

# Changes in Fruit and Vegetable Consumption of Third-Grade Students in Body Quest: Food of the Warrior, a 17-Class Childhood Obesity Prevention Program

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## ABSTRACT

**Objective:** To increase fruit and vegetable (FV) consumption of youth in Body Quest: Food of the Warrior (BQ), a childhood obesity prevention program.

**Design:** Quasi-experimental.

**Setting:** Supplemental Nutrition Assistance Program–Education eligible schools (n = 60).

**Participants:** Third-grade students (n = 2,477).

**Intervention:** Treatment groups (n = 1,674) self-reported foods consumed through the School Lunch Program for 17 weekly assessments; they participated in BQ curriculum, iPad app education, and weekly FV tastings. Control groups (n = 803) completed only pre- and post-assessments.

**Main Outcome Measure:** Weekly FV consumed through School Lunch Program.

**Analysis:** ANCOVA and growth modeling.

**Results:** From before to after the program, the treatment group demonstrated significant, moderate increases in fruit ( $P < .01$ ) and vegetable ( $P < .001$ ) consumptions, increasing from 7 to 8 weekly FV servings. After the program, the treatment group consumed significantly ( $P < .001$ ) more FV than the control group. Fruit and vegetable consumption increased to class 10 and then stabilized. From before to after the program, all FV predictors were significantly higher and included gender (vegetables), race (FV), and free/reduced lunch (fruit).

**Conclusions and Implications:** Nutrition programs can increase FV intake. Even moderate increases in FV intake can be an initial step for the prevention of chronic disease.

**Key Words:** child, rural health, comparative effectiveness research, overweight, fruit, vegetable (*J Nutr Educ Behav.* 2014;46:286–292.)

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## INTRODUCTION

Two health issues are common among today's youth. First, an alarming number of children are overweight and obese.<sup>1</sup> Second, consumption of fruits and vegetables (FV) among youth is less than ideal.<sup>2–4</sup> When eaten in place of high-calorie foods, foods of lower energy density, such as FV, can contribute to weight management.<sup>5</sup> People who live in states reporting higher FV intakes

are less obese than those in states reporting lower FV intakes.<sup>1</sup>

For 2 decades, school-based nutrition intervention programs have attempted to increase children's FV intake.<sup>6–11</sup> The results are diverse, documenting only fruit consumption increases,<sup>6,9,10</sup> both fruit and vegetable increases,<sup>7</sup> or no FV increases.<sup>8,11</sup> Attributes of these studies include physical activity, gardening, tastings, parent education, school food service

training, and classroom activities.<sup>6,9,10</sup> The duration of these programs and exposure to FV also have significant impacts on FV intake.<sup>2,4</sup>

This study used the rising obesity prevalence in youth as motivation to develop a childhood obesity prevention program, Body Quest: Food of the Warrior (BQ). Body Quest is a 17-class, elementary school-based program designed to increase FV consumption, increase physical activity, and promote family involvement. The purpose of this study was to report changes in FV consumption of third-grade students who participated in BQ and also the School Lunch Program.

## METHODS

### Design

Body Quest was an untreated control group, quasi-experimental design

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program with dependent pre- and post-assessment samples. Participants were third-grade students in Alabama schools who were eligible for Supplemental Nutrition Assistance Program–Education (SNAP-Ed). This requires a school to have  $\geq 50\%$  students receiving free or reduced-price lunch (FRL). The Institutional Review Board at Auburn University approved this research. Informed consent was obtained from parents of participating students and standardized scripts were used to recruit students. Students were not required to give assent, and those students whose parents did not provide consent were given alternate activities with the classroom teacher. The number of nonparticipating students was  $< 1\%$ .

The BQ curriculum, materials, and 7 iPad apps were developed by the Alabama Cooperative Extension System and are based on the Experiential Learning Theory.<sup>12</sup> This theory allows students to learn through reflection about their experiences. Body Quest materials (eg, card decks, vow cards, family discussion prompts) were focused and developmentally appropriate.

Each SNAP-Ed Extension, full-time, nutrition paraprofessional educator ( $n = 24$ ) worked with 6 third-grade classes. Three classes were designated as either a treatment (iPad education) or control group. Treatment groups were in different schools from control groups. Schools were randomly assigned, with 1–3 classrooms per school.

## Intervention

During the 2011–2012 school year, educators provided 17 weekly, 45-minute BQ classes to the treatment group. Classes consisted of pre-assessments (weeks 1–2), intervention (weeks 3–15), and post-assessments (weeks 16–17). During the intervention, 6 nutrition topics were sequentially taught: trying new foods, food groups, balanced meals, food nutrients, healthy snacks, and extending FV message to others. At every intervention class, FV were emphasized. During the 6 traditional, educator-led lessons, instruction included lecture and interactive activities using a BQ card deck. In the following week, a nontraditional reinforcement lesson

was taught via 1 of 7 iPad apps. For the treatment group only, FV tastings were provided at each class and family members received weekly take-home activities. Control groups were given pre- and post-assessments, but no intervention, FV tastings, or family take-home messages.

## iPad apps engage young technology users.

Tastings were integral as they exposed students to FV and removed accessibility barriers students may face at home. Tastings consisted of 4 fresh FV that rotated weekly. Fruits and vegetables were chosen based on accessibility in local grocery stores, and also by frequency of use in the School Lunch Program. Fruits included blueberries, cantaloupe, strawberries, oranges, pears, pineapples, and peaches. Vegetables included tomatoes, squash, broccoli, cauliflower, pickled okra, carrots, bell peppers, spinach, and dark leafy lettuce. A 1-oz cup of ranch dressing was distributed with vegetables for dipping.

## Instrumentation

The educators collected demographic data at the beginning of the study. Each school administrator provided students' genders and race. Free or reduced-price lunch data were provided by the Alabama Department of Education.<sup>13</sup> Each school's Child Nutrition program director reported on participation in the Fresh Fruit and Vegetable Program (FFVP).<sup>14</sup>

The researchers developed a What's for Lunch (W4L) checklist to assess FV consumption of students eating a school lunch. Criteria for the checklist were that it had to be easy to use and time-efficient for students and classroom teachers, yet monitor consumption change. Students' self-reported consumption was defined as the portion or serving of each food provided by the School Lunch Program that was eaten. Educators listed all available food items on the form; readability varied upon food items listed. Besides food items, only a few words were on the form (eg, name, day, date). Age-appropriate options

for students to report were simple words such as “yes” and “no,” “foods not served,” and “did not eat a school lunch today.”

Educators customized the W4L checklist based on each school's lunch menu for a 5-day period and then personalized the W4L checklist with the names of students. Forms were distributed before the corresponding 5-day period. Immediately after lunch, students reported on the W4L checklist whether they ate each food provided by the School Lunch Program. Classroom teachers assisted students with any questions about completing the W4L checklist. The educators collected completed forms. Treatment group students completed the W4L checklist each school day for the entirety of BQ. Control group students completed the W4L checklist during the 2 weeks of pre- and post-assessment.

## Coding and Data Entry of Fruits and Vegetables

Although all foods from the school lunch menu were listed on the W4L checklist, only FV were analyzed. Educators entered FV data into a shared network site using codes for individual food items. For this study, fruits were collapsed into 1 category, as were vegetables.

## Validity and Reliability of the W4L Checklist

For the past 8 years in Alabama SNAP-Ed, the W4L methodology was used in classrooms for students to self-report food items consumed through the School Lunch Program. For the current study, face validity of the W4L checklist was determined from a 6-week BQ pilot study that included 800 students in 40 classrooms in 40 Alabama counties. The W4L checklist was customized with appropriate foods, distributed to third graders, and collected by educators. Classroom teachers facilitated daily reporting of school lunch foods by students immediately after lunch. The evaluation allowed educators ( $n = 24$ ) and teachers ( $n = 40$ ) to provide input on strengths or weaknesses of the form. Written questions also probed for usefulness, ease of use, and readability. In addition, university faculty, school

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