

Increased Classroom Consumption of Home-Provided Fruits and Vegetables for Normal and Overweight Children: Results of the *Food Dudes* Program in Italy

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ABSTRACT

Objective: To increase classroom consumption of home-provided fruits (F) and vegetables (V) in obese, overweight, and normal weight children.

Design: Consumption evaluated within and across the baseline phase and the end of the intervention and maintenance phases.

Setting: Three Italian primary schools.

Participants: The study involved 672 children (321 male and 329 female) aged 5–11 years. Body mass index measures were available for 461 children.

Intervention: Intervention schools received the *Food Dudes* (FD) program: 16 days of repeated taste exposure (40 g of F and 40 g of V), video modeling, and rewards-based techniques. The comparison school was only repeatedly exposed to FV.

Main Outcome Measure: Grams of FV brought from home and eaten.

Analysis: Chi-square, independent *t* test, repeated-measures ANOVA, and generalized estimating equation model.

Results: Intervention schools show a significant increase in home-provided F ($P < .001$) and V ($P < .001$) consumption both in overweight and non-overweight children. Approximately half of children in the intervention schools ate at least 1 portion of FV at the end of the intervention and maintenance phases.

Conclusions and Implications: The increase in home-provided FV intake was similar in overweight and non-overweight children in the FD intervention schools compared with the comparison school. The effect of the FD program was higher at the end of the intervention phase than the end of the maintenance phase.

Key Words: child, fruit, vegetables, childhood obesity, food habits (*J Nutr Educ Behav.* 2015;47:338-344.)

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INTRODUCTION

Childhood overweight and obesity in Western countries are continuously rising.¹ In Italy, their prevalence has reached 22.9% and 11.1%, respectively.² Results from national surveys show that daily fruit (F) and vegetable (V) (FV) intake for Italian schoolchil-

dren is far lower than recommended.^{3,4} Consumption of a high-calorie diet, often associated with reduced daily activity, is a behavioral factor that affects body weight.⁵ Fruits and vegetables have lower energy density than other foods.⁶ Experts recommend a daily intake of 400 g or 5- to 80-g portions of FV for children.^{7,8} However,

there are conflicting reports regarding overweight children's consumption of FV: In some studies, overweight children eat less FV than do their normal weight counterparts⁹ whereas in other studies they eat the same F and/or V quantities as normal weight children.¹⁰ Moreover, little is known about whether obesity or overweight¹¹ might be a moderator of any program designed to increase FV consumption. It is postulated that interventions explicitly based on well-evidenced theories of behavior change are more likely to be effective in altering dietary habits,¹² specifically, in increasing FV consumption.¹³

School-based, multi-component programs seem to be effective in modifying variables related to FV consumption.¹⁴ One such intervention is the *Food Dudes* (FD) *Healthy Eating Program*,¹⁵ a behavior change program based on 3 core principles: (1) role-modeling,

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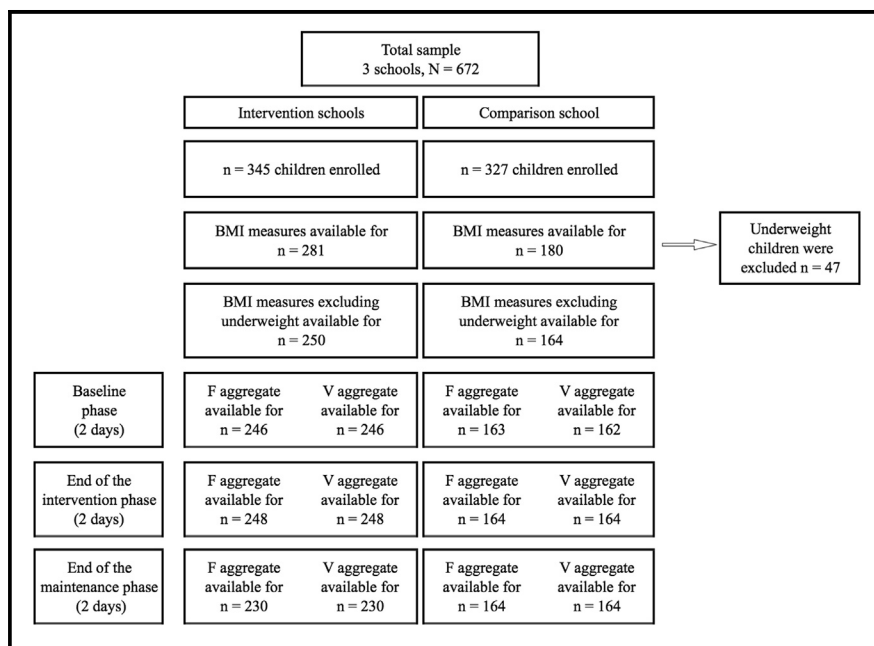


Figure 1. Flow of participants through the study phases (days) for parent-referred data to calculate body mass index (BMI) and home-provided fruit (F) and vegetable (V) intake.

(2) rewards, and (3) repeated tasting. To date, studies have been conducted in English-speaking countries,¹⁶⁻²⁰ with children of differing socioeconomic status,^{17,18} as well as in the home setting.^{15,21} However, consensus on the effectiveness of this program is not unanimous^{22,23} and further work is required to verify both its short- and long-term effectiveness in increasing FV consumption,²² including its extension to other cultures and languages. Moreover, the question of whether body weight might moderate the effectiveness of the FD program has yet to be investigated.

The aim of the current study was to assess whether overweight and normal weight children who followed the FD program would differ in the amount of classroom consumption of home-provided FV compared with children who did not follow the program.

METHODS

Ethics

Although Italian laws and IULM University guidelines for this type of study mandated no institutional review board approval, the study was conducted according to the Declara-

tion of Helsinki. The school board, school managers, and teachers approved all procedures involving the students. If parents did not provide informed consent, their children did not participate in the study. Moreover, if a child did not want to participate, teachers communicated this to the researchers and the child was not enrolled.

Settings and Participants

Children aged 5–11 years who attended 3 elementary schools located in different towns in Sicily, Italy participated in the study. In all participating schools, parents routinely provided their children with snacks to be eaten during the midmorning snack time in the classroom. Children in schools in Acireale (n = 221) and Camporotondo (n = 124) were assigned to the intervention condition, and children in the school San Pietro Clarenza (n = 327) to the comparison condition. These cities were chosen based on a convenience and logistic criterion. The cities are located in the same zone and are medium-sized suburban districts according to national data. No differences were found in terms of size and sociodemographic characteristics with respect to children and families. Children with a

known allergy to any of the provided F or V did not receive that food. Overall, 672 children were enrolled (Figure 1), 327 and 345 of whom entered the comparison and intervention groups, respectively. Gender information was available for 650 children (321 male [49.4%] and 329 [50.6%] female). Parent-reported body mass index (BMI) data were available for 461 children (68.8%). Data from underweight children were not included because of the small group sizes (n = 31 for the intervention schools [17 male and 14 female]; n = 16 for the comparison school [8 male and 8 female]).

Study Design

Baseline phase. For 2 consecutive days, in both intervention and comparison schools, trained researchers assessed all food that was brought from home for the midmorning snack. No additional food was provided. On day 3, teachers were instructed to give study-provided FV to children immediately before they ate their usual home-provided snack. Children were free to taste study-provided FV or not. All teachers were instructed not to encourage or coerce children in any way to eat the FV or to comment on whether children tasted the study-provided foods.

Intervention phase. While children in the comparison school continued to receive the study-provided FV, the full FD program was implemented in the intervention schools (see details below). Children in both groups continued to receive home-provided FV.

Maintenance phase. Study-provided foods were discontinued in both groups. Intervention rewards were phased out.

Intervention Procedures

Classroom teachers were thoroughly trained by the researchers before the beginning of the study and received a written description of the procedures, phases, and use of rewards. They were instructed to refer to all foods with the general terms of *fruits* and *vegetables* rather than by their specific names, in line with the language

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