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## Eat your veggies: A chef-prepared, family style school lunch increases vegetable liking and consumption in elementary school students

Debra A. Zellner<sup>a,\*</sup>, Jennifer L. Cobuzzi<sup>b</sup><sup>a</sup> Montclair State University & Monell Chemical Senses Center, USA<sup>b</sup> University of Pennsylvania, USA

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### ABSTRACT

School lunches provide an opportunity to introduce children to healthy foods in ways that might result in both short- and long-term healthier eating. This study compared vegetable consumption and liking for vegetables in 8–10 year old children at two schools, one with a traditional lunch service (61–84 students in School B) and the other (24–26 students in School A) which devoted one day each week to the “Eatiquette Program”, which incorporates chef-prepared food, non-disposable plates and cutlery, and family style service including an adult at each table. Consumption of target vegetables (cauliflower and sweet potato “fries”) was recorded in the lunchroom at the beginning and end of the school year, and a subset of children provided rankings and ratings of liking for those and six other vegetables in separate assessments at those times. Consumption of sweet potato fries was higher in children in the Eatiquette lunch than in the children at the control school at the beginning of the year. Although initial consumption of the cauliflower was not significantly higher in the Eatiquette lunch than in the control school, consumption increased from the beginning to the end of the school year for children eating the Eatiquette lunch. In addition liking for and ranking of the cauliflower increased from the beginning to the end of the year for the children in the Eatiquette ( $n = 6$ ) program but not for those eating the traditional lunch ( $n = 22$ ). The Eatiquette program increased consumption of and liking for vegetables. Aspects of the Eatiquette program including food palatability and the presence of an adult at each table may be responsible for these increases.

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### 1. Introduction

Eating fruits and vegetables has been found to help prevent illnesses such as cancer and cardiovascular disease (Boeing et al., 2012; Joshipura et al., 1999; Ness & Powles, 1997; Van Duyn & Pivonka, 2000). In addition, intake of a greater quantity and variety of vegetables might help prevent obesity (Field, Gillman, Rosner, Rockett, & Colditz, 2003; McCrory et al., 1999; Tohill, Seymour, Serdula, Kettel-Khan, & Rolls, 2004).

However, many children do not eat enough vegetables because they reject foods they find to be unpalatable (Baxter & Thompson, 2002) and vegetables are the least liked category of food (Cooke & Wardle, 2005). This is at least partly due to the fact that vegetables are often bitter and that bitterness negatively influences their acceptance (Dinehart, Hayes, Bartoshuk, Lanier, & Duffy, 2006).

\* Corresponding author at: Department of Psychology, Montclair State University, Montclair, NJ 07043, USA.

E-mail address: [zellnerd@mail.montclair.edu](mailto:zellnerd@mail.montclair.edu) (D.A. Zellner).

Neophobia might also contribute to low consumption of and liking for vegetables (Cooke, 2007) due to the strong relationship between familiarity and liking for foods (Cooke & Wardle, 2005). More familiar foods are better liked than less familiar ones and many vegetables are rarely consumed. In fact, consumption of vegetables other than potatoes, head lettuce, and tomatoes is very low in the US (Kantor, 1999). The increase in liking with exposure is called the “mere exposure effect” and has been found with a variety of stimuli (Zajonc, 1968). According to the mere exposure effect, the more children are exposed to a variety of vegetables, the more likely they are to like those vegetables (Birch & Marlin, 1982). Since exposure increases liking for foods including vegetables (Anzman-Frasca, Savage, Marini, Fisher, & Birch, 2012; Cooke, 2007; Hausner, Olsen, & Moller, 2012; Mennella, Nicklaus, Jagoline, & Yourshaw, 2008; Wardle, Herrera, Cooke, & Gibson, 2003; Wardle et al., 2003) and liking increases consumption (Baxter & Thompson, 2002; Birch, 1979), finding ways to repeatedly expose children to vegetables which they might initially find somewhat unpalatable is crucial to increasing their liking and consumption. If children taste a vegetable for the first time and the

sensory experience is negative it might be difficult to increase exposure to that vegetable and increase liking.

One place where many children have the opportunity to be exposed to a variety of vegetables is in the school lunchroom. Many students in the US consume two meals a day (breakfast and lunch) and approximately a third of their daily calories at school (Briefel, Wilson, & Gleason, 2009). Instituting changes to the school lunch to increase exposure to vegetables is therefore a reasonable way to increase vegetable consumption and liking in children.

A number of studies have investigated manipulations that increase vegetable consumption in lunchrooms. These include the labels given to vegetables (e.g., Special Mix for Superheroes – Morizet, Depezay, Combris, Picard, & Giboreau, 2012; X-ray Vision Carrots – Wansink, Just, Payne, & Klinger, 2012), reinforcement (Hendy, Williams, & Camise, 2005), school gardens (McAleese & Rankin, 2007; Parmer, Salisbury-Glennon, Shannon, & Struempfer, 2009), increase in vegetable portion size (Miller et al., 2015), and forcing students to choose vegetables from a few options rather than simply being given one particular vegetable (Hakim & Meissen, 2013). These have all been found to increase vegetable consumption and/or selection.

One manipulation that has been found to increase vegetable selection and consumption is having a trained chef in charge of the school lunch (Cohen et al., 2012, 2015). In these studies, increased selection and consumption of vegetables were seen, both versus baseline (Cohen et al., 2015) and versus non-chef-involved control schools (Cohen et al., 2012), which suggests that the vegetables were immediately more palatable in the chef-involved schools than in schools without chef involvement.

In one chef-involved study, Cohen et al. (2015) investigated the change in vegetable selection and consumption over the course of seven months of exposure to chef-involved meals. The increase seen in both measures over the course of the school year (approximately 43% increase in selection and 24% increase in consumption) might reflect a change in liking for the taste of the vegetables due to repeated exposure (i.e., the mere exposure effect). An increase in liking of vegetables due to exposure might translate into a longer-lasting increase in vegetable consumption since children eat what they like (Baxter & Thompson, 2002).

A shift in liking seems a probable source of the increased selection and consumption of vegetables seen in Cohen et al. (2012) and Cohen et al. (2015). But neither study measured children's initial liking for the taste of the vegetables or any growth in liking in the chef-involved schools. If the vegetables in the chef-involved schools are initially more palatable, that might not only increase initial consumption and liking of those vegetables, but might also make repeated consumption more likely. That, in turn, would increase the chances that an increase in liking due to mere exposure would occur (see Liem & de Graaf, 2004). This study investigates the effect of a chef-involved school lunch program (Eatiquette program – <http://www.vetricommunity.org/what-we-do/eatiquette/>) on liking for and consumption of vegetables in both the short-term and over the course of a school year. The program is run by a chef's (Marc Vetri) non-profit foundation. The food served is prepared by chefs at the schools according to recipes produced by chefs at the foundation using fresh foods and from-scratch cooking. The lunch differs from a more traditional lunch in that, among other things, the food is served family style at round tables, which include an adult. Food is served by the children and non-disposable plates, utensils, glasses, and serving dishes are used for the meal.

In the present study consumption of, liking for, and ability to identify vegetables were measured at a school using the Eatiquette program and another school using a more traditional school lunch service at both the beginning and end of the school year. Target vegetable measures were compared between the schools at both

times and were also compared within the schools from the beginning to the end of the year to see if there was an increase in consumption and liking due to repeated exposure.

## 2. Method

The current study included a preliminary assessment of equivalency of vegetable consumption and two main methods of data collection in the two different schools. See Table 1. One was a lunchroom observation, where the amount of target vegetables consumed by individual children was observed and recorded. The second method, individual interviews, assessed children's knowledge of, and liking and ranking of eight common vegetables, including the target vegetables observed in the lunchrooms.

This study was approved by the Montclair State University Institutional Review Board.

### 2.1. Subjects

The subjects were 3rd and 4th grade students (8–10 years of age) attending two urban schools in Philadelphia, PA, USA. The preponderance of students in both schools were African-American (in one school there were 2 Caucasian students) and of low socioeconomic status. This population has been found to have higher rates of obesity and diabetes than the US population as a whole (Ogden, Carroll, Kit, & Flegal, 2014). All students in both schools qualified for a government subsidized free school lunch.

### 2.2. School lunchroom descriptions

In School A, the food in the Eatiquette meals, served one day per week, was made from scratch with fresh ingredients. The day's menu was placed on each table so that the children knew what food they would be served that day. In addition, prior to the meal being served, the chef came into the lunchroom and explained the meal and how it was prepared, so that the children were aware of what they would be eating.

The Eatiquette lunch used family style service, with children seated at round tables seating 4–5 people including an adult. Children were assigned to a table. Based on prior assignment, one child served as the table captain for that table. Table captains arrived before the other children donning a chef-coat appropriate for their sizes and were responsible for setting the table, including pouring the water into the glasses. Non-disposable plates, glasses and cutlery were used. Once the other children arrived, the table captain brought the food to the table. The table captains served the food to each person at their tables (often with the assistance of an adult seated at each table) and then sat down to eat with their tablemates. After the main course was eaten the table captain served the dessert course, which consisted of a fruit preparation. Although the 4th graders ate lunch with the 5th graders and the 3rd graders ate with the 2nd graders, any one table had students from the same grade (with the exception of one 3rd grader who ate with 2nd graders).

School B served a traditional school lunch five days per week that included some components of the Eatiquette program. Table captains set round tables with non-disposable glasses and cutlery prior to the arrival of their classmates. The table captains then served the food to the other children on individually prepared plates where all the meal elements (including dessert) were served simultaneously. The other components of the Eatiquette program, including the chef-prepared food, family-style serving, separate dessert course and adults at the table were not part of this lunch.

All lunch meals were 30 min in duration. The lunches served at the two schools met the USDA requirements for school lunches (Nutrition Standards, 2012).

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