Effect of a School-Based Intervention on Parents’ Nutrition and Exercise Knowledge, Attitudes, and Behaviors

John C. Rausch and Evelyn Berger-Jenkins
Columbia University Medical Center

Andres R. Nieto
New York-Presbyterian Hospital

Mary McCord
Medical College of Wisconsin

Dodi Meyer
Columbia University Medical Center

Background: Parents exert a significant effect on children’s eating behaviors and physical activity levels, so it is imperative to find successful obesity prevention programs that target whole families in underserved communities. Purpose: To investigate the effects of a Coordinated School Health Program (CSHP) on parents in the program over a 2-year period. Methods: Parents of kindergarteners (n = 277) in 7 schools participating in a CSHP that served an underserved, predominantly minority community were surveyed at 3 time points regarding their nutrition and physical activity knowledge, attitudes, and behaviors (KABs). Results after years 1 and 2 were compared with pre-intervention results using t tests. Effects of socioeconomic variables were investigated using multivariate linear regression. Results: Reported unhealthy behaviors were lower at the end of both year 1 (P = .03) and year 2 (P = .04). Numerous factors were associated with changes in KABs in the parents, including parental gender. Discussion: A CSHP may have lasting effects on parental behaviors in an underserved, predominantly minority community. Translation to Health Education Practice: Future studies should assess the effects of CSHPs in other populations and which factors most significantly affect parental attitude and behavioral changes so that program content may be tailored accordingly.

BACKGROUND

Obesity rates have doubled in the last 30 years for 2- to 5-year-olds and 12- to 19-year-olds and nearly tripled for 6- to 11-year-olds, reaching an overall rate of 17%.¹ The rates are even higher in Latino and black children, with one in 2 Latino patients in some populations overweight or obese by age 5.² Obesity is increasingly recognized as a chronic illness and puts individuals at risk for multiple physical and psychiatric conditions in childhood, including adverse metabolic, cardiovascular, and orthopedic consequences; worsening asthma; and an increased likelihood of adulthood obesity, which now affects 35% of the population.³,⁴ Though there is some evidence that in certain locations the rates of childhood obesity may be plateauing, the number of children who will develop childhood and adult comorbidities from obesity is a major public health problem that must be addressed. It is estimated, for example, that the rate of type 2 diabetes in adults may increase 50% in developed
countries and even more rapidly in developing countries over the next 20 years.\(^5\)

In order to make real sustained differences in childhood obesity rates, we need to target the whole family and involve parents, because parents exert a significant effect on children’s eating behaviors and physical activity levels.\(^6\) Children’s knowledge of what constitutes healthy eating is affected by their parents’ nutrition knowledge.\(^7,8\) This extends to actual behavior as well, because children’s fruit and vegetable consumption is higher when there are parents who eat more fruits and vegetables in the house.\(^9,11\) In addition, parents who exercise more frequently tend to have children who exercise more frequently.\(^12\) The factors that affect nutrition knowledge and belief in parents have been studied in certain minority populations with high levels of obesity\(^13-15\) but not extensively in Latino communities. Some of these previous investigated factors have included sociodemographic variables such as parental education level, parental sex, race, time in the United States, and language spoken.\(^16-19\)

Efforts to prevent or decrease childhood obesity should therefore be targeted at a family level to have a more significant impact. Coordinated School Health Programs (CSHPs) are one approach that has been utilized to reach children and their parents in order to change nutrition and physical activity, behaviors, and attitudes. This model addresses social, emotional, and physical health from an ecological perspective that includes family and community involvement, health promotion for staff, and a healthy school environment.\(^20\) The model has been utilized in predominantly nonminority communities, and no studies to date have demonstrated a change in parental behavior specifically in predominately minority communities. In addition, such programs have had difficulty in engaging parents.\(^21\) There are particular concerns with Latino immigrant populations due to social norms, inability to miss work, and low health literacy.\(^22\)

**PURPOSE**

We therefore proposed to evaluate the effect of a CSHP program on parental knowledge, attitudes, and behaviors (KABs) regarding nutrition and physical activity in participating parents in an underserved, predominantly minority community over a 2-year period. We also sought to identify whether there were any socioeconomic variables that affected any changes in parental KABs that were noted.

**METHODS**

**Program**

Choosing Healthy and Active Lifestyles/Healthy Schools, Healthy Families (CHALK/HSHF) is a CSHP that has been previously described.\(^23\) In brief, this program is an integrated obesity prevention program whose purpose is to decrease childhood obesity rates in northern Manhattan by disseminating a consistent obesity prevention social marketing campaign across the continuum of a child’s life, namely, targeting school, family, pediatric offices, and community. The program fuses resources from 2 healthy lifestyles outreach programs operated through New York Presbyterian/Ambulatory Care Network’s Community Pediatrics program: CHALK and HSHF, integrating effective school-based and grassroots community-based programming to convey a unified obesity prevention message. This effort is linked to the Ambulatory Care Network’s Patient Centered Medical Home and is part of New York Presbyterian’s population health efforts through the Washington Heights–Inwood Regional Health Collaborative.

Specifically in the schools, the program aims to improve the food environment and increase physical activity for students in the classroom setting, during recess, and in physical education classes. Curriculum for parents revolves around the 10 healthy habits used by the program. Monthly newsletters tied to the healthy habit are sent to all parents. These newsletters are bilingual, culturally sensitive, and targeted to a fifth-grade health literacy (average health literacy of our parents). Nutritional workshops are offered on a regular basis, again tied to the healthy habits and, depending on parent interest, cooking classes are offered through a variety of partner programs. Workshops are organized around parent teacher conference or other dates when parent attendance to school is required. At the time of the study a workshop focusing on physical activity and BMI was offered after schools completed required fitnessgrams for each child. Bulletin board focusing on healthy habits are located at the entrance of the school or where visible to parents. The program works very closely with school staff to target as many parents as possible.

At the time of the study, the population of the schools was mostly minority, with 84% Latino and 12% African American students, and most were of lower socioeconomic status, with 89% receiving free or reduced-price lunch. During the study period, the program was in 7 schools and staff included a program coordinator, outreach worker, nutritionist, and physical activity coordinator. Presently, the program is in 15 schools and has a scaled-back staff. Though the program also focuses on activities targeted at the students and staff,\(^24\) this study is particularly interested in the effect on the parents, and this is the first report on parental impact.

**Study Methods**

Though parents are involved in the program each year the child is in school, this study focused on the parents of kindergarteners, the first year children are in the schools, in order to collect baseline data. All parents of kindergarteners in the 7 participating schools were surveyed at 3 time points
over the 2-year intervention: (1) before the intervention, at the beginning of the kindergarten academic year in 2008; (2) at the end of year 1 of the intervention, after the kindergarten academic year in 2009; and (3) at the end of year 2 of the intervention, after the first-grade academic year in 2010. The surveys, which were available in English and Spanish, included questions regarding parent’s KABs related to nutrition and physical activity utilizing a pen-and-paper survey that was adapted from previously validated surveys.25-29 This study was approved by the Columbia University Medical Center Institutional Review Board and the New York City Department of Education Institutional Review Board, and any parent could opt out. Data were anonymous but were collected with unique identification numbers in order to link data for individual parents over time.

Scales
Questions for the surveys were abstracted from 5 surveys.25-30 The scales are described below. In addition, the scales and their psychometric properties are given in Table 1.

Knowledge
Six knowledge items were included, with 4 items assessing nutrition knowledge26 and 2 items assessing physical activity knowledge.28 All items were multiple choice and were scored by giving one point for correct answers and zero points for incorrect or missing answers. Two scales were created to provide mean scores for nutrition and physical activity knowledge for the groups by summing the scores for each item and dividing by the number of items answered (range 0-1 for each scale).

Attitudes
Twenty attitude items were adapted from previous studies,25,29 with 16 items assessing nutrition attitudes, including “value attributed” to a healthy diet (6 items), barriers to a healthy diet (3 items), and self-efficacy for a healthy diet (7 items), and 4 items assessing readiness to change their physical activity. All nutrition attitude items were scored using 4-point Likert scales with responses ranging from strongly disagree to strongly agree, on a scale from 1 to 4 with 4 being the desired response. A mean nutrition attitude scale was created by summing the scores for each item in the scale and dividing by the number of items answered (range 1-4 for each scale). Self-efficacy to participate in physical activity included 4 items scored on a 7-point Likert scale with responses ranging from not confident I can exercise to very confident I can exercise. A mean physical activity score was created by summing the scores for each item in the scale and dividing by number of items answered (range 1-7).

Behaviors
A comprehensive diet recall was adopted from a previous survey30 and included questions that asked how often the parents ate different foods in 8 major food groups (grains, proteins, dairy, fruits, vegetables, fast food, sweets, and other snacks). Responses were scored on a 5-point scale ranging from never to several times per day. Foods were grouped into healthy foods and unhealthy foods by the research team. Those foods that were considered healthy, as predetermined by the research team, were given a score from 0.5 to 5, with higher numbers representing eating the healthy foods more often. The research team downweighted some items because some foods were considered healthier than others; that is, skim milk was deemed to be healthier than 2% milk, though both were considered healthy. The unhealthy foods were scored similarly, with the higher score representing eating the food less often. The scale was created by summing each item and dividing by the number of items answered (range 0.5 to 5). The physical activity items were adopted from a previous survey27 and included 4 questions that asked about activities done the prior day or in general (going to the gym, any exercise, walking to work, eating in front of the TV), with one point given for each healthy activity and zero if this activity was not performed. The scale was created by summing each item and dividing by the number of items answered (range 0-1).

Analysis
All data were analyzed using SAS 9.4 (SAS Inc.). Changes in the scores for each of the scales after the first year and the second year, compared to pre-intervention, were analyzed using paired t tests at each time point. In order to investi-gate the effect of different socioeconomic variables, bivariate analysis was done using linear regression with each socioeconomic variable as an independent variable and the changes in the scores of the scales at the 2 time points as dependent variables. The socioeconomic variables considered were whether or not the parent was born in the
United States; education level; parent’s age; race; whether or not the parent works outside the home; marital status; whether the parent has an obesity-related complication, including hypertension, dyslipidemia, or diabetes; language spoken; and parental gender. If a variable was significant at a level of 0.1, it was included in a multivariate linear regression model.

RESULTS

There were 277 parents completing the initial survey with 149 (54%) of the same parents completing the survey after year 1 and 126 (45%) completing the survey after year 2. There were no statistically significant differences between those parents who completed all 3 surveys and those who only completed the first survey with respect to demographic variables. The demographics of the population are listed in Table 2. Most respondents were born outside the United States (67%), Hispanic/Latino (83%), female caregivers (92%), and spoke mostly Spanish/or a language other than English at home (78%). Although the parents were relatively young (62% under the age of 35), 23% reported having a complication that is often associated with diabetes—hypertension, dyslipidemia, or diabetes.

Knowledge

There was no statistically significant increase in parental knowledge of healthy nutrition or physical activity at either time point (Table 3).

Attitudes

There was an increase in parents’ readiness to change to a more physically active lifestyle that was statistically significant \( (P = .01) \) after year 1 but not after year 2 \( (P = .5) \). Otherwise there were no statistically significant changes in parental attitudes (Table 3).

Behaviors

Though reported healthy nutrition behaviors did not change, reported unhealthy behaviors were significantly lower at the end of both year 1 \( (P = .03) \) and year 2 \( (P = .04) \). Reported physical activity behavior improved and almost reached statistical significance after both year 1 and year 2 \( (P = .07; \) Table 4).

Factors

As can be seen in Table 4, there were a number of factors that were associated with changes in knowledge, attitudes, and behaviors in the parents over the 2-year time period. These were not always in the same direction. For example, female caregivers were significantly less likely to have improvements in self-reported self-efficacy for a healthy diet than male caregivers. At the same time, female caregivers were more likely to have increases in physical activity knowledge than male caregivers, although this increase did not reach statistical significance \( (P = .06) \).

DISCUSSION

This study evaluated the effect of a CSHP on the parents of enrolled students in an underserved, predominantly minority community. The participation of parents in efforts to curb childhood obesity will be critical because parents exert significant effects on their children’s eating behaviors and physical activity levels. School programs offer the opportunity to involve the students, school staff, and the parents, although few studies have documented an effect on parental KABs. Our evaluation of CHALK/HSHF program showed a statistically significant decrease in the reported consumption of unhealthy foods by participating parents at the end of both the first and second year of the program. It further suggested that there was an increase in reported physical activity levels at both time points, although these numbers did not reach statistical significance. If there was even a small increase in physical activity and decreased consumption of foods high in sugar
and fat this could have a significant effect on the health of both the parents and their children for whom they serve as role models.

The results with regards to the parental knowledge and attitudes were less consistent. There were some increases in knowledge, but these did not reach statistical significance. There are numerous reasons why knowledge may not have changed. There may not have been enough power in our sample, the survey may not be applicable in our population, or the intervention may not have sufficiently addressed the specific knowledge items. Further, the nature of the intervention requires parental involvement and because the survey was anonymous there is no way to know what parts of the program the respondents attended. This will have to be studied further. The only statistically significant increase in parental attitudes was in readiness to increase physical activity after the end of the first year, although this was not maintained by the end of the second year. It is not clear why the attitudes changed at the first time point and not the second. Again, power may be an issue as the number of respondents dropped between the 2 points.

It is interesting that the study showed the biggest effect on the decreased consumption of unhealthy foods, whereas changes in knowledge and attitudes were not statistically different. It is quite possible that the focus of the program on healthy habits and the limiting of unhealthy foods was the most resonant message for the parents. Limiting unhealthy dietary choices may have been the easiest option to improve nutrition for some of our families. This will need to be further studied and more emphasis will have to be placed on increasing options for obtaining healthy foods and opportunities for physical activity. The program has started to address these issues—it has created a farmers’ market and is working on making gym spaces available to participating families.

The analysis of the factors that affected the changes in parental responses over time yielded some interesting results. First, there were some gender differences in the results. Men were more likely to see increases in the dietary scales, whereas women were more likely to have increases in physical activity knowledge. Perhaps this represents a knowledge difference between men and women with regards

<table>
<thead>
<tr>
<th>TABLE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Knowledge, Attitudes, and Behavior Scales After Years 1 and 2 Compared to Pre-Intervention</td>
</tr>
<tr>
<td>Scale</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Diet knowledge (range 0-1)</td>
</tr>
<tr>
<td>Value attributed to a healthy diet (range 0-4)</td>
</tr>
<tr>
<td>Barriers to a healthy diet (range 0-4)</td>
</tr>
<tr>
<td>Self-efficacy for a healthy diet (range 0-4)</td>
</tr>
<tr>
<td>Healthy eating behaviors (range 0-5)</td>
</tr>
<tr>
<td>Unhealthy eating behaviors (range 0-5)</td>
</tr>
<tr>
<td>Physical activity knowledge (range 0-1)</td>
</tr>
<tr>
<td>Readiness to change physical activity (range 0-7)</td>
</tr>
<tr>
<td>Physical activity behaviors (range 0-1)</td>
</tr>
</tbody>
</table>

*These changes represent absolute differences.

<table>
<thead>
<tr>
<th>TABLE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors Associated With Changes in Scales</td>
</tr>
<tr>
<td>Scale</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Diet knowledge</td>
</tr>
<tr>
<td>Self-efficacy for a healthy diet</td>
</tr>
<tr>
<td>Unhealthy eating behaviors</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Physical activity knowledge</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Readiness to change physical activity</td>
</tr>
<tr>
<td>Physical activity behaviors</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

*N/A indicates not applicable.
to nutrition and physical activity. All of these findings suggest that the information that is provided to parents should be targeted as much as possible to the audience and that perhaps there should be different content for men and women, such as the program Healthy Dads, Healthy Kids, whose approach is focused on helping fathers lose weight and positively impact their children’s health behaviors.31

There were some other notable results. Parents with medical comorbidities had greater increases in dietary knowledge; this group of parents most likely had a particular interest in improving their dietary habits. Age was also a factor. Older parents were more likely to decrease their consumption of unhealthy foods and to increase their physical activity compared to younger parents. This suggests that older parents may be more aware of the complications of obesity and may be in a better position to implement lifestyle changes. Finally, Hispanic parents were less likely to have an increase in physical activity knowledge. This may represent a problem in the way the information was presented to this group. All of these factors will need to be considered when planning future interventions.

The study does have a number of limitations. The lack of a control group raises the possibility that the changes that occurred were due to outside sources besides the intervention. In addition, the study involved only a small number of parents from an underserved, predominantly minority neighborhood and results may be difficult to generalize to other communities. Further, behaviors are self-reported and may not be entirely accurate, although the questions were adopted from validated surveys, when available. Additionally, the results regarding parental knowledge and attitudes were not consistently significant, which may represent a failure of the intervention or of the study design to detect actual changes (small sample size and lack of specificity of the scales). Finally, the study only followed parents for 2 years, and changes may not have been conserved after that period, although it is encouraging, given similar results after both the first and second years.

The current study is important because it is one of the first studies that suggests that a CHSP may have lasting effects on parental behaviors in an underserved, predominantly minority community. CHALK/HSHF has previously also been shown to increase physical activity in school aged children23 and was recently selected as one of 3 model programs by ChildObesity180, a national organization including public, nonprofit, academic, and private-sector leaders, for its Active Schools Acceleration Project, a program that has given grants to schools to implement CHALK or one of the other model programs. It is through the expansion of such programs that future studies can assess the effects of CHSPs in other populations.

CHSPs are well suited to combat the obesity epidemic because they are multifactorial, require participation from the family and community, and are tailored to the developmental level of the children. It is obvious from the reported study that there are numerous factors, including parental age, gender, and ethnicity, that must be considered in developing these programs in each particular community in order to successfully engage parents. A further question that needs to be investigated is whether the changes seen in parents directly impact the children and their behavior. The hope is that by targeting the whole family, there is a greater opportunity to develop lasting changes in dietary habits and physical activity levels in both the children and their families. Such changes would contribute greatly to the efforts to combat childhood obesity in the United States.

ACKNOWLEDGMENTS

We would like to acknowledge program manager Melissa Pfugh and research assistants Dulce Barrios, Elizabeth Croswell, and Michael Serzan, as well as all participating parents.

FUNDING

This work was funded by the Columbia University Medical Center Irving Institute Clinical and Translational Science Award: Community Engagement Program. Grant No. 1 UL1 RR024156-04NHI/NCRR, US Department of Health and Human Services Office of Minority Health Grant No. CPIMP071048-013, and New York-Presbyterian Hospital.

REFERENCES