

Testing a Beverage and Fruit/Vegetable Education Intervention in a University Dining Hall

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ABSTRACT

Objective: To test the effect of a nutrition intervention that included education and 2 labeling components on students' food choices.

Design: Repeat cross-sectional study taking place on 6 dinner occasions before and 6 afterward.

Setting: The study was conducted during dinner meals in a buffet-style dining hall in a university campus residence, where students paid a set price and consumed all they cared to eat.

Participants: University students (n = 368 to 510) visited the cafeteria on each of the data collection dates.

Intervention: Fruit and vegetable consumption were encouraged; sugar-sweetened beverage consumption was discouraged using physical activity calorie equivalent labeling.

Main Outcome Measures: Beverage choices and vegetable/fruit bar visits.

Analysis: Logistic regression was used to compare the proportion of student who selected each beverage, fruit, or vegetable before and after the intervention, while controlling for menu and gender as covariates.

Results: There was a significant decrease in the proportion of students selecting a sugar-sweetened beverage before vs after the intervention (49% vs 41%, respectively; $P = .004$) and an increase in students choosing water (43% vs 54%, respectively; $P < .001$). There was a significant increase in students who took fruit after the intervention (36%; $P < .001$) vs before (30%). The number of students visiting the vegetable bar significantly increased from 60% to 72% ($P < .001$).

Conclusions: This intervention may be a way to encourage healthy dietary choices in campus dining halls.

Key Words: cafeteria, fruit, vegetable, sugar-sweetened beverages, university students, physical activity calorie equivalent label (*J Nutr Educ Behav.* 2017; ■:1-9.)

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INTRODUCTION

The diets of university students have been shown to be low in fruits and vegetables¹⁻³ and high in calories, sugar, fat, and sodium,³⁻⁵ and do not meet nutrient recommendations.^{6,7} Young adults/adolescents on average consume 230 cal from sugar-sweetened beverages each day.⁸ Furthermore, the transition from

high school to a university has been identified as a critical period for weight gain.⁹⁻¹⁵

In recent years, there has been a shift toward buffet-style dining halls in universities to give students greater flexibility and more food choices.¹⁶ In these unstructured eating environments, the traditional cafeteria lineup, which often dictates a choice from each food group, has been replaced with a

food court-style setup that gives students freedom and flexibility in their food choices. Such settings override many of the barriers (such as cost, lack of access, and convenience) that prevent individuals from consuming fruits and vegetables.¹⁷ However, students cite the readily available abundance of food in their campus dining halls as a major cause of weight gain.¹⁶

University students have little knowledge about nutrition¹⁸ and are often completely unaware of the calorie content of their beverages.¹⁹ Efforts to educate university students about nutrition in classroom²⁰⁻²⁴ and online settings²⁵⁻²⁷ have produced significant changes in dietary habits. However, it is unrealistic to expect all students to participate in a nutrition program or course. Thus it has been suggested that educational programs that aim to encourage healthy food choices should take place in settings where food selection actually occurs, such as cafeterias or dining halls.²⁸

Educational interventions have the potential to influence food choices in

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cafeteria settings.²⁹⁻³⁴ In particular, interventions that direct consumers to a preferred choice without requiring comparisons or interpretations may be beneficial because they constitute an environmental nudge toward a preferred choice.^{29,30,35,36}

Young people have said that shocking educational messages are needed to reduce their consumption of sugar-sweetened beverages.¹⁹ Physical activity calorie equivalent (PACE) labeling illustrates the calorie content of a food according to the minutes of physical activity required to burn the calories in that food. Health practitioners also suggested that introducing activity-equivalent calorie labeling on food products is important to help individuals change behavior.³⁷

To date, only 4 studies tested the effect of PACE labeling on consumer food choices; 3 of those studies used Web-based methodologies.³⁸⁻⁴¹ The only non-Web-based study, a randomized study in a metabolic kitchen and graduate student residence, found that PACE labels led to a 139-cal decrease in calories ordered compared with the control group (no labels); however, the researchers found no difference between PACE and calorie labels.⁴¹

The current study had 2 objectives. The first was to test the effect of PACE labeling, combined with messaging encouraging students to drink water when they were thirsty, on students' beverage choices in a university cafeteria. The second objective was to test the effect on student's food choices of messaging that encouraged them to fill half their plate with fruits and vegetables alongside a banner giving students 100 reasons to eat fruits and vegetables. The researchers hypothesized that the intervention would lead to fewer students choosing sugar-sweetened beverages and more visits to the fruit/vegetable bar.

METHODS

Study Setting

This was a repeat cross-sectional design to measure the effects of an intervention implemented in Burwash Dining Hall, a buffet-style cafeteria in a campus residence, supplied by Gordon Food Services, at the University of Toronto. The study protocol was approved by the research ethics board at the University of Toronto.

At Burwash Dining Hall, the majority of students were enrolled in a meal plan administered by the university; therefore students simply swiped their card and could consume however much they chose, with no external factors such as price or convenience to influence their decisions. Each dinner cost \$12.00. Students eating in the dining-hall lived in residence, were generally aged 18–23 years, and came from a wide range of academic programs. The population was 69% female and 31% male and ethno-culturally diverse.

At each dinner the dining hall offered a number of entrées (such as chicken, lasagna, or fajitas), including at least 1 vegetarian option or halal option (such as Szechwan tofu or spinach sauce with rotini), a daily soup (such as mulligatawny, minestrone, black bean,

or cream of leek), a salad bar (including various kinds of lettuce, fresh vegetables, and dressings), and a selection of fruits (apples, oranges, and bananas) and breads, along with multiple side dishes, beverages, and desserts. Foods served during the study collection dates are described in [Supplementary Material 1](#).

The beverage cups in the dining hall held 8 fl oz ounces (when filled approximately 0.5 cm below the brim) and were transparent. Students were free to take as many cups of as many beverages as they wished. The 19 different beverage options available at the cafeteria are listed in [Table 1](#). Ice was available but was not accounted for in these analyses. As for fruit, fresh apples, bananas, and oranges were available daily. Pears were occasionally available. A fresh vegetable bar offering

Table 1. Calorie Content of Beverages at Cafeteria and Estimated Minutes of Jogging Using Physical Activity Calorie Equivalent Labeling

Beverage Category	Beverage	Calories /8-oz Cup	Estimated Min of Jogging to Burn Calories ^a
Water	Water	0	0
Diet soft drinks	Coke Zero	0	
	Diet Coke	0	
Coffee and tea ^b	Coffee and tea	0	
Soft drinks	Ginger ale	87	16
	Sprite	95	
	Orange pop	100	
	Coke	104	
Juice	Orange juice (from concentrate)	95	16
	Lemonade (from concentrate)	95	
	Cranberry cocktail	104	
	Peach juice	109	
	Apple juice (from concentrate)	114	
Flavored coffee/hot chocolate	Swiss mocha cappuccino	149	25
	French vanilla coffee	162	
	Hot chocolate	162	
Chocolate milk	Chocolate milk	170	27
Plain milk ^c	2% milk	123	Not available

^aCalculated minutes of jogging were based on a general jogging Metabolic Equivalent of Task value of 7 and the mean weight of a Canadian adult (75.6 kg), according to the Canadian Health Measures Survey (2009–2011).⁴²; ^bMilk and sugar that may have been added to coffee and tea were not accounted for because these additions were available at a separate station and could be assessed by the data recorder; ^cRegular (plain) milk was not labeled in the intervention as a means to avoid discouraging or encouraging milk consumption.

Note: Physical activity calorie equivalent labeling illustrates the calorie content of a food according to the minutes of physical activity required to burn the calories in that food. Preliminary research demonstrated that such labeling can deter energy consumption.^{38,39}

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