Title: Impact of a nudging intervention and factors associated with vegetable-dish choice among European adolescents (Accepted in European Journal of Nutrition in January, 2019)

Concise title: Choice of a vegetable-based dish among European adolescents

Quenia dos Santos[1*], Federico JA Perez-Cueto[1],Vanessa Mello Rodrigues[2], Katherine Appleton[3], Agnes Giboreau[4], Laure Saulais[4], Erminio Monteleone[5], Caterina Dinnella[5], Margarita Brugarolas[6], Heather Hartwell[2]

[1] *Department of Food Science, Faculty of Science, University of Copenhagen, Rolighedsvej 30, DK-1958 Frederiksberg C, Denmark.*

[2] *Bournemouth University, Foodservice and Applied Nutrition Research Group & Health and Wellbeing, Faculty of Management, BH12 5BB, United Kingdom.*

[3] *Bournemouth University, Department of Psychology, Faculty of Science and Technology, Poole House, Fern Barrow, Poole BH12 5BB, United Kingdom.*

[4] *Centre de Recherche de l'Institut Paul Bocuse, Château du Vivier, BP 25 - 69131 Écully Cedex, France*

[5] *Università degli Studi di Firenze, Dipartimento di Gestione dei Sistemi Agrari, Alimentari e Forestali, Via Donizetti 6, 50144 Firenze, Italy*

[6] *Miguel Hernández University, Agroenvironmental Economy Department, Ctra. Beniel, km. 3,2 Orihuela - Alicante- Spain*

* Corresponding author:

Quenia dos Santos: E-mail address: quenia1104@gmail.com – Mobile phone number: +45 3156-3039

Impact of a nudging intervention and factors associated with vegetable-dish choice among European adolescents.

ABSTRACT

Purpose: To test the impact of a nudge strategy (dish of the day strategy) and the factors associated with vegetable-dish choice, upon food selection by European adolescents in a real foodservice setting.

Methods: A cross-sectional quasi-experimental study was implemented in restaurants in four European countries: Denmark, France, Italy and United Kingdom. In total, 360 individuals aged 12-19 years were allocated into control or intervention groups, and asked to select from meat-based, fish-based, or vegetable-based meals. All three dishes were identically presented in appearance (balls with similar size and weigh) and with the same sauce (tomato sauce) and side dishes (pasta and salad). In the intervention condition, the vegetable-based option was presented as the "dish of the day" and numbers of dishes chosen by each group were compared using the Pearson chi-square test. Multivariate logistic regression analysis was run to assess associations between choice of vegetable-based dish and its potential associated factors (adherence to Mediterranean diet, food neophobia, attitudes towards nudging for vegetables, food choice questionnaire, human values scale, social norms and self-estimated health, country, gender and belonging to control or intervention groups). All analyses were run in SPSS 22.0.

Results: The nudging strategy (dish of the day) did not show a difference on the choice of the vegetable-based option among adolescents tested. However, natural dimension of food choice questionnaire, social norms and attitudes towards vegetables nudging were all positively associated with the choice of the vegetable-based dish. Being male was negatively associated with choosing the vegetable-based dish.

Conclusions: The "dish of the day" strategy did not work under the study conditions. Choice of the vegetable-based dish was predicted by natural dimension, social norms, gender and attitudes towards vegetables nudging**.** An understanding of factors related to choosing vegetable-based offers an important tool for the development and implementation of public policy interventions aiming to increase the consumption of vegetables among adolescents.

Keywords: Adolescents; choice architecture; food choice; vegetables.

INTRODUCTION

Consuming a healthy diet throughout one's life helps prevent malnutrition as well as a range of non-communicable diseases (NCD). However, increased production of processed food, urbanization and lifestyle changes have led to a global shift in dietary patterns. People are consuming more foods high in energy, fats, sugars and salt, and many do not eat enough fruit, vegetables or whole grains [1]. In Europe, school-aged adolescents are the age group with the lowest intake of fruits and vegetables compared to the World Health Organization guidelines [2]. This is of concern from a public health nutrition perspective, as food habits consolidated at this age tend to endure later in life [3].

Research evidence increasingly suggests that vegetables and fruits may provide greater benefits because of their high content of protein (such as beans and peas) and fibre, and low dietary sugar (especially green leafy vegetables) [4]. Despite this there have been several studies of psychosocial, environmental and life course factors influencing fruit consumption, but very few on the consumption of vegetables separately (or vegetable-based dishes), making this a significantly under-researched area. Moreover, interventions aiming to increase the intake of vegetables as a separate and distinct food group have tended to focus on younger children, while such interventions have not been undertaken with adolescents [5]. Adolescence is a period of rapid physical, cognitive and social development, where considerable changes may occur in eating practices and dietary intake [6]. Such studies that have occurred in this group identify barriers to vegetable consumption similar to those in younger children [7] such as individual preference, perceptions of taste and appearance, and environmental factors [8], but also identify the increased importance of cognitive factors [9].

Consumer behaviour is highly complex with regard to food, since there are many internal and external influences on perception, attitude and action. Product attributes, individual characteristics of the consumer and the eating environment all play a key role in food-related decisions. Dietary habits rely on food choices based on two mental processes: one that requires very little active decision-making, and another where choice options are carefully considered. Dual process theories describe these respectively as automatic/heuristic and reflective/systematic processing of the information available in choice situations. Choice architecture or "nudging" aims to influence decisions by managing the way options are presented in choosing situations [10]. It seeks to alter people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives [11]. Within public health nutrition, this could mean altering the environment in foodservice provision by judicious product placement or labelling, for example.

Foodservice providers can play a potential role in facilitating healthy choices [12]. In addition, the potential of nudging interventions on the promotion of healthy foods has begun to attract public health sector attention, particularly when the aim is to make the healthier choices the easier ones [13]. A review that investigated the effect of positional changes of food placement on food choice has identified that manipulation of food product order or proximity can influence participants towards a healthier food choice [14]. A study in Denmark found that a choice architecture approach could increase intake of healthy items and decrease

consumption of other meal components among male university students through combining the order of placement in a buffet and separating the fruits and vegetables [15]. Moreover, a recent meta-analysis has shown that nudging interventions that aim to increase fruit and vegetable choice generally have a moderately significant effect, the largest effects being from altering placement and from combined nudges [16].

None of these studies, however, investigated the effects of nudging on vegetable consumption using the dish of the day strategy specifically for adolescents, making this experiment unique. The dish of the day strategy consists in naming the target dish (in this case, the vegetable-based dish) as "dish of the day" to check if this will affect the dish orders compared to a situation where this strategy is not used. Furthermore, a review of the literature demonstrates that no study has investigated the attitudes towards choice architectural nudge interventions as a potential factor for increased vegetable consumption, or was conducted in a real-life food service situation [17]. Additionally, there is a paucity of data on customers' choice of vegetable-based dishes, especially in a foodservice situation. Finally, in recent years, there has been a shift away from encouraging individual behaviour change to an approach that addresses wider, population-level factors [18], which could be achieved through nudging. Changing the overall choice environment can contribute to changing behaviour more sustainably.

Based on literature, it seemed plausible that using the concept of "dish of the day" as a nudge could work. A previous experiment conducted at a self-service buffet located in a University, aimed to investigate the efficiency of three nudge strategies (priming, default and perceived variety) in relation to the intake of vegetables [19]. It was found that the default nudging strategy (in which 200g of a pre-portioned salad was offered) successfully increased the energy intake from vegetables among participants. Another study within the catering sector [20] suggested the use of strategies for promoting healthy eating such as the use of "dish of the day" or "chef´s recommendation".

The objective of the present study was to investigate whether a nudge strategy (i.e. "dish of the day") would influence European adolescents to select a vegetable-based dish over fish and meat-based options when they are choosing a meal in a real foodservice setting, and how potential factors are associated with their selections.

METHODS

The study reported here forms part of a wider European study the VeggiEAT project (https://microsites.bournemouth.ac.uk/veggieat/) that aims to develop a platform for predictive modelling of processed vegetable intake that takes into account individual characteristics (acceptability, intake level, age groups) as well as environmental cues (choice architecture and institutional setting).

Study Design

This was a cross-sectional quasi- experimental study which sought to test whether a nudge strategy (i.e. "dish of the day strategy") would influence adolescents to select a vegetable-based dish when this dish was described as dish of the day (intervention group) compared to the control group (where this strategy was not used). The experiments were held in a real foodservice setting (except one data collection in Denmark that was held in a setting assembling a real foodservice), and in addition to the nudging strategy investigated the potential determinants of vegetable-based dish choice. It was a quasi- experimental study because it involved selecting groups, upon which a variable was tested (choice of the dish), without any random pre-selection processes of the groups. The intervention and control groups were chosen from institutions that collaborated previously with the researchers involved in the study.

The experiment was implemented in four operating restaurants in four countries – Denmark (DK), France (FR), Italy (IT) and United Kingdom (UK), where the food was served exactly as it would be in the normal operation. In Denmark, there was one more data collection held in a room assembled as an operation restaurant. In order to manage expectations of subjects in the experiment, participants were invited for a free meal, but were not informed of the overall purpose of the study.

Sample size calculation for detecting differences in the choice of the dish

The minimum feasible sample size was calculated on the basis of a pilot test previously conducted at the Institute Paul Bocuse (IPB), France, in November 2015, and the variable used was choice of the vegetable-dish (quantity). This showed that a minimum of 88 individuals (44 individuals for the control and 44 for the intervention) were needed in each country, based on 80% power and a significance level of 5%.

Participants

Individuals between 12 and 19 years old were recruited from January to April 2017, and each research centre employed the most effective methods to reach participants. In Denmark, invitation e-mails were sent to schools located in Copenhagen area with students between 12 to 17 years old, and three schools agreed to take part in the study. In France, e-mails were sent to an internal consumer database from a culinary school (Institut

Paul Bocuse), as well as advertisements were made online through their social networks. The meal was offered as an incentive to attract respondents. In Italy, the recruitment was realised in a secondary school in Firenze through school personnel. All students aged 14-16 years old were invited to participate. In the UK, adolescents were recruited at a college located in Bournemouth, using posters and personal invitations. The principal researcher visited classes with students aged 16-19 years to reinforce the invitation to participate. The researcher checked their eligibility (being an adolescent between 12 and 19 years old and not being allergic/intolerant to any of the meal ingredients) and emailed those who replied by e-mail or signed a registration form during the visits. Vegetarians or vegans should not be included in the study.

Choice architecture experiment

The nudging strategy was tested as follows. Participants were subdivided in each country into intervention and control groups, of equal size and approximately equivalent composition (percentage of males and females), since it is always an advantage to have balanced groups. This distribution in intervention and control groups was done according to what the researchers judged to be better, aiming to have intervention and control groups in separate days /times, thus people that will come in a given day/time would be all part of the same group (control or intervention). Therefore, each participant was not randomly distributed to either control or intervention, but instead, a group was distributed to control or intervention according to their availability to be present in the same day. Members of the intervention groups were asked to choose between three meals, based respectively on Meat balls, Veggie balls and Fish cakes. All three dishes were labelled with their names, but the Veggie balls were presented as the "dish of the day". The vegetable-based dish was both labelled as "dish of the day", and orally informed by foodservice employees as being the "dish of the day" in all countries with the following phrase: "Welcome! Today we have Veggie balls as dish of the day" (verbal prompt). In the control situation, the three identical dishes to the intervention condition were just labelled with their names and no "dish of the day" was offered (Figure 1). All dishes were provided free of charge and were portioned and served by foodservice employees. During the experiment sessions, no other foods were available by the foodservice. Meat balls and fish cakes have already been served by the foodservice previously, but it was the first time they served the Veggie balls.

Before participating in the experiment, each participant read and signed a consent form, and was provided with an identification number, which was also used to label their plate. Participants were asked to complete the first questionnaire with information on their age, gender, if they considered themselves vegetarian, and to self-rate their hunger with a 10-point hunger scale [21]. This scale varies from 1 to 10 (1 being extremely hungry and 10 being extremely full).

The dishes chosen by a participant were logged against participant identification numbers. After the meal, participants answered the second questionnaire containing questions regarding potential determinants of food choice, such as food neophobia and self-estimated health.

The Veggie ball recipe was previously designed and tested for operational purposes at Institut Paul Bocuse, as part of the wider VeggiEAT project. The Veggie ball was similar to a meatball in appearance (balls had similar size and weight) but the Veggie balls was made of vegetables (sweet corn, pea, red beans and chickpeas) instead of meat, baked in the oven on a greased baking sheet. The Meat balls and Fish cakes were made using the foodservice's usual recipes, adjusted for portion size and participant numbers. In each country, the three options dishes were identically presented in appearance (balls with similar size and weight) served with the same side dishes (pasta and salad) and with the same sauce (tomato sauce).

Data Collection

Data collection in DK occurred on two occasions in February and April 2017. For one school, food was prepared and served at school cafeteria. For the other two schools, food was prepared at the Gastronomy laboratory and served at the Sensory Evaluation Room at the Copenhagen University, which was assembled as an operating restaurant, with tables, chairs, cutlery, plates and all the materials/equipment needed. All the three foods were displayed side by side in the same order (Figure 1). In France, the data collection occurred on 2 occasions in the Living Lab, in May 2017. Choices were made individually from a menu card delivered by a living lab employee (prior to seeing the dishes) that indicated the Veggie balls as "dish of the day" for the intervention group. This employee also said to the participants that the Veggie balls were the dish of the day (verbal prompt). The order of presentation of the dishes on the menu was randomized on each menu card to minimize ordering effects. In Italy, data collection occurred on one occasion, in May 2017, at the canteen annex to the school and it was done by the school personnel. The meal consisted of three dishes: first course (risotto with mushrooms), main dish (meat balls, fish cakes or Veggie balls served with green salad) and dessert (fruit tart). In the UK, data collection occurred on three separate sessions, two in January, and one in March 2017, in two different time slots (12:00 and 13:10), at the College training canteen. Data collection for control and intervention groups always occurred in separate days.

Data from the questionnaires were entered to computers using a standardised coding procedure. Ethical approval was obtained through the appropriate channels in all the VeggiEAT Project countries. Relevant health and safety issues, together with a risk assessment protocol, were addressed prior to the commencement of the research. Written informed consent was obtained from all participants. Confidentiality and anonymity were assured at all times.

Definition of the variables

As human behaviour is complex, vegetable intake has multiple determinants, from individual preferences, knowledge and beliefs, to elements of the family, social, economic and physical environments [5]. Based on the possible determinants of vegetable-based dish choice, the variables below were selected for this study:

Adherence to Mediterranean Diet

Adherence to Mediterranean Diet was assessed through a 14-point Mediterranean Diet Adherence Screener (MEDAS) [22]. This scale consists of 12 questions on food consumption frequency and 2 questions on food intake habits considered characteristic of the Mediterranean diet. Each question is scored 0 or 1. The final Mediterranean adherence score ranged from 0 to 14.

As Mediterranean diet (MD) is dietary pattern rich in vegetable-based foods [23] and an indicator of diet quality, it is expected that subjects with a higher adherence to Mediterranean diet are more prone to choose vegetable-based meals.

Food Neophobia

Food neophobia was evaluated through Food Neophobia scale [24]. This is a 10-point scale in which a high mean score, calculated by summing the individual item scores measured on a 7-point Likert scale (ranging from strongly disagree to strongly agree), represents high food neophobia, while a low score represents low food neophobia.

The Veggie balls was a new dish and it was specifically developed for this experiment and the other options (meat balls and fish cake) were made using the foodservice's usual recipes, thus it is expected that higher food neophobia could negatively influence the choice of the vegetable-based dish.

Attitudes towards Vegetables Nudging

This was evaluated through a set of questions regarding 10 hypothetical scenarios for vegetables consumption in a school setting so the respondents were able to relate to the concepts of food choice behaviour change interventions [25]. So the mean score of the scale was calculated, by summing the individual item scores measured on a 5-point Likert scale (ranging from strongly disagree to strongly agree). These concepts and scenarios formed the attitudes towards nudging for vegetables consumption scale.

According to the" Theory of Planned Behaviour" [26], attitudes towards a given subject are mediators of intentions and behaviours. Therefore, attitudes towards nudging in relation to the consumption of vegetables can indicate if the participants are more or less sensitive to small interventions made by foodservice providers to increase vegetables consumption.

Food Choice Questionnaire (FCQ)

This scale is a multidimensional tool that measures motives related to food choice [27]. Thus, it helps us to understand the reasons people choose their food. Participants were asked to endorse the statement ''it is important to me that the food I eat on a typical day...'' for each of the 24 items by choosing between four responses: not at all important, a little important, moderately important and very important, scored 1 to 4. This

scale is formed by 8 dimensions: sensory (questions 1, 5 and 24 of the scale); natural (questions 4, 9 and 14); mood (questions 12, 15, 19 and 20); health (questions 2, 13, 18 and 22); price (questions 10 and 23); weight (questions 6,11 and 21); familiarity (questions 7 and 17) and convenience (questions 3, 8 and 16).

Human Values Scale

This is a very well-established measure developed by Schwartz, 2003 [28]. A 21-point scale ranges from "very much like me" to "not like me at all" and it is formed by 10 human values: self-direction, power, universalism, achievement, security, stimulation, conformity, tradition, hedonism and benevolence. All items measuring values were centred on the participant's mean rating across all values completed as recommended by Schwartz, 2009 [29]; centring involves subtracting the participant's overall mean score of values from each of the individual value. The Human Values contributes to the individual food choice.

Social Norms and Self-estimated health

Nørnberg et al. 2016 [30] applied these scales in a previous study. They were both included in question 10 of the VeggiEAT questionnaire. The factor 'Social norms', was assessed with three statements: my friends eat vegetables every day; my mom and dad eat vegetables every day; my parents encourage me to eat vegetables every day. To measure self-estimated health, respondents were asked to assess whether they think they are healthier compared to others their age; eat healthier than others their age; would like to lose weight, and eat more vegetables than most people at their age. The mean score of each scale was calculated by summing the individual item scores measured on a 5-point Likert scale (ranging from strongly disagree to strongly agree). Food choice is strongly affected by people sharing the same social context, such as family and friends [31]. Thus, being part of a social context where family and friends eat vegetables increases the likelihood of choosing vegetable-based dishes, as well of being concerned about health issues.

Country

This variable refers to the country of residence of the participant, represented by: 1= United Kingdom; 2= Denmark; 3= France and 4= Italy. Among the factors that influence the food choice, country of residence can be highlighted once the cultural environment (i.e. cultural and sub-cultural norms) has been attributed as an important element in consumer's food choices since it describes the types of food that are eaten and they can vary from place to place [32].

Group

This variable indicates if the participant belongs to: 1=intervention (nudging) group or; 2= control group. The inclusion of this variable accounts for the possible effect of the nudge in the choice of the dish.

286

287 *Gender*

288 Represented by 1= male, 2= female. This variable can influence food choice since previous studies
289 showed that girls and women consume larger amounts of fruit and vegetables than do boys and men [33,34].

290

291 *Dependent variable (outcome)*

292 Number of vegetable-based dishes (Veggie ball) chosen in quantities.

293

294 **Statistical Analyses**

295 Firstly, a Pearson's chi-square test was used to check if there was any difference in the choice of dish
296 between control and intervention groups. If no differences were found in any countries, the variable choice of
297 dish would be recoded as vegetable-based dish (VeggiEAT dish) and animal-based dish (meatballs +fish
298 cakes), since the purpose of the paper is to detect the determinants of the choice of vegetable-based dish.
299 Descriptive statistics for all the scales and dimensions used in this study were calculated and they were
300 compared using One-way ANOVA test to check if there were mean differences between each country.

301 Then, univariate binary logistic regression models were run for each dimension of Food Choice
302 Questionnaire and Human Values scale to detect which dimensions were statically significant in relation to the
303 choice of vegetable-based dish. Then, multivariate logistic regression was run using the backward stepwise
304 selection with those dimensions detected previously in addition to other variables such as gender; attitudes
305 towards vegetable nudging; Mediterranean score; food neophobia score; country and group in order to obtain
306 a model that better explains the choice of vegetable-based dish. The correlations between the candidate
307 variables to be included in multivariate logistic regression model were tested to avoid multicollinearity.
308 Finally, we calculated the maximum number of independent variables to be included in a model according to
309 the sample size and the proportion of positive cases (percentage of people who chose the vegetable-based dish
310 in this case) according to Peduzzi et al, 1996 [35]. A p value of <0.05 was used to define statistical
311 significance. All analyses were run in SPSS 22.0.

312

313 **RESULTS**

314

315 The socio-demographic characteristics of the sample (360 adolescents) are found in Table 1. In most
316 countries, prevalence of males and females in the sample was around 50%, except in Italy where the prevalence
317 of the male adolescents was slightly higher (60%). Mean age also varied, however it was within the range
318 allowed for the sample (12-19 years old). In relation to frequency of eating out, in Denmark, Italy and the
319 United Kingdom, more than 80% of the adolescents reported to have their meals outside home up to 2 times a
320 week. In France, adolescents reported to have their meals outside home more frequently – 44.3% reported

eating out from 3-4 days a week up to everyday. A similar scenario was found for eating in the school canteen. There were no differences for those variables between control and intervention groups for all countries (data not shown).

No differences in the choice of the dish between control and intervention groups were found (Table 2). Hence, the dishes were recoded as "meat-based dish" (meatballs + fish cakes) and "vegetable-based dish" (Veggie balls), for the next analyses, aiming to measure the influence of the food choice predictors on the choice of the vegetable-based dish.

Mean and confidence intervals (CI) for each scale or dimensions per country are seen in Table 3. In general, there were no differences between the countries, some exceptions were detected through one-way ANOVA test, such as self-estimated health ($p=0.02$); for the Food Choice Questionnaire (FCQ) price dimension ($p=0.001$); weight dimension ($p=0.001$); familiarity dimension ($p=0.01$) and sensory dimension ($p=0.03$). For the Human Values scale, differences were detected for hedonism dimension ($p=0.001$); achievement dimension ($p=0.007$); power dimension ($p=0.006$) and security dimension ($p=0.01$).

Table 4 presents the results of the univariate logistic regression analysis regarding the association between each dimension of food choice questionnaire and Human Values scale with the choice of vegetable-based dish. Natural, health and weight dimensions of food choice questionnaire were found to be significantly related with choice of vegetable-based dish. For those dimensions, scores were positively associated with the choice of the vegetable-based dish, and an increase of 1 unit in natural, health and weight dimensions of the Food Choice Questionnaire leads to a 271%, 330% and 164% higher likelihood to choose the vegetable-based dish respectively. For the Human Values scale, the power dimension score was negatively associated with the choice of vegetable-based dish, and an increase of 1 unit in this dimension leads to a 26% lower likelihood in the choice of the vegetable-based dish.

All of the candidate independent variables to be included in the multivariate logistic regression model (Adherence to Mediterranean Diet: Food Neophobia; Attitudes Towards Vegetables Nudging: Food Choice Questionnaire; Humans Values Scale; Social Norms and Self-Estimated Health; Gender; Group; Country) were checked for multicollinearity through Spearman´s correlations because they were not normally distributed (data not shown). All the variables either did not present correlation or present negligible correlation (correlation coefficient lower than 0.3), showing that they can be used in the same model.

Table 5 shows the result from the multivariate logistic regression using the backward stepwise selection. Our multivariate logistic regression model retained 5 variables. An increase of 1 unit in the natural dimension of the Food Choice Questionnaire, Social norms and attitudes towards vegetables nudging scale leads to a 94%, 16% and 5% higher likelihood in choosing the vegetable-based dish respectively. Male adolescents were 57% less likely to choose the vegetable-based dish. As we had a final sample size of 360 adolescents, maximum of six independent variables were allowed for inclusion in the model. As our final model presented four independent variables, the model is adequate and not over fitted.

DISCUSSION

This study is unique and adds to the body of knowledge in this field as it considers the potential determinants of food choice to investigate the selection of a vegetable-based dish by European adolescents in a real foodservice setting. The results showed that the nudging strategy tested (vegetable-based dish presented as "dish of the day") was not enough to increase choice of the vegetable-based option among adolescents for any country tested. However, our analysis revealed that the natural dimension, social norms and attitudes towards vegetables nudging were positively associated with the choice of the vegetable-based dish. Conversely, being male was negatively associated with making a vegetable-based dish choice.

In this study, the positive predictors for the choice of the vegetable-based dish during the experiment were natural dimension, social norms and attitudes towards nudging. According to the Euromonitor Global Consumer Trends Survey, 2016 [36], fifty-five percent of respondents look for natural features when buying products. "Natural" labels are especially important to consumers when they are choosing the type of food to buy. This interest has remained steady (and high) over the past five years; nearly half of global respondents indicated an interest in natural foods in 2013, 2015, and 2016. Adolescents surrounded by family and friends that eat vegetables were more likely to choose the vegetable-based dish, highlighting the importance of social norms for the initiation and maintenance of a variety of behaviours [37, 38]. The influence of peers and friends on youth's eating is crucial, because adolescents need to feel approved and liked by the social group they belong. In this experiment, when adolescents were asked to choose between the dishes in both control and intervention situation, they were surrounded by other adolescents, and the choice of one could have influenced the choice of others, as seen in previous studies [39]. Finally, a higher score in attitudes towards vegetables nudging scale was associated with a higher likelihood of choosing the vegetable-based dish. Thus, participants that chose the vegetable-based option were more open and positive in relation to nudge strategies than those who selected the meat-based dishes.

Conversely, being male was negatively associated with the choice of the vegetable-based dish. Based on the literature, it was found that women have a higher consumption of fruits and vegetables than men [33-34, 40]. Thus, it was expected that female adolescents would have higher probability of choosing the vegetable-based dish. The intake of fruits and vegetables is generally low by men because often they give more importance to eat meat, since there is a solid relationship between perceived masculinity and meat consumption [41].

Food choices may be influenced by many cues in a food environment. However, many choices in settings such as canteens are relatively low involvement choices, i.e. consumers do not actively process available information about choice alternatives [42]. Therefore, using choice architecture to reshape the setting in which consumers take their meals has been increasingly pointed as a good strategy towards healthier choices,

as it can be simple, easy to implement and inexpensive, maintaining the freedom of choices [43]. A previous review analysing the effects of the few choice architectural nudge interventions that aimed to promote vegetable intake among adolescents in a school setting found inconclusive results [17]. In the present study, the use of the nudging "dish of the day" was not sufficient to encourage the adolescents to choose the promoted dish.

The inefficacy of the strategy tested might be explained due to the fact of the vegetable-based dish is a new dish when compared to the other options. The most popular alternative in this study – the meatballs served with pasta and tomato sauce – is a very popular dish, and hence may have made the participants more comfortable in choosing this option and less prone to try the Veggie balls. Additionally, the adolescents' preference for the meatballs can be connected to their usual dietary pattern of relatively high intake of fat (total and saturated) and sodium, and low intake of polyunsaturated fats, vitamins and minerals [44] and a vegetable-based dish presents the opposite profile of nutrients, which can be less attractive to them. Other factors may also play a role, such as how filling or satisfying the food is or that food can focus social interactions [45].

The limited available evidence suggests that a combination of different nudges might be more effective for embedded healthier eating in the food choice environment [44]. A study in Denmark found that a choice architecture approach could increase intake of healthy items and decrease consumption of other meal components among male university students through combining the order of placement in a buffet and separating the fruits and vegetables [15]. A review that investigated the effect of positional changes of food placement on food choice has identified that manipulation of food product order or proximity can influence participants towards a healthier food choice [14]. Moreover, a recent meta-analysis has shown that nudging interventions that aim to increase fruit and/or vegetable choice generally have a moderately significant effect, the largest effects being from altering placement and from combined nudges [16].

The emphasis of studies focusing on the health behaviour of adolescents is actually primarily on smoking, drinking and physical activity, and second on whole grain and fruit and vegetable intake [17]. However, the available evidence demonstrates that female adolescents tend to have healthier food behaviour than male adolescents, by either eating less fast food [46], or having more meals in a family environment [45]. In fact, there are a range of factors thought to influence people's dietary choices, including health, cost, convenience and taste [29].

Despite the important findings from this study, some limitations must be noted. Although United Kingdom, Denmark and Italy had less respondents than required for the choice of the dish detection (84, 84 and 85 adolescents respectively), their sample sizes represent around 96% of the ideal sample size, which does not seem to compromise our results at all. Secondly, the intervention offered as competitive dishes two very popular options, which may have weakened the power of the nudging tested. Finally, adolescents were recruited from different environments (schools in Denmark, culinary school in France, secondary school in Italy and college in United Kingdom) which could have an impact in the results of the study.

Although there is a recognised need at the European level to promote consumption of vegetables as a public health issue, especially for adolescents, the potential for doing this through school foodservice operations has not been previously identified. Considering the findings from this study, further investigation should target adolescents in their social groups, specifically males, in order to test if they would be more susceptible to the effects of combined nudging strategies or whether other interventions could increase their consumption of vegetarian dishes. Finally, testing conditions within a larger sample would permit the development of a structural equation modelling about factors related to the choice of vegetable-based dishes in a real foodservice setting.

Conclusions

Our results showed that the "dish of the day" nudge strategy did not work for this sample of European adolescents under the study conditions. Factors such as greater appreciation given to natural foods (without additives and artificial ingredients); belonging to a social group that consume vegetables and being more open towards nudging strategies that promote vegetables intake were positively associated with the choice of the vegetable-based dish. Conversely, being male was negatively associated with making a vegetable-based dish choice.

Our findings can be used as important tools to support the development and implementation of public policy interventions aiming to increase the consumption of vegetables and decrease the intake of meat among adolescents.

Acknowledgments

This work is part of EU/FP7 Funded VeggiEAT project (Grant No. PIAP-GA-2013-612326). The funder had no input into study design, data collection or analysis, or manuscript preparation and revision.

Conflicts of interest

No conflicts of interest.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the universities committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards."

References

1. Ng M, Fleming T, Robinson M et al (2014) Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 384:766–781. doi: 10.1016/S0140-6736(14)60460-8

2. Elmadfa I, Meyer A, Nowak V et al (2009) European nutrition and health report 2009. Forum Nutr 62:1-405. doi: 10.1159/000242367
3. Lien N, Lytle LA, Klepp KI (2001). Stability in consumption of fruit, vegetables, and sugary foods in a cohort from age 14 to age 21. Prev Med 33:217-226. doi: 10.1006/pmed.2001.0874
4. Slavin JL, Lloyd B (2012) Health benefits of fruits and vegetables. Adv Nutr 3:506–516. doi: 10.3945/an.112.002154
5. Appleton KM, Hemingway A, Saulais L et al (2016) Increasing vegetable intakes: rationale and systematic review of published interventions. Eur J Nutr 55:869-896. doi: 10.1007/s00394-015-1130-8
6. Mooney E, Farley H, Strugnell C (2004) Dieting among adolescent females - some emerging trends. Int J Cons Stud 28:347–354. doi: 10.1111/j.1470-6431.2004.00392.x
7. Poelman AAM, Delahunty CM, de Graaf C (2015) Vegetable preparation practices for 5–6 years old Australian children as reported by their parents; relationships with liking and consumption. Food Qual Prefer 42:20–26. doi: 10.1016/j.foodqual.2015.01.005
8. Peltzer K, Pengpid S (2010) Fruits and vegetables consumption and associated factors among in-school adolescents in seven African countries. Int J Public Health 55:669-678. doi: 10.1007/s00038-010-0194-8.
9. Middlestadt SE, Lederer AM, Smith NK et al (2013) Determinants of middle-school students asking parents for fruits and vegetables: a theory-based salient belief elicitation. Public Health Nutr 16: 1971–1978. doi: 10.1017/S1368980012004557
10. Thaler RH, Sunstein CR (2008) Nudge: Improving decisions about health, wealth, and happiness. Yale University Press, New Haven
11. Quest M, Needham D (2008). British Hospitality; trends and developments 2008. British Hospitality Association, London
12. Skov LR, Lourenço S, Hansen GL et al (2013) Choice architecture as a means to change eating behaviour in self-service settings: a systematic review. Obes Rev 14:187-196. doi: 10.1111/j.1467-789X.2012.01054.x.
13. Hansen PG, Skov LR, Skov KL (2016). Making healthy choices easier: regulation versus nudging. Annu Rev Public Health 18:237-251. doi: 10.1146/annurev-publhealth-032315-021537
14. Bucher T, Collins C, Rollo ME et al (2016) Nudging consumers towards healthier choices: a systematic review of positional influences on food choice. Br J Nutr 115:2252–2263. doi: 10.1017/S0007114516001653
15. Kongsbak I, Skov LR, Nielsen BK et al (2016) Increasing fruit and vegetable intake among male university students in an ad libitum buffet setting: a choice architectural nudge intervention. Food Qual Prefer 49:183-188. doi: 10.1016/j.foodqual.2015.12.006

16. Broers VJV, De Breucker C, Van den Broucke S et al (2017). A systematic review and meta-analysis of the effectiveness of nudging to increase fruit and vegetable choice. Eur J Public Health [Epub ahead of print]. doi: 10.1093/eurpub/ckx085
17. Nørnberg TR, Houlby L, Skov LR et al (2016) Choice architecture interventions for increased vegetable intake and behaviour change in a school setting: a systematic review. Perspect Public Health 136:132-142. doi: 10.1177/1757913915596017
18. Kleinert S, Horton R (2015) Rethinking and reframing obesity. Lancet 385:2326-2328. doi: 10.1016/S0140-6736(15)60163-5
19. Friis R, Skov LR, Olsen A et al (2017) Comparison of three nudge interventions (priming, default option, and perceived variety) to promote vegetable consumption in a self-service buffet setting. PLoS One 12:e0176028. doi: 10.1371/journal.pone.0176028
20. Lachat C, Naska A, Trichopoulou A et al (2010) Essential actions for caterers to promote healthy eating out among European consumers: results from a participatory stakeholder analysis in the HECTOR project. Public Health Nutr 14 (2):193-202. doi:10.1017/S1368980010002387
21. Ominchanski L (1992) The Centre for Health Promotion and Wellness MIT Medical. You count, calories don't. https://medical.mit.edu/sites/default/files/hunger_scale.pdf. Accessed 12 July 2017
22. Martínez-González MA, García-Arellano A, Toledo E et al (2012) A 14-Item Mediterranean Diet Assessment Tool and Obesity Indexes among High-Risk Subjects: The PREDIMED Trial. *PLOS One* **7**, e43134. doi: 10.1371/journal.pone.0043134
23. Bach-Faig A, Berry EM, Lairon D *et al.* (2011) Mediterranean diet pyramid today. Science and cultural updates. Public Health Nutr 14, 2274-2284. doi: 10.1017/S1368980011002515.
24. Pliner P, Hobden K (1992) Development of a scale to measure the trait of food neophobia in humans. Appetite 19:105-120. doi: 10.1016/0195-6663(92)90014-W
25. Dolan P, Hallsworth M, Halpern D et al (2012) Influencing behaviour: the mindspace way. J Econ Psychol 33:264–277. doi: 10.1016/j.joep.2011.10.009
26. Ajzen, I. (1991) The theory of planned behavior. Organ Behav Hum Decis Process *50*:179-211. doi:https://doi.org/10.1016/0749-5978(91)90020-T
27. Steptoe A, Pollard, Wardle J (1995) Development of a measure of the motives underlying the selection of food: the food choice questionnaire. Appetite 25: 267-284. doi: 10.1006/appe.1995.0061
28. Schwartz SH (2003). A proposal for measuring value orientations across nations. Chapter 7 in the Questionnaire Development Report of the European Social Survey. https://www.europeansocialsurvey.org/docs/methodology/core_ess_questionnaire/ESS_core_questionnaire_human_values.pdf. Accessed 27 August 2017

29. Schwartz SH (2009) Draft user's manual: Proper use of the Schwartz value survey, version 14, January 2009, compiled by Romie F Littrell. Auckland, New Zealand: Centre for Cross Cultural Comparisons. http://www.crossculturalcentre. homestead.com. Accessed 26 August 2017
30. Nørnberg TR, Skov LR, Houlby L et al (2016) Attitudes and acceptability of behavior change techniques to promote healthy food choices among Danish adolescents. Fam Consum Scienc Res J 44:264-279. doi: 10.1111/fcsr.12142
31. Higgs S, Thomas J (2016) Social influences on eating. Curr Opin Behav Sci 9:1-6.
32. Manan HA (2016) The Hierarchical Influence of Personal Values on Attitudes Toward Food and Food Choices. Procedia Economics and Finance 37 (Supplement C):439-446. doi:https://doi.org/10.1016/S2212-5671(16)30149-6
33. Bere E, Brug J, Klepp K-I (2008) Why do boys eat less fruit and vegetables than girls? Public Health Nutr *11*:321-325. doi:10.1017/S1368980007000729
34. Rasmussen M, Krølner R, Klepp K-I et al (2006) Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part I: quantitative studies. Int J Behav Nutr Phys Act *3*:22. doi:10.1186/1479-5868-3-22
35. Peduzzi P, Concato J, Kemper E et al (1996) A simulation study of the number of events per variable in logistic regression analysis. J Clin Epidemiol 49:1373-1379. doi: 10.1016/S0895-4356(96)00236-3
36. Holmes, L (2016) The intangible appeal of "natural": growing consumer interest in an unregulated product label. Euromonitor International. http://blog.euromonitor.com/2016/11/intangible-appeal-natural-growing-consumer-interest-unregulated-product-label.html. Accessed 30 November 2017.
37. Franca LR, Dautzenberg B, Reynaud M (2010) Heavy episodic drinking and alcohol consumption in French colleges: the role of perceived social norms. Alcohol Clin Exp Res 34:164–174. doi: 10.1111/j.1530-0277.2009.01078.x.
38. Fisher TD (2009) The impact of socially conveyed norms on the reporting of sexual behavior and attitudes by men and women. J Exp Soc Psychol 45:567–572. doi.org/10.1016/j.jesp.2009.02.007
39. Christie CD, Chen FS (2018) Vegetarian or meat? Food choice modeling of main dishes occurs outside of awareness. Appetite 121 (Supplement C):50-54. doi:https://doi.org/10.1016/j.appet.2017.10.036
40. Conner TS, Thompson LM, Knight RL et al (2017) The Role of Personality Traits in Young Adult Fruit and Vegetable Consumption. Front Psychol 8:119. doi:10.3389/fpsyg.2017.00119
41. Fischer,O (2015) Masculinity and Meat Consumption-Historical Approchaes to a Current Health Issue, Medizinhist Journal 50:42-65
42. Diethelm K, Jankovic N, Moreno LA et al (2012) Food intake of European adolescents in the light of different food-based dietary guidelines: results of the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) Study. Public Health Nutr 15:386–398. doi: 10.1017/S1368980011001935

43. Neumark-Sztainer D, Story M, Perry C et al (1999) Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. J Am Diet Assoc 99:929-937. doi: 10.1016/S0002-8223(99)00222-9

44. Schröder M, Lyon P (2013) Embedding healthy eating: nudging or toolbox? Nutr Food Sci 43:330-338. doi: 10.1108/NFS-03-2012-0028

45. Larson NI, Neumark-Sztainer DR, Hannan PJ et al (2007) Family meals during adolescence are associated with higher diet quality and healthful meal patterns during young adulthood. J Am Diet Assoc 107:1502-1510. doi: 10.1016/j.jada.2007.06.012

46. Ronteltap A, Sijtsema SJ, Dagevos H et al (2012) Construal levels of healthy eating: exploring consumers' interpretation of health in the food context. Appetite 3:333-340. doi: 10.1016/j.appet.2012.05.023

Figure 1: How the dishes were presented in Control and Intervention groups

Control

Meat balls with tomato sauce and pasta

Veggie balls with tomato sauce and pasta

Fish cakes with tomato sauce and pasta

Intervention

Meat balls with tomato sauce and pasta

DISH OF THE DAY:

Veggie balls with tomato sauce and pasta

Fish cakes with tomato sauce and pasta

611 **Table 1**: Socio-demographic characteristics of adolescents by country

	Denmark (n=84)	**France (n=107)**	**Italy (n=85)**	**UK (n=84)**
Sex (% female)	48.8	48.7	40.0	45.7
Age (years)				
Mean (Standard Deviation)	14.8 (0.85)	17.1 (1.17)	15.4 (0.87)	17.1 (0.96)
Range	13-17	16-19	14-16	16-19
Frequency of eating out (not considering school canteen) (%)				
Never	9.8	3.5	12.0	11.0
Once a week or less	58.5	37.2	56.0	53.0
2-days a week	23.2	15.0	24.0	21.0
3-4 days a week	2.4	20.4	8.0	10.0
Everyday	6.1	23.9	0.0	5.0
Frequency of eating in canteen (%)				
Never	33.0	27.4	59.5	26.0
Once a week or less	22.0	11.5	38.1	37.0
2-days a week	11.0	13.3	1.2	16.0
3-4 days a week	16.0	25.7	1.2	16.0
Everyday	18.0	22.1	0.0	5.0

612

613

614

615

616

617

618

619

620

621

Table 2: Proportional comparison with (%) of choice of dish between intervention and control groups in adolescents by country

Country	Choice of Dish	Intervention	Control	P value
	Meat balls	28 (77.8)	34 (72.0)	
Denmark (n=84)	Veggie balls	4 (11.0)	7 (15.0)	0.80
	Fish cakes	5 (11.2)	6 (13.0)	
France (n=107)	Meat balls	44 (73.4)	41 (77.4)	
	Veggie balls	8 (13.3)	5 (9.4)	0.80
	Fish cakes	8 (13.3)	7 (13.2)	
Italy (n=85)	Meat balls	28 (66.7)	26 (62.0)	
	Veggie balls	8 (19.0)	7(17.0)	0.69
	Fish cakes	6 (14.3)	9 (21.0)	
UK (n=84)	Meat balls	21 (50.0)	22 (56.5)	
	Veggie balls	8 (19.0)	4 (10.2)	0.53
	Fish cakes	13 (31.0)	13 (33.3)	

*Statistically significant at $p<0.05$ (Pearson's Chi-square).

640 **Table 3**: Means and CI for scales and dimensions used in the study

Variables (mean and CI)	Denmark (n=84)	France (n=107)	Italy (n=85)	UK (n=84)
Attitudes towards nudging	26.9 (25.0; 28.8)	27.8 (26.7; 28.8)	27.8 (26.5;28.9)	29.5 (28.0; 31.7)
Food Neophobia	39.8 (38.6; 41.1)	40.6 (39.6; 41.7)	38.4 (36.8;39.9)	40.0 (38.5; 41.8)
Adherence to Mediterranean diet	6.7 (6.5; 7.1)	6.8 (6.4; 7.2)	6.8 (6.4; 7.1)	6.8 (6.5; 7.3)
Social Norms	10.9 (10.6; 11.6)	10.5 (10.0; 10.9)	9.6 (9.1; 10.1)	10.2 (9.7; 10.8)
Self-estimated health	12.2 (11.8; 12.9)	11.9 (11.4; 12.4)	11.1 (10.6; 11.6)	12.3 (11.9; 13.0)
Food Choice Questionnaire Dimensions				
Health	2.8 (2.6; 2.9)	2.7 (2.6; 2.8)	2.7 (2.6; 2.8)	2.8 (2.7; 2.9)
Mood	2.6 (2.5; 2.7)	2.5 (2.4; 2.6)	2.7 (2.6; 2.9)	2.7 (2.6; 2.8)
Sensory	3.1 (3.0; 3.2)	3.1 (3.0; 3.2)	2.9 (2.7; 3.1)	3.2 (3.1; 3.3)
Convenience	2.4 (2.6; 2.8)	2.5 (2.4; 2.6)	2.7 (2.5; 2.8)	2.4 (2.2; 2.6)
Natural	2.5 (2.3; 2.6)	2.4 (2.3; 2.6)	2.7 (2.5; 2.9)	2.5 (2.3; 2.7)
Price	2.3 (2.2; 2.5)	2.5 (2.3; 2.6)	2.6 (2.4; 2.8)	2.8 (2.6; 2.9)
Weight	2.1 (2.0; 2.3)	2.0 (1.8; 2.1)	2.7 (2.6; 2.9)	2.3 (2.1; 2.5)
Familiarity	2.0 (1.8; 2.1)	1.9 (1.7; 2.0)	2.4 (2.2; 2.6)	2.2 (2.0; 2.4)
Human Values Dimensions				
Conformity	3.2 (3.0; 3.5)	3.6 (3.4; 3.8)	3.5 (3.2; 3.7)	3.6 (3.1; 3.7)
Tradition	3.1 (2.9; 3.3)	3.3 (3.1; 3.6)	3.0 (2.7; 3.2)	3.0 (2.8; 3.3)
Benevolence	2.0 (1.8; 2.2)	2.0 (1.9; 2.2)	2.4 (2.1; 2.7)	2.1 (1.9; 2.4)
Universalism	2.3 (2.1; 2.5)	2.5 (2.3; 2.7)	2.6 (2.4; 2.8)	2.4 (2.2; 2.6)
Self -direction	2.4 (2.2; 2.6)	2.1 (1.9; 2.3)	2.2 (1.9; 2.4)	2.4 (2.2; 2.6)
Stimulation	2.6 (2.3; 2.8)	2.3 (2.1; 2.5)	2.4 (2.1; 2.6)	2.4 (2.2; 2.6)
Hedonism	2.4 (2.2; 2.6)	1.8 (1.6; 1.9)	2.8 (2.5; 3.1)	2.5 (2.2; 2.7)
Achievement	2.8 (2.6; 3.0)	2.6 (2.4; 2.8)	3.0 (2.8; 3.3)	2.4 (2.2; 2.7)
Power	3.6 (3.3; 3.8)	3.6 (3.3; 3.8)	4.0 (3.7; 4.2)	3.4 (3.2; 3.6)
Security	4.2 (3.9; 4.4)	3.4 (3.2; 3.6)	4.1 (3.8; 4.3)	4.3 (4.0; 4.5)

641

642

643

644

645

646

647

648

649

650 **Table 4:** Odds ratios and 95% CI for univariate logistic regression using each dimension of Food Choice
651 Questionnaire and of Human Values Scale associated with participants' choice of vegetable-based dish for
652 all 360 participants**.**

Dimensions	Estimate	OR for vegetable-based dish	95% CI	P value
Food Choice Questionnaire				
Convenience	-0.23	0.78	(0.52; 1.17)	0.24
Sensory	-0.03	0.96	(0.59; 1.57)	0.88
Natural	0.99	2.71	(1.78; 4.12)	0.01*
Mood	0.16	1.18	(0.78; 1.78)	0.42
Health	1.19	3.30	(1.90; 5.73)	0.01*
Price	0.07	1.07	(0.74; 1.55)	0.82
Weight	0.50	1.64	(1.14; 2.37)	0.01*
Familiarity	-0.04	0.95	(0.66; 1.38)	0.81
Human Values Scale				
Security	0.17	1.18	(0.86; 1.62)	0.28
Universalism	0.30	1.35	(0.89; 2.05)	0.15
Power	-0.30	0.74	(0.56: 0.97)	0.03*
Hedonism	-0.01	0.98	(0.96; 1.00)	0.17
Achievement	-0.01	0.98	(0.96; 1.01)	0.15
Stimulation	0.08	1.08	(0.76; 1.55)	0.64
Self-direction	-0.13	0.87	(0.57; 1.33)	0.53
Tradition	-0.14	0.86	(0.61; 1.20)	0.39
Conformity	0.05	1.05	(0.77: 1.44)	0.72
Benevolence	0.09	1.10	(0.72; 1.66)	0.65

653 *Statistically significant (P < 0.05); OR=odds ratios
654
655

656

657 **Table 5**: Odds ratios and 95% CI in multivariate logistic regression model associated with participants'
658 choice of vegetable-based dish for all 360 participants.

Variables	Estimate	OR for vegetable-based dish	95% CI	P value
Natural dimension	0.66	1.94	(1.16; 3.23)	0.01
Social Norms	0.16	1.16	(1.01; 1.34)	0.03
Gender‡	-0.82	0.43	(0.22; 0.85)	0.02
Attitudes towards nudging	0.06	1.05	(1.01; 1.10)	0.03

659 ‡ Reference category: Female; OR=odds ratio
660

661

662

663 **APPENDIX 1:** Questionnaire 1

VeggIEAT

ID Number: _____

We are very pleased to welcome you to our study!

Before choosing your meal, please answer these few questions:

You are: ( ) Male ( ) Female

Do you consider yourself to be a vegetarian/vegan? ( ) No ( ) Yes _____

Could you tell us, how hungry do you feel now? (Please, circulate a number)

Please, do not hesitate in contacting us if you have any question.

664

665 **APPENDIX 2:** Questionnaire 2

VeggIEAT

ID Number: _____

This questionnaire is designed to know a little about your personal characteristics. Please take a few minutes to answer the following questions. Do not hesitate in contacting us if you have any questions.

1. Which main dish did you choose?

( ) Meat balls ( ) Veggie balls ( ) Fish cakes

2. Please, circle the face that mostly nearly describes how much did you like the dish:

Don't like it at all. Don't like it. Don't know. Like it. Like it very much.

3. How often do you usually eat out each week?

( ) Never
( ) Once a week or less
( ) 2 days a week
( ) 3-4 days a week
( ) Everyday

3b. How often do you usually eat in the college canteen each week?

( ) Never
( ) Once a week or less
( ) 2 days a week
( ) 3-4 days a week
( ) Everyday

4. Please, choose according your food habits:

In my house, olive oil is used for cooking	**( ) Yes**	**( ) No**
I consume more than 2 tablespoons of olive oil per day (for cooking + addition in salads)	( ) Yes	( ) No
I eat 2 or more cups of vegetables per day (including raw vegetables)	**( ) Yes**	**( ) No**
I eat 3 or more fruits per day (including fresh juices)	( ) Yes	( ) No
I eat 1 or more pieces of red meat (including sausages) per day	**( ) Yes**	**( ) No**
I eat 2 or more teaspoons of butter per day	( ) Yes	( ) No
I drink less than 1 glass of soft drinks per day	**( ) Yes**	**( ) No**
I eat more than 3 cups of pulses (e.g. beans, peas, lentils) per week	( ) Yes	( ) No
I eat fish 3 or more times per week	**( ) Yes**	**( ) No**
I eat sweets, confectionery and candies less than 3 times a week	( ) Yes	( ) No
I eat dried fruits one or more times per week	**( ) Yes**	**( ) No**
I prefer eating chicken than beef or sausages	( ) Yes	( ) No
I eat pasta, rice and other cereals 2 or more times per week	**( ) Yes**	**( ) No**

666

5. Could you indicate what occasions you usually consume this type of food in?

	Any day	Weekend or Special occasions	Alone	With family or friends	At home	Outside home	Do not consume
Milk and dairy products	( )	( )	( )	( )	( )	( )	( )
Meat (beef, pork, lamb, chicken)	( )	( )	( )	( )	( )	( )	( )
Processed meat (sausages, bacon)	( )	( )	( )	( )	( )	( )	( )
Fish and seafood	( )	( )	( )	( )	( )	( )	( )
Vegetables	( )	( )	( )	( )	( )	( )	( )
Fruits and fresh juices	( )	( )	( )	( )	( )	( )	( )
Bread or cereals	( )	( )	( )	( )	( )	( )	( )
Potatoes, rice and pasta	( )	( )	( )	( )	( )	( )	( )
Sweets, snacks, confectionary	( )	( )	( )	( )	( )	( )	( )
Soft drinks	( )	( )	( )	( )	( )	( )	( )
Peanuts and other nuts	( )	( )	( )	( )	( )	( )	( )

6. Please, could you indicate the level of importance you assign to each of these food characteristics?

It is important to me that the food I eat on a typical day:	Not at all important 1	A little important 2	Moderately important 3	Very important 4
Tastes good	( )	( )	( )	( )
Is nutritious	( )	( )	( )	( )
Takes no time to prepare	( )	( )	( )	( )
Contains natural ingredients	( )	( )	( )	( )
Smells nice	( )	( )	( )	( )
Is low in calories	( )	( )	( )	( )
Is familiar	( )	( )	( )	( )
Is easy to prepare	( )	( )	( )	( )
Contains no additives	( )	( )	( )	( )
Is not expensive	( )	( )	( )	( )
Helps me control my weight	( )	( )	( )	( )
Helps me relax	( )	( )	( )	( )
Is high in fibre and roughage	( )	( )	( )	( )
Contains no artificial ingredients	( )	( )	( )	( )
Makes me feel good	( )	( )	( )	( )
Can be cooked very simply	( )	( )	( )	( )
Is like the food I ate when I was a child	( )	( )	( )	( )
Keeps me healthy	( )	( )	( )	( )
Cheers me up	( )	( )	( )	( )
Helps me to cope with life	( )	( )	( )	( )
Is low in fat	( )	( )	( )	( )
Contains a lot of vitamins and minerals	( )	( )	( )	( )
Is cheap	( )	( )	( )	( )
Has a pleasant texture	( )	( )	( )	( )

667

7. Here we briefly describe some people. Please read each description and think about how much each person *is* or *is not* like you, and tick the correspondent boxes:

	How much is this person like you?					
	Very much like me	Like me	Some-what like me	A little like me	Not like me	**Not like me at all**
	1	**2**	**3**	**4**	**5**	**6**
1. Thinking up new ideas and being creative is important to him/her. He/she likes to do things in her own original way	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
2. It is important to him/her to be rich. He/she wants to have a lot of money and expensive things	( )	( )	( )	( )	( )	( )
3. He/she thinks it is important that every person in the world be treated equally. He/she believes everyone should have equal opportunities in life	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
4. It's very important to him/her to show his/her abilities. He/she wants people to admire what he/she does	( )	( )	( )	( )	( )	( )
5. It is important to him/her to live in secure surroundings. He/she avoids anything that might endanger his/her safety	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
6. He/she likes surprises and is always looking for new things to do. He/she thinks it's important to do lots of different things in life	( )	( )	( )	( )	( )	( )
7. He/she believes that people should do what they're told, and thinks people should follow rules at all times, even when no-one is watching	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
8. It is important to him/her to listen to people who are different from him/her. Even when he/she disagrees with them, he/she still wants to understand them	( )	( )	( )	( )	( )	( )
9. It is important to him/her to be humble and modest. He/she tries not to draw attention to herself	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
10. Having a good time is important to him/her. He/she likes to "spoil" him/herself	( )	( )	( )	( )	( )	( )
11. It is important to him/her to make his/her own decisions about what he/she does. He/she likes to be free and not depend on others	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
12. It's very important to him/her to help the people around him/her. He/she wants to care for their well-being	( )	( )	( )	( )	( )	( )
13. Being very successful is important to him/her. He/she hopes people will recognize his/her achievements	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
14. It is important to him/her that the government insure his/her safety against all threats. He/she wants the state to be strong so it can defend its citizens	( )	( )	( )	( )	( )	( )
15. He/she looks for adventures and likes to take risks. He/she wants to have an exciting life	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
16. It is important to him/her always to behave properly. He/she wants to avoid doing anything people would say is wrong	( )	( )	( )	( )	( )	( )
17. It is important to him/her to be in charge and tell others what to do. He/She wants people to do what he/she says	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
18. It is important to him/her to be loyal to his/her friends. He/she wants to devote herself to people close to him/her	( )	( )	( )	( )	( )	( )
19. He/she strongly believes that people should care for nature. Looking after the environment is important to him/her	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**
20. Tradition is important to him/her. He/she tries to follow the customs handed down by his/her religion or his/her family	( )	( )	( )	( )	( )	( )
21. He/she seeks every chance he/she can to have fun. It is important to him/her to do things that give him/her pleasure	**( )**	**( )**	**( )**	**( )**	**( )**	**( )**

668

8. How much do you agree or disagree with the following statements about trying new or different foods?

	Disagree strongly 1	2	3	4	5	6	Agree strongly 7
I am constantly sampling new and different foods	( )	( )	( )	( )	( )	( )	( )
I don't trust new foods	( )	( )	( )	( )	( )	( )	( )
If I don't know what is in a food, I won't try it	( )	( )	( )	( )	( )	( )	( )
I like foods from different countries	( )	( )	( )	( )	( )	( )	( )
Ethnic food looks too weird to eat	( )	( )	( )	( )	( )	( )	( )
At dinner parties, I will try a new food	( )	( )	( )	( )	( )	( )	( )
I am afraid to eat things I have never had before	( )	( )	( )	( )	( )	( )	( )
I am very particular about the foods I will eat	( )	( )	( )	( )	( )	( )	( )
I will eat almost anything	( )	( )	( )	( )	( )	( )	( )
I like to try new ethnic restaurants	( )	( )	( )	( )	( )	( )	( )

9. How much do you agree or disagree with the following statements about your buffet habits?

	Disagree strongly 1	2	3	4	Agree strongly 5
View the entire selection before selecting what to take on their plate	( )	( )	( )	( )	( )
Follow the line and decide what to take as the dishes are presented	( )	( )	( )	( )	( )
Take vegetables or salad and then the other dishes	( )	( )	( )	( )	( )
Take meat and then the other dishes	( )	( )	( )	( )	( )
Take pasta, rice, and potatoes first and then the other dishes	( )	( )	( )	( )	( )

10. How much do you agree or disagree with the following statements about your habits?

	Disagree strongly 1	2	3	4	Agree strongly 5
Think I am healthier compared to others with my age	( )	( )	( )	( )	( )
Eat healthier than others with my age	( )	( )	( )	( )	( )
Would like to lose weight	( )	( )	( )	( )	( )
Eat more vegetables than most people at my age	( )	( )	( )	( )	( )
My friends eat vegetables every day	( )	( )	( )	( )	( )
My mom and dad eat vegetables every day	( )	( )	( )	( )	( )
My parents encourage me to eat vegetables every day	( )	( )	( )	( )	( )

669

11. How much do you agree or disagree with the following statements about you?

	Not at all true 1	Hardly true 2	Moderately true 3	Exactly true 4
I can always manage to solve difficult problems if I try hard enough	( )	( )	( )	( )
If someone opposes me, I can find the means and ways to get what I want	( )	( )	( )	( )
It is easy for me to stick to my aims and accomplish my goals.	( )	( )	( )	( )
I am confident that I could deal efficiently with unexpected events	( )	( )	( )	( )
Thanks to my resourcefulness, I know how to handle unforeseen situations	( )	( )	( )	( )
I can solve most problems if I invest the necessary effort	( )	( )	( )	( )
I can remain calm when facing difficulties because I can rely on my coping abilities	( )	( )	( )	( )
When I am confronted with a problem, I can usually find several solutions	( )	( )	( )	( )
If I am in trouble, I can usually think of a solution	( )	( )	( )	( )
I can usually handle whatever comes my way	( )	( )	( )	( )

12. How much do you agree or disagree with the following statements:

	Disagree strongly 1	2	3	4	Agree strongly 5
I think it would be acceptable if the canteen used celebrities to inform me about health related to eating vegetables	( )	( )	( )	( )	( )
I think it would be acceptable if the canteen held a competition where the winner would be the one with the largest vegetable intake in 1 week	( )	( )	( )	( )	( )
I think it would be acceptable if the canteen made scare campaigns to get me to eat more vegetables, e.g., by showing examples of diseases caused by low vegetable intake	( )	( )	( )	( )	( )
I think it would be acceptable if the canteen informed me about how many vegetables I eat compared to my friends and classmates	( )	( )	( )	( )	( )
I think it would be acceptable if the canteen automatically gave me a green salad with my lunch in order to get me to eat more vegetables if I easily could choose not to take it	( )	( )	( )	( )	( )
I think it would be acceptable if the canteen had posters with simple and easy tips on how I could eat more vegetables to get me to eat healthier	( )	( )	( )	( )	( )
I think it would be acceptable if the staff in the canteen asked me if I wanted more vegetables when buying my lunch	( )	( )	( )	( )	( )
I think it would be acceptable to change the names of the dishes in the canteen so the dishes containing many vegetables would sound more appealing and make me want to choose them	( )	( )	( )	( )	( )
I think it is acceptable if the college encouraged me to sign up for a "6 a day" or "I love vegetables" club to make me feel obligated to eat more vegetables	( )	( )	( )	( )	( )
I think it would be acceptable the canteen had posters showing happy and popular teenagers eating vegetables and a lonely and sad teenager eating unhealthy food to make me feel like eating more vegetables	( )	( )	( )	( )	( )

Thank you very much for your time!

670