

Fresh Fruit and Vegetable Program and Requests for Fruits and Vegetables Outside School Settings

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ABSTRACT

Background Consumption of fruits and vegetables (F/V) among elementary school-aged children remains inadequate, especially among low-income children. The US Department of Agriculture's Fresh Fruit and Vegetable Program (FFVP) provides F/V as snacks to children during the school day, outside of school meals. School-based initiatives are successful in changing behaviors in school settings; however, their influence on behaviors outside of schools needs investigation.

Objective To examine whether FFVP participation is associated with F/V requests at stores, self-efficacy to ask for and choose F/V at home, and F/V consumption.

Design Cross-sectional study.

Participant/setting Fourth graders in six classrooms (n=296) from three urban, low-income school districts in Phoenix, AZ, were surveyed during 2015; one FFVP and one non-FFVP school from each district that were similar in school size, percent free/reduced-price meal eligibility, and race/ethnicity of enrolled students were selected.

Main outcome measures Children's self-reported F/V requests during shopping, their self-efficacy to ask for and choose F/V at home, and F/V consumption on the previous day (non-FFVP school day) were measured using questions adapted from validated surveys.

Statistical analysis Multivariable mixed-effect regression models, adjusting for clustering of students within classes and classes within schools were explored.

Results In models adjusting for individual-level factors (ie, age and sex) only, several significant positive associations were observed between school FFVP participation and healthier F/V outcomes. After additionally adjusting for school-level factors (ie, total enrollment and % Hispanic/Latino students) significant associations were observed between school FFVP participation and more requests for vegetables during shopping ($P<0.001$), higher scores on self-efficacy to choose vegetables at home ($P=0.004$), stronger preferences for vegetables ($P<0.001$), and more frequent consumption of fruit ($P=0.006$).

Conclusions School FFVP participation was associated with more requests for vegetables during shopping and higher self-efficacy to make healthy choices at home, suggesting the influence of the FFVP may extend beyond the school day.

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DESPITE STRONG EVIDENCE SUPPORTING THE benefits of eating fruits and vegetables (F/V), consumption among elementary school-aged children remains inadequate. Fewer than 5% of children between ages 4 and 8 years eat the daily recommended amount of vegetables, and only 1% of boys between ages 9 and 13 years consume the recommended number of vegetable servings per day.¹ Whereas 60% of children aged 4 to 8 years meet the daily-recommended intakes for total fruit, among older children (boys and girls aged 9 to 13 years), fewer than a quarter do. Further, F/V consumption is lowest among children from low-income households.¹⁻³

Schools are a key venue for improving eating behaviors because more than 95% of school-aged children (aged 5 to 17 years) attend private or public schools in the United States where students can consume up to two meals and a snack during the school day.^{4,5} School-based initiatives have shown success in increasing F/V consumption in children.^{6,7} In addition to serving more F/V in school meals, these initiatives provide repeated exposure to specific items. Such exposures can result in increased preferences due to the "mere exposure effect" or the "familiarity principle," which suggests that individuals develop a preference for familiar items.⁸ These preferences have the potential to extend beyond school settings. However, the influence of school-based initiatives on

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behaviors outside of school food environments, including requests for and consumption of F/V, is not as well studied.⁹ Research is needed to explore if school-based programs influence students' requests for food items at home and in retail environments.

The US Department of Agriculture Fresh Fruit and Vegetable Program (FFVP), is specifically designed to broaden exposure and consumption of F/V among elementary school-aged children.¹⁰ Established during 2008 as a national program, the FFVP provides fresh F/V as snacks at least twice a week to children during the school day, outside of school meal programs.¹⁰ The program targets schools that have the highest proportion of students receiving free and reduced-price meals, a proxy indicator of poverty level. During the 2010-2011 school year, the majority of schools participating in the FFVP nationwide had more than 75% of students eligible for free or reduced-price meals.¹¹ In Arizona, all 108 FFVP-participating schools during the 2015-2016 school year had more than 90% of students eligible for these meals.¹² Although not required, FFVP guidelines strongly encourage that nutrition education and promotional strategies accompany exposure to F/V snacks, because these components may enhance attitudes and preferences for F/V as well as consumption of F/V.^{11,13}

A number of studies have found positive associations between FFVP participation and increased preference for,^{11,14,15} and consumption of,^{9,16} F/V among elementary school-aged children as well as healthier school food environments.¹⁷ Olsho and colleagues¹⁶ found students from FFVP schools consumed significantly more fresh F/V outside of school than students from non-FFVP schools. The authors hypothesize that the FFVP may influence F/V consumption indirectly by influencing knowledge, attitudes, and positive perceptions about F/V. In a 2013 FFVP evaluation report, some parents reported that their children, who participated in the FFVP at school, were requesting more F/V at home.¹¹ The current study was designed to test the hypothesis that students from FFVP-participating schools make more requests for F/V during shopping trips; have higher self-efficacy, or confidence, to choose and ask for F/V at home; and consume more F/V on non-FFVP school days compared with students whose schools do not participate in the FFVP.

METHODS

Using a cross-sectional design, data were collected between April and May 2015 from fourth-grade students attending six elementary schools within three school districts in the Phoenix, AZ, area (two schools from each district). Fourth-grade students were selected to represent elementary school-aged children given their reading level and ability to answer questions on their own. Most survey measures selected for the study have been validated for this age group.¹⁸⁻²³

A convenience sample of six schools comprising one FFVP-participating school and one non-FFVP participating school from each of three school districts was selected, such that schools from within each district were similar in terms of size of student enrollment, percent of students receiving free and reduced-price school lunch meals, and racial/ethnic composition of the student body, based on information from the National Center for Education Statistics' Common Core Data files for 2012-2013 school year (see [Table 1](#)).²⁴ In two school

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Research Question: Is Fresh Fruit and Vegetable Program (FFVP) participation associated with more requests for fruits and vegetables at the store, higher self-efficacy to ask for and choose fruits and vegetables at home, and higher fruit and vegetable consumption?

Key Findings: Compared with fourth-grade students from non-FFVP schools, students from FFVP participating schools reported significantly more requests for vegetables during shopping, higher scores on self-efficacy to choose vegetables at home, stronger preferences for vegetables, and more frequent consumption of fruit.

districts, close matches were possible. In one, the closest matching non-FFVP school had smaller enrollment and fewer Hispanic students. To investigate potential effects of these differences on associations between outcome variables and FFVP status, models were run with and without adjustment for school-level factors.

In all, data were collected from three FFVP and three non-FFVP schools. In schools with more than two fourth-grade classrooms, two classes were randomly selected by the school staff. A pen-and-paper survey was administered by researchers to all students in the classroom during a class time agreed upon with the school principal. A total of 296 completed surveys were collected. All schools included in the study provided classroom instruction in English, and as a result, surveys were administered in English. Because the study aimed to examine the reach of FFVP beyond schools, surveys were administered on days when the FFVP was not offered in participating schools on the previous day. This ensured that F/V consumed as part of the FFVP would not be included in student self-reports. The survey was field tested with four students from similar schools not included in the study, and based on field test results to ensure clarity and address discrepancies in reading levels, it was decided to read aloud all the questions to students as they followed along in their own copies and selected their responses. On an average, students took 18 minutes to complete the survey. Students received a pencil as an incentive for participating in the study.

This study was approved by the Arizona State University Institutional Review Board. The institutional review board required written principal consent (as loco-parentis) or passive parental consent. In four schools, principals provided written consent, and in two schools, parents had the option of excusing their children from participation. All students present in class participated, except in two cases where parents' excused them from participating in the survey. All parent consent materials were available in English and Spanish. Verbal assent was obtained from students before survey administration.

A 19-question survey with 51 items was developed using questions adapted from validated surveys. The questions included in the survey had been validated in previous studies¹⁸⁻²³ for children aged 9 to 11 years and had been used with English- and Spanish-speaking students. Most questions and scales were used in their original forms. Any adaptations that were made are described below.

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