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School meal acceptance depends on the dish, student, and context

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ABSTRACT

Students (n = 127) from grades 3, 6, and 8 (8–15-year-old) evaluated 13 school meals with special attention to main dishes. Hedonic ratings (1 = really bad, 7 = really good) of 1109 meals, perceived hunger prior to eating, and aspects of the eating context were rated. Attitudes to school meals and food neophobia were measured. Considerable differences were observed in responses to main dishes, soups being better accepted than casseroles or dishes served with starches. A semi-trained laboratory panel (n = 17) characterized the best liked main dishes as being recognizable by appearance, odor and flavor, and bright and colorful, while the least liked dishes were described as having fatty mouth feel and cheesy odor and flavor. Hedonic ratings of main dishes were highly correlated with overall meal ratings. The 3rd graders rated the main dishes higher than 6th and 8th graders, who perceived them as too low in spiciness and not hot enough when served. Typically, 3rd grade boys rated the meals most positively and 6th grade boys most negatively. Attitudes to school meals were more positive in 3rd graders than in higher-grade students. In regression analysis explaining 29.7% of variation, hedonic ratings of the meals were positively predicted by attitudes to school food, perceived hunger, and appropriate queuing in the canteen, and negatively predicted by food neophobia and being a 6th or 8th grader. In conclusion, sensory characteristics of main dishes greatly affect the popularity of school meals; and means to impact the negative attitude to school food in teenage would be of great use.

1. Introduction

School meals are part of the school day in most European countries, but the organization of meal provision varies by country (School Lunch Standards in Europe, 2012). In Finland, free and nutritionally well-balanced daily meals are secured by law since 1940s (Tikkanen & Urho, 2009). School Meal Recommendation (2008), prepared by the national expert body, National Nutrition Council, currently guides and supports the implementation of school meals. The meal should consist of a hot main course, a vegetable based side dish, drink (milk, sour milk, or water), and bread and spread, and provide approximately one-third of the daily energy. A parallel vegetarian meal should also be served. Besides meeting nutritional needs, the meals should support learning of healthy eating habits and table manners (Finnish National Board of Education, 2014).

School meals have been extensively studied from the point of view of health and nutrition (e.g., Kainulainen, Benn, Fjellström, & Palojoki, 2012; Tilles-Tirkkonen et al., 2011; Williamson, Han, Johnson, Martin, & Newton, 2013), in relation to weight control and obesity (Millimet, Tshernis, & Husain, 2010), and in view of the pedagogic goals (Benn & Carlsson, 2014; Persson Osowski, Göranzon, & Fjellström, 2013). Attention has also been paid to waste (Cohen, Richardson, Parker, Catalano, & Rimm, 2014; Marlette, Templeton, & Panemangalore, 2005), indicating that the acceptance of school lunch is an issue. Indeed, the weighted leftovers were highly predicted by hedonic ratings of daily school lunch among pre-school children (r = −0.96) (Caporale, Policastro, Tuorila, & Monteleone, 2009).

Hedonic responses to individual dishes served at school have been collected in some studies. Some have relied on memorized responses (e.g., Pagliarini, Gabbiadini, & Ratti, 2005), others have presented photographs of foods served at school (e.g., Noble, Corney, Eves, Kipps, & Lumbers, 2000). Hedonic responses to actual dishes have been rarely collected, an exception being the study by Caporale et al. (2009) in which the children rated samples of the school meal before attending the lunch; after each lunch their leftovers were recorded. Evaluation of actual dishes should be useful for caterers and help to understand and predict children's perception of meals in a real eating context.

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Besides foods, the internal state, demographics and mental dispositions of an individual play a role in the acceptance and enjoyment of school lunch. Perceived hunger modifies momentary hedonic responses to food, a phenomenon known as alliesthesia (Cabanac, 1979). Another momentary influence on eating may be emotions evoked by the food (Cardello et al., 2012). Responses to school lunch have typically been collected from a fairly narrow age group (pre-teens or early teenagers) (e.g., Marlette et al. 2005; Williamson et al., 2013), although in most western countries, the period of enrolling school lasts more than a decade. During that time, the students undergo major bodily and mental changes which potentially also change responses to foods. Thus, comparing responses of different age groups to the same foods can open up the perceptual world of children and teens. Furthermore, individuals have a range of dispositions to foods. Food neophobia, defined as the reluctance to try and eat unfamiliar foods, has been found to vary widely within and across populations (Pliner & Salvy, 2006). It has particular impact on responses to new foods, but it tends to reduce overall enjoyment from any food (Knaapila et al., 2011). The trait food neophobia can be quantified using a 10-item instrument developed by Pliner and Hobden (1992).

The context of eating impacts the perception of food. Research from the US military context suggested that a navy canteen, compared to regular cafeteria, had many annoying aspects that may deteriorate the eating experience (Salter, Sherman, Adams, & Rock, 1990). Context effects on food perception have been demonstrated e.g., by modifying the dining environments using ethnic styles (Bell, Meiselman, Pierson, & Reeve, 1994). Contextual aspects of food acceptance have been discussed in book chapters related to meals (Meiselman, 2009), and a recent book has been devoted to the context issue (Spence & Piqueras-Fiszman, 2014).

The present study was designed to identify factors affecting the acceptance of school meals. Attention was first paid to main dishes, as perceived by students (hedonic responses) and by a laboratory panel (sensory profile). The role of selected individual characteristics (grade, roughly representing the age group; gender; food neophobia; attitude to school food; momentary hunger) and contextual factors related to dining environments were also examined.

2. Materials and methods

2.1. Overview

Two groups of respondents were recruited, students ($n = 127$) and laboratory panelists ($n = 17$). The students rated the meals after lunch breaks in a class room and completed questionnaires on demographics, psychosocial background, and the perceived eating context at school. The laboratory panel described the sensory attributes of the main dishes in controlled conditions in the laboratory. The descriptive panel was set up to provide an analytical view of the sensory aspects of the dishes. Such descriptive data could not be obtained from the consumer panel (students), while a laboratory panel acts as a measuring instrument without any specific demographic or other requirements (Lawless & Heymann, 2010). The CATA (check-all-that-apply) method (see Ares & Jaeger, 2013; Valentin, Chollet, Lelievre, & Abdi, 2012; Varela & Ares, 2012) was used in the descriptive analysis.

Two schools were invited to participate. They were catered by a company which, in the school year 2012–13 when the study took place, served the meals to 90% of the schools in Helsinki. The meal plan followed a 6-week rotating menu. The catering company delivered the main dishes to the schools on the day of serving (for the students), and to the sensory laboratory of the University of Helsinki on the day of sensory evaluation or one day before (for the laboratory panel).

Data collection in the two schools, and consequently in the sensory laboratory, was phased in two partially overlapping waves which followed the 6-week menu plan that started in one school in week 1, and in the other one three weeks later, in week 4. Thus, the data collection spread over 9 weeks. The meals served in the two schools were made with the same recipes, but were of different batches; and the sensory evaluation was conducted on one batch only. To avoid burdening the school program and students, the ratings of dishes were conducted two or, at maximum, three times a week. The target meals were different types of dishes (soups, casseroles, sauces, patties) and were made of different raw materials (pork, beef, fish, poultry, vegetarian). Each day, one regular (containing components of animal origin) and one vegetarian dish were available.

Of the 26 main dishes evaluated, 13 regular dishes containing components of animal origin were included in the present analyses. The excluded 13 vegetarian main dishes were chosen too rarely by the students to allow proper analysis. Apart from one exception (barley porridge with sweet berry soup), the vegetarian dishes were chosen by less than 10 students on the day of serving.

2.2. Collection of responses to meals in schools

2.2.1. Respondents

A total of 127 students from two schools in Helsinki participated in the study. Of these, 43 were from the 3rd grade (mean age 8.9 yrs), 54 from the 6th grade (mean age 11.9 yrs), and 30 from the 8th grade (mean age 14.0 yrs) (Table 1). In one of the schools, students from 3rd, 6th, and 8th grade participated in the study, while in the other, only 3rd and 6th graders participated.

As the first phase of recruitment, the principals of the schools were approached and they approved of the participation of their schools. Next, the City of Helsinki school authority approved of the procedure of data collection. Then, information leaflets on the nature and the length of the study were taken by the students of respective classes to the parents. The students informed of their willingness to participate by returning the informed consent signed by their parents.

2.2.2. Procedure

During each lunch hour in the school canteen, the author responsible for data collection at schools (I.P.) took a photo of meal options. The evaluations were conducted in the class rooms after lunch break, where the photos were projected on screen to remind the students of the meal they were asked to evaluate. The students

Table 1
Description of study population by grade.

Description	3rd graders	6th graders	8th graders
No. of participants (Boys + girls)	$n = 43$ (23 + 20)	$n = 54$ (26 + 28)	$n = 30$ (13 + 17)
Age (years)			
Mean (SD)	8.9 (0.7)	11.9 (0.5)	14.0 (0.4)
Range	8–12	11–13	13–15
General attitude to school food[*]	($n = 41$)	($n = 53$)	($n = 27$)
Mean (SD)	4.7 (1.4)	3.6 (1.1)	3.1 (0.7)
Range	2.5–7.0	1.0–6.5	1.0–7.0
Food neophobia score[**]	($n = 27$)	($n = 53$)	($n = 18$)
Mean (SD)	32.0 (11.2)	34.8 (12.1)	29.6 (8.6)
Range	10–50	10–61	12–41

[*] Mean of four ratings from 1 = really bad to 7 = really good (ratings missing from 6 students).
[**] Completion of the questionnaire on the last day of meal ratings (ratings missing from 29 students).