



## Building healthy communities: A comprehensive school health program to prevent obesity in elementary schools



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### ARTICLE INFO

#### Keywords:

Childhood obesity  
Waist to Height Ratio  
Comprehensive school physical activity programs  
Whole of school approach  
Body Mass Index  
Elementary school

### ABSTRACT

Obesity among children is highly prevalent and can lead to risk factors for chronic disease in adulthood. Key organizations have called on schools to play a larger role by increasing children's physical activity and nutrition by adopting an overall culture of health. This study examined the impact of a socioecological theory driven school-wide nutrition and physical activity intervention on 5th graders' central adiposity and obesity level. In 2015–2016, in the Midwest region of U.S., four treatment and two control schools, including 628 (377 treatment) 5th grade children participated in an eight-month intervention. Children in the treatment schools participated in a comprehensive healthy school transformation program consisting of six components. Waist-to-Height Ratio (WHtR) and Body Mass Index (BMI) was calculated and used as the measure of obesity. ANCOVA revealed a significant difference in WHtR among treatment and control groups at time two (T2)  $F_{MI}(1,6148.14) = 4.43, p = .035, R^2 = 0.64, R^2_{Treatment} = 0.01$ , with no significant differences based on age, sex, and race. Additionally, the ANCOVA for BMI revealed a marginally significant lower BMI among the treatment than comparison group students  $F_{MI}(1, 614) = 3.575, p = .059, R^2 = 0.01 (M_{diff} = -0.23, 95\%CI \text{ upper boundary: } -0.03)$ . The healthy school intervention led to significant differences in obesity levels, regardless of age, sex, or race, across the 8-month program between 5th grade children in treatment and non-treatment schools. This supports the ability of schoolwide programs to significantly and positively impact student health and chronic disease prevention.

### 1. Introduction

It is well known that obesity is a major public health issue in the United States and internationally, with adult and youth obesity levels hitting record highs within the last decade. Over the last three decades, levels of central adiposity have had drastic increases among adolescents with 33.29% of children and adolescents ages 6–18 categorized as obese according to measures of central adiposity (Xi et al., 2014). Measuring central adiposity among children is important given the predictive relationship that it has in adults for chronic disease such as metabolic syndrome and cardiovascular disease (Czernichow et al.,

2011; Ashwell et al., 2012). Understanding children's weight status and central adiposity at an early age could help prevent the risk of chronic disease later in life.

Reducing childhood obesity is no easy task, as there are myriad factors that influence childhood obesity making it hard to create intervention programs that have a significant impact (Karnik and Kanekar, 2012). Furthermore, childhood obesity not only has immediate impact on children (Lifshitz, 2008), but it also tracks into adulthood (Singh et al., 2008). Obese children are 75–80% more likely to become obese adults and are at a significantly greater risk of developing chronic disease including cancer and diabetes (Lifshitz, 2008).

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<https://doi.org/10.1016/j.ypmed.2018.03.005>

Received 7 November 2017; Received in revised form 24 January 2018; Accepted 9 March 2018

Available online 13 March 2018

0091-7435/ © 2018 Published by Elsevier Inc.

Given these statistics, agencies (e.g., the Institute of Medicine and Centers for Disease Control and Prevention) are calling on schools to play a larger role in the battle against childhood obesity by encouraging schools to increase children's physically active, improve eating behaviors, and adopt an overall culture of health (IOM, 213; CDC, 2013).

Although utilizing the school setting as an intervention site to increase physical activity (PA) and healthy eating (HE) has been promoted, the verdict of whether this type of programming is effective is still out. Large scale comprehensive studies such as Sports, Play, and Active Recreation for Kids (SPARK; Sallis et al., 1993), Child and Adolescent Trial for Cardiovascular Health (CATCH; Luepker et al., 1996), and Physical Activity Across the Curriculum (PAAC; Donnelly et al., 2009) have not shown significant decreases in BMI. In response to their efforts and the identified limitations of the measurement strategies, additional research has ensued.

It has been suggested that comprehensive school health interventions that are guided by Social-Ecological Framework (SEF) should include program components affecting at least two levels of influence (Sallis et al., 2008). Sbruzzi et al. (2013) conducted a systematic review and meta-analysis of randomized control trials targeting childhood obesity through educational interventions across a number of participant characteristics and levels of influence including schools, parent-child dyads, parent-only, and obese children. Results indicated that educational interventions targeting HE, lifestyle changes, and family environment outcomes were effective at the point of intervention, but lacked statistical significance across preventative outcomes (Sbruzzi et al., 2013). These findings highlight the need for innovative approaches to interventions, prevention, and analyses.

## 2. Purpose

The purpose of this study was to examine the impact of a comprehensive school PA and HE program called Building Healthy Communities: Elementary School Program (BHC) on the obesity status of 5th grade children. It was hypothesized that students in the BHC treatment group would significantly decrease their Waist-to-Height Ratio (WHtR) and BMI over one school year and that students in the comparison group would increase or maintain their WHtR and BMI.

## 3. Method

Over a period of eight months, children in the treatment schools participated in BHC, which was developed using socio-ecological model and designed to change the culture of the school by increasing students' knowledge and behaviors for living healthy. The program included six components: 1) principal engagement, 2) classroom nutrition lessons and PA breaks, 3) active recess, 4) quality physical education, 5) student leadership, and 6) after-school Healthy Kids Clubs (HKCs; see Fig. 1). With guidance from a healthy school educator, teachers and school personnel increased opportunities for students to be PA, eat healthier, learn about HE and PA, and change school environment policies. No new or additional school PA or HE interventions or programs were implemented in any of the treatment or comparison schools.

### 3.1. Program description

BHC is a comprehensive PA and HE intervention that focuses on six components (see Fig. 2) to prevent and decrease obesity among elementary age youth. Each school is assigned a healthy school coordinator to support the school implementing BHC by visiting the school weekly to mentor staff and ensure the program components were being implemented as intended. The estimated cost of the program per school was approximately \$15,000, which included the staffing, curriculum and PA equipment.



Fig. 1. BHC program.

#### 3.1.1. Principal engagement

Principals supported policies, systems, and environmental changes in their schools. They or their delegate read “healthy tips of the day” focusing on school wide HE and PA health messaging, distributed healthy living newsletters to parents, and posted health messaging throughout the school and online.

#### 3.1.2. Quality physical education

Certified physical education teachers received the evidence-based curriculum *Exemplary Physical Education Curriculum (EPEC)* and all PA equipment necessary to teach it. Additionally, teachers participated in a one-day professional development followed by site-based mentoring. They completed an implementation log across the year and school coordinators randomly visited classes twice a month to ensure implementation fidelity. Of the four treatment schools, 75% (3/4) teachers implemented regular EPEC lessons, while the fourth teacher incorporated high activity pieces of EPEC into their existing curriculum.

#### 3.1.3. Classroom engagement

Classroom teachers integrated PA and HE lessons into their classroom routines. Each was mentored by a healthy school coordinator to teach six HE lessons throughout the year developed from evidence-based USDA lessons. Classroom PA break resources and mentoring (e.g., GoNoodle, Fuel Up to Play 60, Energizers, etc.) were provided to help teachers implement PA into their classroom routines. Teachers were also encouraged to adopt a culture of health in their classrooms by encouraging PA homework, creating rules around healthy snacks and treats, and avoiding recess as punishment. Classroom teachers maintained a daily log of their HE lessons, PA breaks, and parent messaging. At the treatment schools, 70% of the teachers reported implementing daily classroom PA breaks, 16% reported implementing them 4 times a week, and approximately 10% implemented them one time a week or less.

#### 3.1.4. Active recess

Each school received a recess cart with equipment (i.e. jump ropes, hula hoops, playground balls, basketballs, and soccer balls) so that students had access to numerous options for PA during recess. Additionally, during physical education classes students learned games to play at recess to reinforce and encourage them to be active. Existing

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