to an overemphasis on academic performance by their schools and parents, although a considerable number of parents reported that they value their children's health more than their academic performance.

One frequently recurring theme in the FG discussions was the prevalence of high-calorie snack consumption because those food items "taste good." Eating snacks is common among students in China, and the types of snacks are often energy dense. In our sample, students reported favoring high-calorie snacks, including chips, fried food, and sugary drinks over fruits or vegetables. Consistent with previous studies,[32] our findings showed that unhealthy snack foods are often readily available at home and are also easily accessible around schools and the neighborhoods where children live. In fact, many vendors specifically target children for sale of such food items to increase their profits.[32]

Encouragingly, although the majority of the students stated that they chose foods based on taste, some parents made the effort to try different ways of cooking to convince their children to eat more vegetables. Adding herbs and spices to enhance the flavor of the meals and cooking the vegetables with the child's favorite meat were strategies identified by parents. Indeed, healthy cooking methods can capture the flavor and retain the nutrients in foods without adding excessive amounts of fat or salt. Our finding also suggested that a family-focused program with meal preparation (i.e., healthy cooking demonstrations) as

a component might be implemented in China, as such family-oriented programs are associated with better dietary quality and healthy body weight for American youth.[33,34] Thus, future school-based interventions need to reach children's homes and communities to address the root causes of childhood obesity.[35]

The school food environment (school lunch service) is another recurring theme. It affects what students eat at school and influences the development of their lifelong eating habits. In most urban areas in China, schools provide some meal services, though there are large variations in the standards and operations of these services. Our study found that the perceptions toward school lunch services varied significantly among students and parents in Beijing and Nanjing, between schools, in terms of price, quality, nutritious options, actual taste, and program transparency. Some parents reported that the imbalanced school lunches often led to their children's overeating at dinner at home.

Food environment is considered one of two major parts of the obesogenic environment, and is an important target of childhood obesity prevention efforts.[29,30] As the economy grows, children naturally have greater accessibility to various types of food than older generations, leading to a rapid rise in the consumption of meat, fats, and sugar, especially fast foods.[29,30] School food environment and policies could play an important role in helping children eat a healthy diet and develop desirable lifelong eating habits.[36] However, the growing exposure to soft drinks and snack foods seems intractable in schools, as in the market and in society. Anderson and Butcher (2006)[37] explored the complex interactions among school financial pressure, availability and accessibility of the junk food, and childhood obesity. They observed that under financial pressure, schools tended to make junk food available to students, and each 10% increase in the availability of junk food in schools led to about a 1% increase in students' average BMI.

The school food environment plays an important role in affecting children's dietary intake. The United States Department of Agriculture (USDA) revised the meal nutrition standards of the National School Lunch Program (NSLP) and School Breakfast Program (SBP) in 2010.[38] The new standards are expected to enhance the diet and health of school children and to help mitigate the childhood obesity trend. Evidence showed that the most effective practices for reducing energy from low-energy, energy-dense foods were the characteristics of the school meal programs (i.e., not offering French fries),[38,39] as children in U.S. public schools consume approximately 35% to 47% of their daily dietary intake in school, including school lunches.[40] However, to our knowledge, there is little such research in China. To curb childhood obesity in China, we call on policymakers in China to establish nutrition guidelines and other policy-relevant school meal programs in order to improve the quality/standard of school lunch services. More research is needed in China to examine how the schools and parents have responded to changing social and economic environments, including the growing influence of Western culture and the rapid fast food industry growth in China[41], and how children's eating, PA, and health outcomes are affected.

North-South differences in favorite staple foods was a unique subtheme that emerged as a major factor that influenced students' food choices. Northern Chinese cuisine emphasizes salty flavors, with fewer vegetables and wheat-based products as the staple food. In Southern China, people eat rice as a staple food,[42] and the Southern cuisines are much less salty and are renowned for their great variety of fruit and vegetable ingredients. When designing obesity prevention interventions in China, it is important to recognize the regional differences in food culture and dietary patterns and their health and nutrition implications.[43-45]

The children and parents both reported that the children had limited PA time due to academic demand. The overemphasis on academic performance resulted in a high demand for children's time for study in and after school, including weekends, which left little time for PA. One of the two most significant examinations for students in China is "Zhongkao" (i.e., entrance examination to senior high school), which students take at the end of ninth grade. The other exam is the national entrance examination, which determines which university/college the students will attend after finishing high school. Students compete to attend the best universities in China, as there are large numbers of eligible high school students each year.

Most parents and students are well aware of the intense competition and of the fact that entering the best universities affects the children's future career and life. Often schoolteachers' work performance and compensation are linked to how well their students perform in these exams. Thus, there is a strong push toward academic excellence throughout China. Encouragingly, there has been strong support and many actions taken by the sectors of the governments on school education to reduce study burden and ensure adequate PA in China. New PA promotion programs have been developed, both locally and nationwide.[46-48] One example is the "Happy 10 Program," which promotes PA, physical growth, and development of schoolchildren.[49]

There are differences in eating, PA, and sedentary behaviors among children across countries. Thus, specifically tailored interventions are needed to fit each country's needs.[30] For example, unlike previous findings related to U.S children, Chinese students do not watch television or use portable electronic devices as frequently as their U.S. counterparts. Another surprising finding was that access to PA environments and facilities is not considered a barrier for students. In fact, most reported that their communities had PA facilities within walking distance. It is the "lack of time due to studying" and "lack of friends" that prevent them from being active. Many parents in our FGs stated that they thought PA was important for their children, and they hoped that their children could have more time to play, in a manner that mirrored their own childhoods. There is a need for creative intervention strategies to balance studying and engaging in PA for students, both at and after school, and parents would be an integral part of the efforts, in addition to the schools.

Our findings have implications for health education professionals, researchers, and policymakers, suggesting avenues for further actions. Some of our findings are sur-

Table 3. Key recommendations for school lunch services and school-based physical activity, based on focus group discussions with students' parents (n=41) in Beijing and Nanjing, two major cities in North and South China

Regarding school lunch
1. Improve the nutritional quality of meals.
2. Meals should combine various meats and fresh vegetables and fruits.
3. Decrease the amount of fried food provided.
4. Make school lunch service program more transparent.
5. Allow parents to monitor a variety of food environments, including food safety, food production, the process of food preparation and distribution, as well as the meal pricing.
Regarding physical activity
1. Need more school-based interventions to create an active school environment.
2. No further reduction in PA time.
3. Dieting alone won't work. Need to target both nutrition and physical activity.
4. Provide fun PA programs that allow students to practice collaboration skills.

prising to us in light of previous perceptions, but we find this encouraging. For example, we found that a large proportion of the parents did not put a lot of emphasis on their children's academic excellence, but did value their children's physical health and happiness. This is encouraging as future family- and school-based interventions are developed. The parents made some specific recommendations for improving school food services and increasing PA during and after school (Table 3).

The present study has several strengths, including its study design of the FG discussions. Qualitative data were collected from both children and their parents in a major city in both North and South China to avoid social desirability bias. The moderators were skilled at working with the study participants in this type of setting (i.e., the moderators stated that there were no "right" or "wrong" answers and remained tactful and non-judgmental in tone). Further, the children's responses provided evidence that they were well engaged during the discussion and challenged each other's opinions. This indicated a sense of openness among the focus group participants and produced good quality data.

This study has a few limitations. First, we coded the discussion conducted in Chinese into English. We strived for compatible and competent translators who had experiences in both the Chinese and U.S. cultures and were familiar with obesity research; still, some information might have been lost during the translation. Second, this study has unknown generalizability to the larger child and adolescent community in China. Participant geographic variations (i.e., the North-South differences in favorite staple foods) are not only consistent with previous epidemiology findings[50] but also indicate that we have a heterogeneous sample. Third, all students in the participating schools were eligible to join the study. However, at the Beijing site, overweight students and their parents were more interested in participating in the study, while normal weight children and their parents were reluctant to participate due to lack of interest and concern about taking time away from study. For future research, it is important to get buy-in from both teachers and parents. Also, as a qualitative study, this study could not compare how individual social demographics are associated with dietary and physical activity behaviors. The sample size is modest, and, thus, such analysis may not be very meaningful. Future survey studies with representative and adequate numbers of participants should be implemented in China to illuminate the relationship between body mass index, individual social-demographics, and dietary preference and exercise behavior among Chinese adolescents.

In conclusion, the children selected from Beijing and Nanjing, two major cities in China, one in the North and one in the South, reported that they chose food often based on flavor. Their consumption of unhealthy snacks was prevalent. There are inconsistent standards for school lunch services, and school meal services varied across schools. There are mixed perceptions among students and parents toward school meals. Children had limited PA time due to an emphasis on academic performance. The parents made some recommendations for improving school food services and increasing PA for children during and after school. These findings provide useful insights to help develop future family- and school-targeted health promotion interventions, including childhood obesity prevention. Intervention framing needs to consider the unique Chinese social, cultural, and economic context as well as parent-child differences.

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