

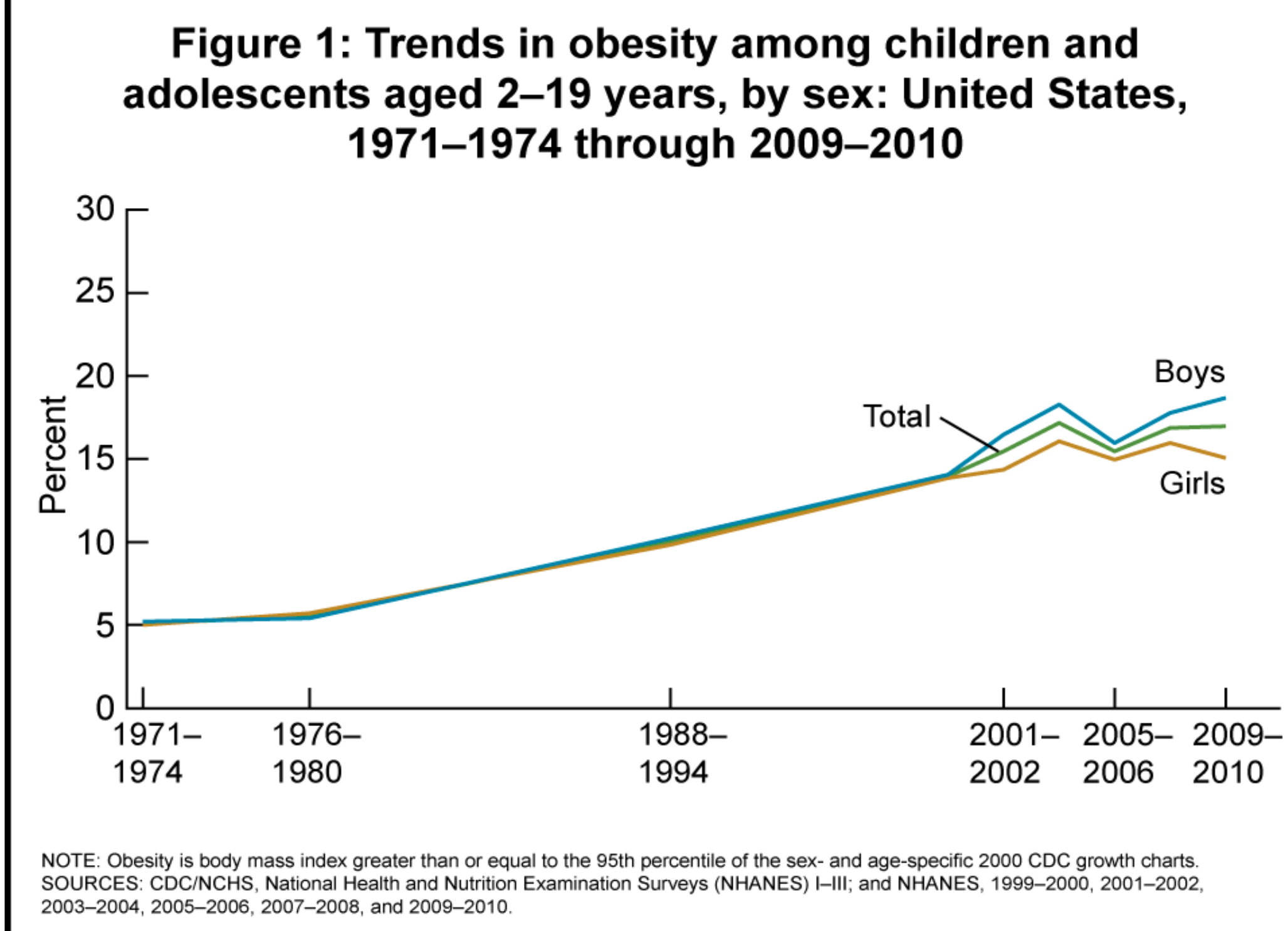
Impact of School-based Nutrition Education Programs on BMI in Children



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Introduction

Obesity in children is defined as a BMI at or above the 95th percentile of the sex-specific CDC BMI-for-age growth chart (Ogden, et al. 2014). According to the CDC's most recent data from 2013, national prevalence of obesity amongst children aged 2-19 is about 17%. Nutrition is a key component of maintaining a healthy BMI. It is known that healthy children perform better in school, and have greater long-term health as they transition into adulthood (Langford, et al. 2015). Implementing nutrition education programs in schools, while children are young and developing lifestyle habits, can help promote long-term health and good nutrition, and may contribute to reducing the incidence of obesity. In 1995, the World Health Organization developed a framework to implement health education in schools globally in order to develop "health promoting schools," and make children more health conscious (World Health Organization, 2015). The goal of this poster project is to review the effectiveness of several unique school-based nutrition education programs on decreasing childhood obesity and promoting healthy behaviors in school-age children.



Methods

Literature search: A literature search was performed using Pubmed. The terms that were used in the initial search included a combination of nutrition education, schools, childhood obesity, BMI, and school nutrition interventions. This search yielded over 3,000 results. The results were limited by selecting full text articles, clinical trials, articles in English, and studies with a population spanning ages 2-18. These criteria limited the search results to 344. From there, the Pubmed search was made more specific by adding keywords to the initial search, such as "effects on BMI." This yielded a final number of 60 articles, and six of these articles were selected for review. The results of these clinical trials are summarized in the following section.



The CATCH coordinated school health program was assessed in the Hoelscher et al. study.

<http://catchinfo.org/research/he-cdc-model/>

Results

Author(s)	Population	Intervention	Outcomes measured	Results	Limitations
Elizondo-Montemayor L, Moreno-Sánchez D, Gutierrez NG	N=101 (ages 5-12, Mexico)	Anthropometrics, dietetic assessment, energy-restriction, tailor-made daily menus, and parental education	BMI percentile	BMI percentile fell significantly by a mean difference of -3.0 (P = 0.00).	Voluntary participation, relatively small sample size. No control group. The children and their parents/caregivers were likely to be highly motivated and thus the study could be biased.
Wright, et al.	N=251 (ages 8-12, U.S.)	Nutrition and physical activity educational after-school program, and school activities, including creation of an Advisory Committee that made wellness policies.	BMI	Children in intervention group decreased their BMI by 2.80 (p=0.04) and BMI z-scores on average by 0.48 (p=0.03).	Low sample size
Hoelscher, et al.	N=1107 (ages 8-10, U.S.)	CATCH BPC (school-based nutrition and physical activity educational program plus the additional support and resources of community leaders)	BMI, BMI percentile	In schools assigned to the CATCH BPC intervention, % of students classified as overweight/obese decreased by 8.3 percent on average (p<0.005).	No control group assigned that lacked both a school-based educational program and a community-involved aspect, no condition assigned to only a community-involved intervention without a school-based component.
Fairclough et al.	N=318 (ages 10-11, UK)	CHANGE! Project (20 weeks of teacher-led education, learning resources, and classwork assignments about nutrition and physical activity)	BMI, BMI z-score	Children in the intervention group were found to have decreased BMI z-score at follow-up by 0.24 (p=0.04) compared to the control group.	No way to determine if the nutrition education or the physical activity education component affected outcome more.
Foster et al.	N=1349 (ages 9-11, U.S.)	School self assessment, nutrition education, nutrition policy, social marketing, and parent outreach	BMI, BMI z-score	Intervention schools: unadjusted prevalence of overweight decreased by 10.3% after 2 years v. 25.9% increase in control school. (P < 0.001)	Data of physical activity and at home behaviors are self-reported. Schools may have significant differences that cannot be accounted for.
Gortmaker et al.	N=1295 (ages 10-12, U.S.)	Education about decreasing screen time, decreasing consumption of high fat foods, increasing physical activity and fruit and vegetable intake.	BMI	Obesity prevalence in female students was reduced by 3.3% in intervention schools while obesity prevalence increased by 2.2% in control schools (P = 0.03)	Accuracy of self report surveys. Only schools could be randomized, not students. 35% of students in each school declined to participate.

In each of the six studies reviewed in the table above, some form of nutrition education intervention was implemented in a school. The interventions, while similar, contained unique components in addition to the basic nutrition education. In other words, no intervention was exactly the same. For example, in the Wright et al. study, there was a combination of nutrition education, physical activity, and after school activities. In the Hoelscher et al. study, they used nutrition education, physical activity, and a community support component. Although there was variation across the interventions, each intervention was successful at reducing BMI or the percentage of students classified as overweight/obese in the target population.

The Elizondo-Montemayor study showed a reduction in BMI percentile by 3.0 (p=0.03), while the Wright study intervention reduced BMI by 2.80 (p = 0.4). The Hoelscher et al. study reduced percentage of students classified as obese by 8.3% on average (p<0.005), while the Foster et al. study decreased percentage of overweight and obese by 10.3% (p<0.001). The Gortmaker et al. study showed a significant reduction in obesity amongst the study population (p=0.03) with a -3.3 decrease in prevalence of obesity, while the Fairclough et al. study showed significant decrease in BMI z-scores (p=0.003). Overall, each intervention had a positive and significant effect on the outcomes measured.



<http://www.nutritionaustralia.org/sites/default/files/act/childcare.jpg>, <https://snap.nal.usda.gov/small-group-nutrition-education-class/>, extension.arizona.edu

Discussion

Childhood obesity is not a problem with a singular cause, and as a result, efforts to combat it in schools have been multifaceted. Each study reviewed in this poster demonstrates a core school-based nutrition education program coupled with additional, unique methods aimed at reducing or preventing obesity. This was done to examine which current aspects of school obesity prevention are effective and should be incorporated into today's school curriculum.

For example, the intervention used in the Hoelscher et al. study involved community leaders in addition to the school-based nutrition program. An agency in the community was partnered with the school in order to promote and adhere to the program. The results of this study demonstrate that involving the community, and getting as many people involved in promoting nutrition as possible, may be beneficial in reducing BMI.

In the Elizondo-Montemayor study, the unique components of the intervention included individual nutrition counseling for each student along with their parents. Including the students' parents in the personal counseling sessions could have a profound effect on BMI outcomes. It allows the parents, who provide food when the children are at home, to become more educated on healthy food choices for their children and support their healthy habits.

Wright et al. studied nutrition education coupled with the establishment of a school health advisory council. This council created school wellness policies, organized seminars for the staff, and created a newsletter which went out to parents. A particularly effective aspect of this committee was the breadth of the members included: school administrators, teachers, parents, dietitians, and even prominent community leaders. Because the advisory council involved such a diverse group of people, a more holistic plan for reducing BMI was able to be implemented and enforced.

In the Fairclough et al. study, children were taught about the importance of physical activity, as well as a balanced diet. The students were encouraged to "move more and sit less." This study emphasized the importance of exercise for preventing obesity, and gave students strategies to be physically active in their own lives.

Across each of these studies, some of the most meaningful components in preventing or reducing obesity include involving parents in making changes, increasing community involvement, encouraging physical activity, and creating an advisory committee with a well-rounded membership to create and enforce school policies. Results of this study do not advocate for a single best method for reducing childhood obesity, but rather highlight how a multifactorial approach can have the best outcomes. Regardless of the different components used in school-based interventions, it is most important that schools recognize that even small changes can make a difference in reducing obesity in children.

Recommendations for Action

Based on this review, it is clear that there is not one best approach to reducing obesity in schools. Rather, a multi-component program seems to have the greatest impact. A coordinated school health program that combines nutrition education with physical activity, along with parent and community involvement may be the best approach to reducing BMI. We recommend that schools start by implementing a baseline nutrition education program, and expand on that program to make it multifaceted. It works best when more people are involved - students, parents, teachers, administrators, community leaders, etc. Getting the community involved in the efforts can have a profound impact. Obesity is a public health issue that currently "eats up" a lot of society's time, resources, and well-being, but with these changes we may be able to improve the health outcomes of our children.