

Industry-Academia Partnership and Pathways (IAPP)

Grant agreement No: 2013-612326

*DELIVERABLE Work Package 5*

**D5.1 Production of model mapping determinants of vegetable acceptability through sensory characteristics and choice architecture**

Lead Contractors for the D5.1

University of Copenhagen

University of Florence

Final report

August 2017

**ACKNOWLEDGEMENT**

The authors gratefully acknowledge the European Community’s financial support under the Seventh Framework Programme’s Marie Curie Actions Fellowships specifically the Industry Academia Partnerships and Pathways (VeggiEAT IAPP Project No. 612326).

**DISCLAIMER**

The views expressed in this publication are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of the information. The information in this document is provided as it is and no guarantee or warranty is given that the information is fit for any particular purpose. The user thereof uses the information at its sole risk and liability.

**Investigators (VeggiEat Team)**

- Denmark (DK) - WP Leader: Armando Pérez-Cueto, Quenia dos Santos, Xiao Zhou, Bárbara Nogueira

- France (FR): Agnès Giboreau, Laure Saulais, Laurence Depezay

- Italy (IT): Erminio Monteleone, Caterina Dinnella

- United Kingdom (UK): Heather Hartwell, Katherine Appleton, Ann Hemingway, Vanessa Mello Rodrigues, Carmen Martins

**Partners in alphabetic order**

- Bonduelle (Lille – FR)

- Bournemouth University (Bournemouth – UK)

- Institut Paul Bocuse (Lyon – FR)

- University of Copenhagen (Copenhagen – DK)

- University of Florence (Florence – IT)

Table of Contents

[PREFACE 4](#_Toc494361640)

[EXECUTIVE SUMMARY 5](#_Toc494361641)

[Modelling vegetable based dish choices through choice architecture and sensory characteristics 7](#_Toc494361642)

[INTRODUCTION 7](#_Toc494361643)

[METHODS 9](#_Toc494361644)

[Study Design 10](#_Toc494361645)

[Sample size Calculation 10](#_Toc494361646)

[Recruitment 10](#_Toc494361647)

[Data collection 12](#_Toc494361648)

[Ethics 12](#_Toc494361649)

[Definition of the variables 12](#_Toc494361650)

[Statistical Analyses 14](#_Toc494361651)

[Modelling the determinants of vegetable acceptability through choice architecture 14](#_Toc494361652)

[Modelling the determinants of vegetable acceptability through sensory characteristics 15](#_Toc494361653)

[RESULTS 15](#_Toc494361654)

[GENERAL DESCRIPTION OF ADOLESCENTS 15](#_Toc494361655)

[RESULTS FOR MODELLING VEGETABLES ACCEPTABILITY THROUGH CHOICE ARCHITECTURE FOR ADOLESCENTS 17](#_Toc494361656)

[GENERAL DESCRIPTION OF SENIORS 18](#_Toc494361657)

[RESULTS FOR MODELLING VEGETABLES ACCEPTABILITY THROUGH CHOICE ARCHITECTURE FOR SENIORS 19](#_Toc494361658)

[Results for the determinants of vegetable acceptability through sensory characteristics 20](#_Toc494361659)

[DISCUSSION 21](#_Toc494361660)

[CONCLUSION 24](#_Toc494361661)

[REFERENCES 25](#_Toc494361662)

# PREFACE

The research reported here way jointly supported by the European Commission under the Seventh Framework Programme for Support for training and career development of researchers Marie Curie Industry Academia Partnerships and Pathways (IAPP) – VeggiEAT Project No. 612326. The objective of the project is to critically evaluate vegetable acceptability through individual and environmental characteristics across the lifespan in institutional food service. This report refers specifically to the Deliverable D5.1 -WP5 - Production of model mapping determinants of vegetable acceptability through sensory characteristics and choice architecture. The objective of WP 5 was to establish model(s) that will bring together the results from the exposure study and the choice architecture study, and combine in one data set consumer characteristics, foodscape, and other attitudinal factors. All of these were synthesized in model(s) aimed at the identification of the factors that determines vegetable consumption across age groups in canteen settings.

The results contribute to a better understanding about the factors that influence the food choice in both adolescents and seniors. It was seen that the full model including gender; Mediterranean score; food neophobia; self-efficacy; hunger scale and attitudes towards nudging did not show differences in relation to the choice of plant-based dish for seniors. On the other hand, it was found that male adolescents were 67% less likely to choose the plant-based dish and those who scored higher in the nudging scale; were 8% more likely to choose the plant-based dish. Some other factors (from Food Choice Questionnaire, Human Values Scale and Social Norms and self-estimated health) showed association with adolescents and/or seniors. Future studies with larger sample size are needed to try new modelling strategies. University of Copenhagen (KU) coordinated the work, supported by Bonduelle, Bournemouth University, Institut Paul Bocuse and University of Florence. Correspondence should be addressed to Federico J. Armando Pérez-Cueto, University of Copenhagen, Department of Food Science, Rolighedsvej 26, 1958, Frederiksberg C, Denmark. Tel. +45 60 74 33 90. Email: apce@food.ku.dk.

Copenhagen, August, 2017.

# 

# EXECUTIVE SUMMARY

The objective of WP5 was to establish model(s) that will bring together the results from the exposure study and the choice architecture study, and combine in one data set consumer characteristics, foodscape, and other attitudinal factors. All of these were synthesized in model(s) aimed at the identification of the factors that determines vegetable consumption across age groups in canteen settings.

A total of 380 adolescents and 345 elderly citizens from Denmark, France, Italy and United Kingdom participated in this study.

The two questionnaires applied consisted of sociodemographic characteristics and hunger scale (questionnaire 1); food related lifestyle (adherence to Mediterranean Diet, Food Frequency Questionnaire, Food Neophobia, Buffet View); personal values (Human Values Scale, self-efficacy, social norms and self-estimated health) and attitudes towards nudging.

As no differences were found between control and intervention groups in the choice of dish for both adolescents and seniors, this variable was recoded as plant-based dish (VeggiEAT dish) and animal-based dish (meatballs +fish cakes).

Binary logistic regression analyses were used to assess associations between choice of dish (dependent variable: plant-based and animal-based dish) and independent variables. A binary logistic regression model adjusted by gender, Mediterranean score, hunger scale, attitudes towards nudging, self-efficacy and food neophobia was run to check if differences would be found in relation to the outcome (choice of the dish). Additional models with the same purpose were run with social norms scale and self-estimated health; with each dimension of FCQ and with each dimension of the Human Values Scale.

For the full model, including gender; Mediterranean score; food neophobia; self-efficacy, hunger scale and attitudes towards nudging differences were not found in relation to the choice of plant-based dish for seniors. On the other hand, it was found that male adolescents were 67% less likely to choose the plant-based dish and those who scored higher in the nudging scale; were 8% more likely to choose the plant-based dish.

For the Food Choice Questionnaire (FCQ), adolescents who scored higher in the health dimension of FCQ were 112% more likely to choose the plant-based dish. Furthermore, those who scored higher in the natural dimension were 81% more likely to choose the plant-based dish. For seniors, those with higher score in the convenience dimension and with higher score in the sensory dimension were 32% less likely and 90% more likely to choose the plant-based dish, respectively.

The results of the model including each dimension of the Human Values Scale associated with the choice of plant-based dish, showed that adolescents who scored higher in the power dimension were 40% more likely to choose the plant-based dish; and those with higher score in the universalism dimension were 34 % less likely to choose the plant-based dish. For seniors, those with higher score in the security dimension were 43% more likely to choose the plant-based dish. In addition, seniors with a higher score in the universalism dimension of the Humans Value Scale were 40% less likely to choose the plant-based dish.

Finally, adolescents with higher scores in the social norms and self-estimated health were 18% and 20%, respectively, more likely to choose the plant-based dish.

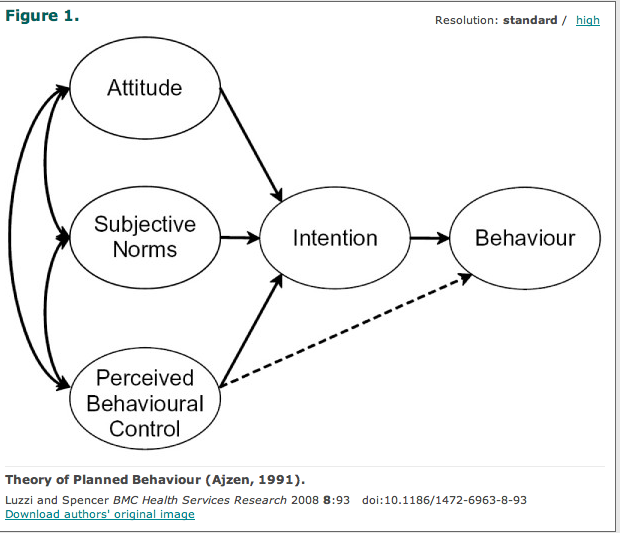
In conclusion, it was observed that different factors seem to drive adolescents and senior citizens in their food choice. It is important that future studies could consider these factors when designing new interventions within these populations.

# Modelling vegetable based dish choices through choice architecture and sensory characteristics

# INTRODUCTION

The determinants of food choice are a complex subject. Hunger is one of the most important determinants, but the food we select daily is not only determined by physiological or nutritional needs. They are influenced by biological determinants (mainly hunger, appetite and taste); economic determinants (cost, income and availability); physical factors such as access to food, education; skills (including cooking) and time available to buy food and prepare meals. Furthermore, social determinants such as culture, family, peers and meal patterns and psychological factors such as mood, stress and guilt also play an important role in the choice of food. Finally, attitudes, beliefs and knowledge about food (what consumers know about food; about a healthy diet and so on) influence food selection (EUFIC, 2006).

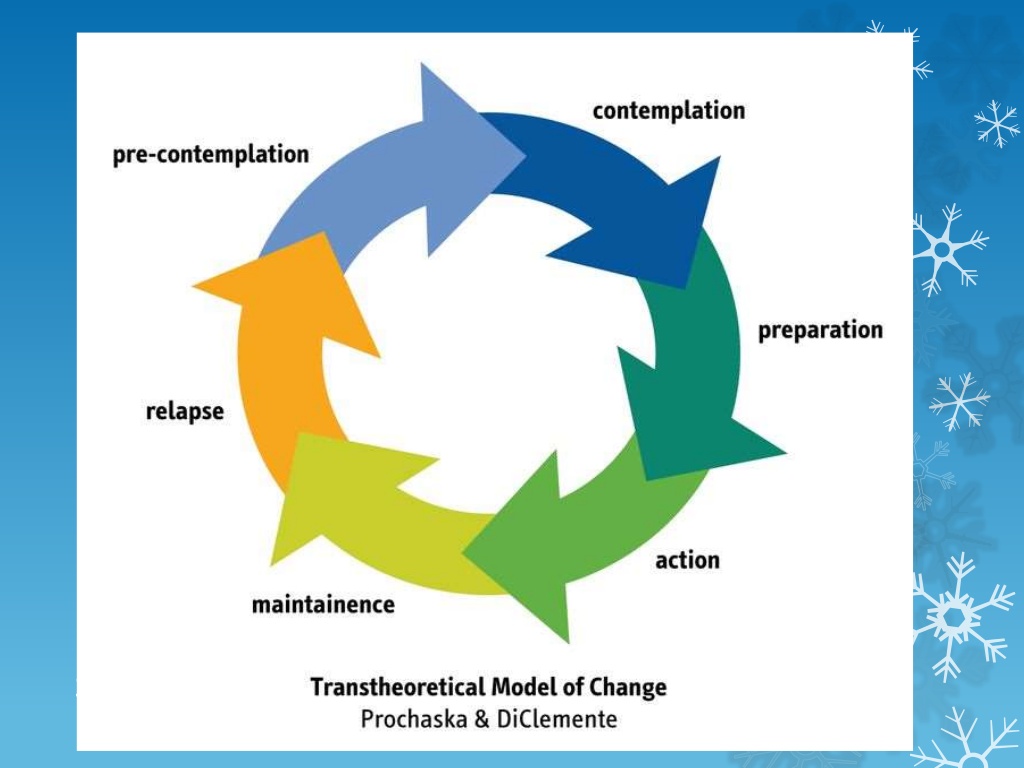
Because of that, interventions to change food intake/ food selection in most cases have limited effectiveness, and only a slight effect on behavior changes was observed. One of the reasons for the lack of impact is related to the theories supporting this type of intervention. Most assume that dietary behaviours are reasoned and based on conscious decisions, as seen in The Theory of Planned Behavior (Figure 1)( Ajzen,1985), Health Behavioral Model (Figure 2)(Rosenstock, 1974) and Transtheoretical Model (Figure 3)( Prochaska & DiClemente, 1994). Yet, dietary behaviors are mainly habitual and occur without conscious effort.



**Figure 1: The Theory of Planned behavior (adopted from *Luzzi and Spencer*(28)).**



**Figure 2: The Health Behavioral Model).**

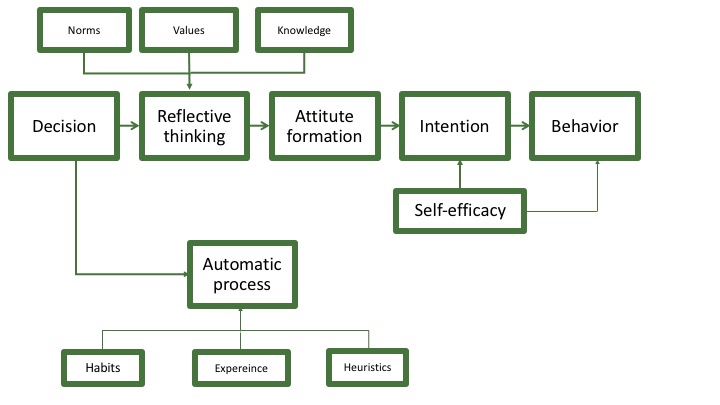


**Figure 3: The Transtheoretical Model, which was developed to understand addiction behavior1.**

1It consists of 5 stages (Pre-contemplation, Contemplation, Preparation, Action, and Maintenance), plus one potential (Relapse).

For the implementation of these interventions globally, less costly population-level interventions are preferable, so that governments and organizations can take action in a bottom-up fashion and achieve better health equity in the long-term.

Innovative interventions such as nudge interventions started to be considered to contribute towards achieving behavioral change. Nudging takes advantage of the Dual Process Theory and its two systems of choice (see Figure 4). This theory presents the new paradigm by including the automatic (unreflective, controlled by instinct and heuristics, often unconscious) and reflective (rational, conscious, and often involving self-awareness) systems(Evans, 2008). Nudging aims to affect the decision making process towards a desirable choice, by exploring the automatic system and hence easing the making of better choices (Skov et al., 2013).



**Figure 4: Decision making process based on Dual Process Theory1.**

1The Dual Process Theory involves a division of the human cognition into two systems: the reflective and automatic system. The reflective system is rational and involves conscious reasoning, while the automatic system is more unreflective and controlled by instinct and heuristics.

Therefore, a nudging intervention was considered for the VeggiEAT study with adolescents and seniors, through “the dish of the day strategy” based on a systematic review of the literature as presented at Section 2 of WP4 report. Unfortunately the results of this nudge were inconclusive and no significant differences were found between control and intervention groups under the study conditions, although subtle population nuances were identified. However, as many factors influence food choice, especially vegetable acceptability, these were included in both WP4 VeggiEAT questionnaires and were also subject of previous VeggiEAT Work Packages. The objective of this Work Package 5 is to map the determinants of vegetable acceptability through sensory characteristics and choice architecture.

# METHODS

This Work Package is part of VeggiEAT, a European project (Denmark, France, Italy and United Kingdom) that aims to develop a platform for predictive modelling of processed vegetable intake taking into account individual characteristics (acceptability, intake level, age groups) as well as environmental cues (choice architecture and institutional setting) and thus increase vegetable consumption in adolescents and seniors (VeggiEAT, 2017). This aim will be achieved through the development of consumer-oriented products (sensory evaluation); the development of recipes for use by institutional food providers (restaurants, canteens, etc.) and the benchmarking of choice architecture facilitating the consumption of vegetables.

In order to increase the consumption of vegetables by adolescents and seniors, a VeggiEAT dish was designed at Institut Paul Bocuse, France, incorporating peas and sweet corn. The development of this dish was based on the sensory determinants of stated liking and actual liking of those vegetables, aiming to produce a tasty dish for the target populations. In Work Package 4, the VeggiEAT dish was tested using the ‘dish of the day` as a nudging strategy as a tentative ‘push’ to promote its consumption by adolescents and senior consumers. However, results showed that there were no significant differences in the choice of the dish between control and intervention groups both for adolescents and seniors, although subtle nuances have been identified.

## Study Design

This study was a quasi-randomised field trial design with random allocation to the intervention or the control situations. It was conducted in a sample of European adolescents (aged 13-17 years-old) and European seniors (aged 65 years-old or more).

## Sample size Calculation

The Sample size was calculated based on the pilot test conducted at the Institute Paul Bocuse (IPB) in November 2015 (Lwanga & Lemeshow, 1991). A minimum of 88 individuals (44 individuals for the control and 44 for the intervention in each country), was needed, based on 80% power and a significance level of 95%.

## Recruitment

#### Denmark

* **ADOLESCENTS**

The recruitment was conducted from 25 of January to 15 of February. The first step was to send an email to all schools with students from 12 to 17 years old in Copenhagen, Denmark, explaining about the VeggiEAT Project and inviting them to participate in our study. Three schools agreed to participate in the VeggiEAT study: Copenhagen International School (CIS), Ørestad Gymnasium and Trekronergade Freinetskole.

Data collection occurred on three occasions, in February, March and April 2017, during lunchtime (Copenhagen International School and Ørestad Gymnasium) and during dinnertime (Trekronergade Freinetskole). For Copenhagen International School, food was prepared and served in the school canteen. For the other two schools, food was prepared in the Gastrolab (Gastronomy laboratory at University of Copenhagen) and served in the Sensory Evaluation Room, at the University.

The ninety-four participants were randomly allocated in control and intervention groups.

* **SENIORS**

The recruitment was conducted through phone calls to the senior centres located inside and outside the Copenhagen area and through emails to the senior consumer panel of the University of Copenhagen**.** Participants over 65 years old were invited to take part in the study. Four data collection points occurred from March to May 2017, during lunchtime. Three senior centres participated in the data collection: Aktivitetscenter Nødager, located in Lejre Commune; Aktivitets- og Frivilligcenter in Solrød Commune and Seniorhuset Korsagergård in Vallensbæk Commune. The last data collection was held at the University of Copenhagen with members from the University food panel. Ninety-seven participants who agreed to participate in the study were randomly allocated for control and intervention groups. Seniors from Vallensbæk were the intervention group (n=49) and seniors from Lejre, Solrød and food panel were the control group (n=48).

#### France

* **ADOLESCENTS**

In France, individuals were invited for the same meal in the same context, the Living Lab of the Institute Paul Bocuse, a real restaurant designed as a platform of data collection.

Choices were made individually from a menu card (prior to seeing the dishes) that indicated the veggie balls as dish of the day for the intervention group. The order of presentation of the dishes on the menu was randomized on each menu card to minimize ordering effects.

Recruitment was conducted via email from the IPB’s internal consumer database, as well as online through social networks ads. Participants came for dinner and completed the survey afterwards. The meal was offered as an incentive to attract respondents. The inclusion criteria, besides meeting the age constraints, was absence of food allergies.

* **SENIORS**

The recruitment followed the same methodology for adolescents, with the exception that the seniors were invited for lunch at IPB.

#### Italy

* **ADOLESCENTS**

The recruitment was conducted in a secondary school located in Firenze, through school personnel. All students aged 14-16 years old were invited to participate. Data collection occurred on one occasion, in May 2017, during lunch time, at the canteen annex to the school ran by the school personnel. The meal consisted of three dishes: first course (risotto with mushrooms), main dish (baked balls served with green salad) and dessert (fruit tart).

The eighty-seven participants who signed up for the study were randomly allocated to control and intervention groups.

* **SENIORS**

The recruitment was conducted through mailing key people responsible for lunch clubs in Florence. Participants over 65 years old were invited to take part in the study. Data collection occurred during May 2017 at lunch time, at the club located in Pian di Mugnone (FI).The meal consisted of three dishes: first course (pasta with fresh tomato sauce), main dish (baked balls served with green salad) and dessert (apple crumble with cream).

The forty-seven participants who signed up for the study were randomly allocated to control and intervention groups.

#### United Kingdom

* **ADOLESCENTS**

The recruitment was conducted in an educational establishment located in Bournemouth, through email and posters. All students aged 16-19 years old were invited to participate. Data collection occurred on three occasions, in January and March 2017, during lunch time, in a canteen run by the Hospitality students from Bournemouth University. The eighty six participants who signed up for the study were randomly allocated to control and intervention groups.

* **SENIORS**

The recruitment was conducted through mailing key people responsible for senior care centres, churches and lunch clubs in Bournemouth. Participants over 65 years old were invited to take part in the study. Data collection occurred on 21 December 2016 during lunch time, at a canteen in Bournemouth University. The eighty seven participants who signed up for the study were randomly allocated for having their meals at two different times, in order to test control and intervention conditions.

## Data collection

Before initiating their meals, each participant was provided with a randomly generated identification number, read and signed a consent form and completed the first questionnaire (WP4). Adolescents, if younger than 16 years old, were also required to provide a form signed by their legal guardian. Each centre was responsible to provide the form in the national language.

The choice architecture intervention employed was to use the “Dish of the Day” as a nudge. Further detail is provided in WP 4 report.

## Ethics

Ethical approval was sought and granted through standard procedures in all countries. Appropriate health and safety considerations, together with a risk assessment protocol, were carried out prior to the commencement of the research. Individual written informed consent was obtained from all individuals. Confidentiality and anonymity were assured at all times.

## Definition of the variables

***Adherence to Mediterranean Diet***

Mediterranean Diet Adherence was assessed using the 14-point Mediterranean Diet Adherence Screener (MEDAS) (Martínez-González et al., 2012) which comprises 12 questions on food consumption frequency and two about food intake habits considered characteristic of the Mediterranean diet. Each question was scored 0 or 1 and in this study, final Mediterranean adherence scores ranged from 0-14.

***Hunger scale***

Hunger was self-rated by the participants prior to the meal, using the 10-point hunger scale (Ominchanski, 1992), which varies from 1 to 10 (1 being extremely hungry and 10 being extremely full).

***Food Neophobia***

Food neophobia was evaluated using the Food Neophobia scale (Pliner & Hobden, 1992). This is a 10-point scale in which a high mean score, calculated by summing 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.

***Attitudes towards Nudging***

This was evaluated by asking about ten hypothetical scenarios so the respondents could relate to the concept of food choice behaviour change interventions (Dolan et al., 2012). 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).

***Self-efficacy scale***

The scale assesses a general sense of perceived self-efficacy with the aim in mind to predict coping with daily hassles as well as adaptation after experiencing all kinds of stressful life events (Schwarzer & Jerusalem, 1995). A high mean score, calculated by summing individual item scores measured on a 4-point Likert scale (ranging from not true at all to exactly true), represents a high self-efficacious person in this 10-point scale.

***Food Choice Questionnaire (FCQ)***

This scale is a multidimensional tool that measures motives related to food choice (Steptoe et al, 1995). 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. 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 around the participant’s mean rating across all values completed as recommended by Schwartz (2009); centring involves subtracting the participant’s overall mean score of values from each of the individual value.

***Social Norms and Self-estimated health***

Nørnberg et al., 2016, applied these scales in a previous study. They are included in question 11 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”

• “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).

## Statistical Analyses

Modelling the determinants of vegetable acceptability through choice architecture

First, a chi-square test was used to check if there was any difference in the choice of dish between control and intervention groups. If no differences were found, the variable choice of dish would be recoded as plant-based dish (VeggiEAT dish) and animal-based dish (meatballs +fish cakes).

Binary logistic regression analyses was used to assess associations between choice of dish (dependent variable: plant-based and animal-based dish) and independent variables. Based on the work of Peduzzi et al., 1996 the maximum number of independent variables to be included in a study depends on sample size and the proportion of positive cases (percentage of people who chose the plant-based dish in this case). In this study, 6 is the maximum number of independent variables allowed for inclusion in a logistic regression model.

Thus, a binary logistic regression model adjusted by gender, Mediterranean score, hunger scale, attitudes towards nudging, self-efficacy and food neophobia was run to check if differences would be found in relation to the outcome (choice of the dish). Additional models with the same purpose were run with social norms scale and self-estimated health; with each dimension of FCQ and with each dimension of Human Values Scale. A *p* value of <0.05 was used to define statistical significance. All analyses were run in SAS 9.4.

Modelling the determinants of vegetable acceptability through sensory characteristics

One additional objective of this Work Package was to explain the determinants of vegetable acceptability through sensory characteristics. For this purpose, we selected the variable “liking of the plant-based dish (veggie balls)” by the respondents that chose the plant-based dish, thus the analysis was restricted to this population. We developed many models in a tentative way to explain the determinants of the liking for the veggie balls.

The liking of the dishwas dichotomized into two categories: final score ≤ 3 indicates low liking and final score ≥4 = high liking. Binary logistic regression analysis was used to assess associations between liking of plant-based dish (dependent variable) and independent variables. Based on the work of Peduzzi et al., 1996 the maximum number of independent variables to be included in a study depends on sample size. In this study, 3 is the maximum number of independent variables allowed for inclusion in a logistic regression model.

Thus, binary logistic regression models were built to find possible determinants of the liking for the plant-based dish. One model adjusted by gender, age group (1= adolescents, 2=elderly) and Mediterranean score; a second model including food neophobia, hunger scale and country and a third model including being or not vegetarian, attitudes towards nudging and self-efficacy scale. A *p* value of <0.05 was used to define statistical significance. All analyses were run in SAS 9.4.

# RESULTS

## GENERAL DESCRIPTION OF ADOLESCENTS

The sociodemographic characteristics of the sample are found in Table 1. In most countries, prevalence of males and females in the sample is around 50%, except in Italy where the prevalence of the male adolescents is slightly higher (60%). Mean age also varies, however it is within the range allowed for our sample (13-19 years old). Denmark is the country with higher prevalence of vegetarians, followed by the United Kingdom, France and Italy. In relation to frequency of eating out, in Denmark, Italy and United Kingdom more than 80% of the adolescents have their meals outside the home up to 2 times a week. In France, a higher proportion of adolescents consume meals outside the home (34% reported eating out from 3-4 days a week up to everyday). A similar scenario was found for eating in a school canteen.

**Table 1**: **Sociodemographic characteristics of adolescents by country**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Denmark (n=94)** | **France**  **(n=112)** | **Italy**  **(n=88)** | **United Kingdom**  **(n=86)** |
| **Sex (% female)** | 48.8 | 50.0 | 40.0 | 48.8 |
| **Age (years)** |  | | | |
| Mean (SD) | 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 |
| **People who declared to be Vegetarian (%)** | 9.6 | 2.7 | 1.7 | 5.8 |
| **Frequency of eating out (%)** |  | | | |
| Never | 10.6 | 3.0 | 13.0 | 10.5 |
| Once a week or less | 57.5 | 38.0 | 55.0 | 52.0 |
| 2-days a week | 23.4 | 14.5 | 24.0 | 22.0 |
| 3-4 days a week | 3.2 | 20.0 | 8.0 | 10.5 |
| Everyday | 5.3 | 14.0 | 0 | 5.0 |
| **Frequency of eating in canteen (%)** |  | | | |
| Never | 32.0 | 27.5 | 50.0 | 25.6 |
| Once a week or less | 24.0 | 11.0 | 38.0 | 36.0 |
| 2-days a week | 13.0 | 13.0 | 1.0 | 16.3 |
| 3-4 days a week | 15.0 | 26.0 | 1.0 | 17.4 |
| Everyday | 16.0 | 22.5 | 0 | 4.7 |

No differences in the choice of the dish between control and intervention groups were found, according to Table 2. Thus, as mentioned previously, the dishes were recoded as “animal-based dish” (meat balls + fish cakes) and ”plant-based dish” (veggie balls) and different models were developed as a tentative approach to predict the reasons people chose the animal-based or plant-based dishes (dependent variable, plant based dish as reference in each model).

**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** |
| Denmark | Meat balls | 30 (67.0) | 33 (67.4) | 0.81 |
| Veggie balls | 11 (24.0) | 10 (20.4) |
| Fish cakes | 4 (9.0) | 6 (12.2) |
| France | Meat balls | 44 (72.0) | 41 (74.0) | 0.94 |
| Veggie balls | 9 (15.0) | 7(13.0) |
| Fish cakes | 8 (13.0) | 7 (13.0) |
| Italy | Meat balls | 28 (65.0) | 26 (62.0) | 0.82 |
| Veggie balls | 8 (19.0) | 7(17.0) |
| Fish cakes | 7 (16.0) | 9 (21.0) |
| United Kingdom | Meat balls | 22 (51.0) | 22 (51.0) | 0.80 |
| Veggie balls | 8 (19.0) | 6 (14.0) |
| Fish cakes | 13 (30.0) | 15 (35.0) |

## RESULTS FOR MODELLING VEGETABLES ACCEPTABILITY THROUGH CHOICE ARCHITECTURE FOR ADOLESCENTS

A model including gender, Mediterranean score, food neophobia scale, self-efficacy scale and hunger scale was run and it was found that male adolescents were 67% less likely to choose the plant-based dish. In addition, adolescents who scored higher in the nudging scale; were 8% more likely to choose the plant-based dish.

**Table 3**: **Odds ratios and 95% CI for the model including all independent variables below associated with the choice of plant-based dish in the final logistic regression model in adolescents**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Estimate** | **OR for plant-based dish** | **95% CI** | **P value** |
| Gender‡ | -1.07 | 0.34 | (0.18; 0.63) | 0.0006 |
| Mediterranean Score | 0.09 | 1.09 | (0.94;1.27) | 0.23 |
| Food Neoophobia | 0.01 | 1.01 | (0.96; 1.06) | 0.58 |
| Attitudes towards nudging | 0.07 | 1.08 | (1.03 ;1.12) | 0.0003 |
| Self-efficacy | -0.01 | 0.98 | (0.93: 1.03) | 0.50 |
| Hunger scale | -0.19 | 0.82 | (0.63; 1.08) | 0.16 |

‡ Reference category: Female

Table 4 shows each dimension of FCQ associated with the choice of plant-based dish. Adolescents who scored higher in the health dimension of FFQ were 112% more likely to choose the plant-based dish. Furthermore, adolescents who scored higher in the natural dimension of FFQ were 81% more likely to choose the plant-based dish.

**Table 4**: **Odds ratios and 95% CI for each dimension of FCQ associated with the choice of plant-based dish in adolescents**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Questions** | **Estimate** | **OR for plant-based dish** | **95% CI** | **P value** |
| Sensory | (1,5,24) | -0.15 | 0.85 | (0.55; 1.32) | 0.47 |
| Health | (2,13,18,22) | 0.75 | 2.12 | (1.19; 3.77) | 0.01 |
| Natural | (4, 9, 14) | 0.59 | 1.81 | (1.17; 2.79) | 0.007 |
| Convenience | (3,8,16) | -0.28 | 0.75 | (0.52; 1.07) | 0.11 |
| Mood | (12, 15, 19, 20) | 0.25 | 1.29 | (0.88; 1.87) | 0.18 |
| Price | (10,23) | -0.01 | 0.99 | (0.70; 1.38) | 0.95 |
| Weight | (6,11,21) | 0.27 | 1.31 | (0.95; 1.82) | 0.09 |
| Familiarity | (7,17) | -0.13 | 0.87 | (0.62; 1.22) | 0.44 |

Table 5 shows the results of binary logistic regressions with each dimension of Humans Values Scale associated with the choice of plant-based dish in adolescents. Adolescents who scored higher in the power dimension were 40% more likely to choose the plant-based dish; and those with a higher score in the universalism dimension were 34 % less likely to choose the plant-based dish.

**Table 5**: **Odds ratios and 95% CI for each dimension of Human-Values scale associated with the choice of plant-based dish in adolescents**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Questions** | **Estimate** | **OR for plant-based dish** | **95% CI** | **P value** |
| Power | (2,17) | 0.33 | 1.40 | (1.07; 1.82) | 0.01 |
| Universalism | (3,8,19) | -0.40 | 0.66 | (0.44; 1.01) | 0.04 |
| Security | (5,14) | -0.13 | 0.87 | (0.66; 1.15) | 0.33 |
| Hedonism | (10,21) | 0.01 | 1.01 | (0.99; 1.04) | 0.10 |
| Achievement | (4,13) | 0,02 | 1.02 | (0.99; 1.04) | 0.10 |
| Stimulation | (6,15) | -0.03 | 0.96 | (0.70; 1.33) | 0.83 |
| Self-direction | (1,11) | 0.07 | 1.08 | (0.74; 1.57) | 0.68 |
| Tradition | (9,20) | 0.10 | 1.11 | (0.82; 1.50) | 0.48 |
| Conformity | (7,16) | -0.02 | 0.97 | (0.73; 1.28) | 0.83 |
| Benevolence | (12,18) | -0.29 | 0.74 | (0.51; 1.08) | 0.12 |

The association between social norms scale and self-estimated heath scale with the choice of plant-based dish is found in Table 6. Adolescents with higher scores in the social norms were 18% more likely to choose the plant-based dish and those with higher scores in the self-estimated health scale were 20% more likely to choose the plant-based dish.

**Table 6: Odds ratios and 95% CI for social norms and self-estimated health associated with the choice of plant-based dish in adolescents**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Estimate** | **OR for plant-based dish** | **95% CI** | **P value** |
|  |  |  |  |  |
| Social Norms | 0.16 | 1.18 | (1.04; 1.34) | 0.01 |
| Self-estimated Health | 0.18 | 1.20 | (1.08; 1.33) | 0.007 |

## GENERAL DESCRIPTION OF SENIORS

Female citizens formed most of our sample (Table 7). Prevalence of vegetarians among seniors was low, being higher in the UK (2.3%). The majority of the individuals eat out once a week or less.

**Table 7: Sociodemographic characteristics of elderly by country**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Denmark (n=97)** | **France**  **(n=114)** | **Italy**  **(n=47)** | **United Kingdom**  **(n=87)** |
| **Sex (% female)** | 67.0 | 60.5 | 55.3 | 62.0 |
| Mean (SD) | 73.9 (6.4) | 71.1 (5.2) | 70.7 (5.9) | 71.5 (4.9) |
| Range | 65-89 | 65-89 | 65-87 | 65-84 |
| **People who declared to be Vegetarian (%)** | 1.0 | 2.0 | 0 | 2.3 |
| **Frequency of eating out (%)** |  | | | |
| Never | 10.3 | 18.1 | 25.5 | 12.7 |
| Once a week or less | 68.0 | 66.4 | 57.4 | 58.6 |
| 2-days a week | 18.6 | 13.8 | 6.4 | 26.4 |
| 3-4 days a week | 3.1 | 0.9 | 6.4 | 2.3 |
| Everyday | 0 | 0.8 | 4.3 | 0 |

No differences in the choice of the dish between control and intervention groups were found, according to Table 2. Thus, as mentioned previously, the dishes were recoded as “animal-based dish” (meat balls + fish cakes) and ”plant-based dish” (veggie balls) and different models were developed as a tentative approach to predict the reasons people chose the animal-based or plant-based dish (dependent variable, plant based dish as reference in each model).

**Table 8**: **Proportional comparison with (%) of choice of dish between intervention and control groups in seniors by country**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Country** | **Choice of Dish** | **Intervention** | **Control** | **P value** |
| Denmark | Meat balls | 21 (42.9) | 18 (37.5) | 0.86 |
| Veggie balls | 12 (24.5) | 13 (27.1) |
| Fish cakes | 16 (32.6) | 17 (35.4) |
| France | Meat balls | 25 (42.0) | 19 (33.0) | 0.31 |
| Veggie balls | 8 (13.0) | 5 (8.0) |
| Fish cakes | 27 (45.0) | 34 (59.0) |
| Italy | Meat balls | 9 (39.0) | 7 (29.0) | 0.77 |
| Veggie | 4 (17.0) | 5 (21.0) |
| Fish balls | 10 (44.0) | 12 (50.0) |
| United Kindgom | Meat balls | 9 (20.0) | 17 (40.0) | 0.10 |
| Veggie balls | 10 (23.0) | 10 (23.0) |
| Fish cakes | 25 (57.0) | 16 (37.0) |

## RESULTS FOR MODELLING VEGETABLES ACCEPTABILITY THROUGH CHOICE ARCHITECTURE FOR SENIORS

A model including gender, Mediterranean score, food neophobia scale, self-efficacy scale and hunger scale was run and no differences were found in relation to the choice of plant-based dish (Table 9).

**Table 9**: **Odds ratios and 95% CI for the model with all independent variables below associated with the choice of plant-based dish in the final logistic regression model in seniors**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Variables** | **Estimate** | **OR for plant-based dish** | **95% CI** | **P value** | | Gender‡ | -0.47 | 0.61 | (0.34; 1.11) | 0.11 | | Mediterranean Score | -0.01 | 0.98 | (0.86; 1.11) | 0.76 | | Food Neoophobia | -0.02 | 0.99 | (0.96; 1.03) | 0.87 | | Attitudes towards nudging | -0.01 | 0.98 | (0.95; 1.01) | 0.39 | | Self-efficacy | -0.01 | 0.98 | (0.93; 1.03) | 0.45 | | Hunger scale | -0.12 | 0.88 | (0.61; 1.27) | 0.50 | |

‡ Reference category: Female

Table 10 shows each dimension of FCQ associated with the choice of plant-based dish. Seniors who scored higher in the convenience dimension of FFQ were 32% less likely to choose the plant-based dish. Furthermore, those who scored higher in the sensory dimension of FFQ were 90 % more likely to choose the plant-based dish.

**Table 10**: **Odds ratios and 95% CI for each dimension of Food Choice Questionnaire associated with the choice of plant-based dish in seniors**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Questions** | **Estimate** | **OR for plant-based dish** | **95% CI** | **P value** |
| Convenience | (3,8,16) | -0.38 | 0.68 | (0.49; 0.94) | 0.02 |
| Sensory | (1,5,24) | 0.64 | 1.90 | (1.11;3.26) | 0.01 |
| Natural | (4, 9, 14) | 0.03 | 1.03 | (0.73; 1.46) | 0.83 |
| Mood | (12, 15, 19, 20) | 0.19 | 1.21 | (0.87; 1.70) | 0.25 |
| Health | (2,13,18,22) | 0.31 | 1.36 | (0.86; 1.17) | 0.18 |
| Price | (10,23) | 0.002 | 1.00 | (0.73; 1.17) | 0.99 |
| Weight | (6,11,21) | 0.01 | 1.01 | (0.73; 1.40) | 0.92 |
| Familiarity | (7,17) | -0.22 | 0.79 | (0.58; 1.09) | 0.79 |

Table 11 shows the results of binary logistic regressions with each dimension of Human Values Scale associated with the choice of plant-based dish in seniors. Seniors who scored higher in the security dimension were 43% more likely to choose the plant-based dish; and those with a higher score in the universalism dimension were 40 % less likely to choose the plant-based dish.

**Table 11**: **Odds ratios and 95% CI for each dimension of Human-Values scale associated with the choice of plant-based dish in seniors**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Questions** | **Estimate** | **OR for plant-based dish** | **95% CI** | **P value** |
| Security | (5,14) | 0.35 | 1.43 | (1.10; 1.85) | 0.007 |
| Universalism | (3,8,19) | -0.50 | 0.60 | (0.40;0.88) | 0.01 |
| Power | (2,17) | -0.12 | 0.88 | (0.67; 1.15) | 0.36 |
| Hedonism | (10,21) | 0.02 | 1.00 | (0.98; 1.02) | 0.99 |
| Achievement | (4,13) | 0.02 | 1.00 | (0.98; 1.02) | 0.98 |
| Stimulation | (6,15) | -0.22 | 0.79 | (0.60; 1.04) | 0.09 |
| Self-direction | (1,11) | 0.07 | 1.07 | (0.78; 1.48) | 0.64 |
| Tradition | (9,20) | 0.07 | 1.07 | (0.79; 1.45) | 0.65 |
| Conformity | (7,16) | 0.14 | 1.15 | (0.87; 1.51) | 0.31 |
| Benevolence | (12,18) | -0.19 | 0.82 | (0.56; 1.27) | 0.33 |

## Results for the **determinants of vegetable acceptability through sensory characteristics**

For this analysis, we selected just the respondents who chose the plant-based dish (n=132). Here we analyzed adolescents and elderly together due to the reduced number of people that chose the plant-based option in each group separately.

For the first model, including gender, age group and Mediterranean Score no differences were found (Table 12).

**Table 12**: Odds ratios and 95% CI for the model with gender, age group and Mediterranean score associated with the liking for plant-based dish

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Estimate** | **OR for liking of plant-based dish** | **95% CI** | **P value** |
| Gender | 0.14 | 1.15 | (0.53; 2.48) | 0.71 |
| Age group | -0.24 | 0.78 | (0.39; 1.57) | 0.49 |
| Mediterranean Score | 0.09 | 1.10 | (0.92; 1.30) | 0.27 |

On the other hand, food neophobia seems to play a role in the liking of the plant-based dish. Individuals with higher food neophobia were 7% less likely to report high liking for the plant-based dish (p= 0.02). For the other variables, no differences were found (Table 13).

**Table 13**: Odds ratios and 95% CI for the model with food neophobia, country and hunger scale associated with the liking for plant-based dish

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Estimate** | **OR for liking of plant-based dish** | **95% CI** | **P value** |
| Food Neophobia | -0.06 | 0.93 | (0.87; 0.99) | 0.02 |
| Country | -0.01 | 0.98 | (0.70; 1.37) | 0.91 |
| Hunger Scale | 0.002 | 1.00 | (0.66; 1.51) | 0.98 |

Being or not vegetarian, attitudes towards nudging and self-efficacy seem not to interfere in the liking of a plant-based dish (Table 14).

**Table 14**: Odds ratios and 95% CI for the model being or not vegetarian, attitudes towards nudging and self-efficacy associated with the liking for plant-based dish

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Estimate** | **OR for liking of plant-based dish** | **95% CI** | **P value** |
| Vegetarian | 0.07 | 1.08 | (0.36; 2.18) | 0.88 |
| Attitudes towards nudging | 0.03 | 1.03 | (0.98; 1.07) | 0.17 |
| Self-efficacy | -0.04 | 0.95 | (0.89; 1.02) | 0.20 |

# DISCUSSION

This Work package aimed to model the determinants of vegetables acceptability through choice architecture and sensory characteristics both in adolescents and in seniors. For the choice architecture analyses, it was found that depending on the age group, different factors might influence the choice of the plant-based dish. For adolescents, being female and reporting a higher score in the nudging scale (meaning that they are “open” to be nudged), increases the likelihood of choosing the plant-based dish. Furthermore, concerns about health and the natural origin of food and being less concerned about power and wealth also increase the odds of selecting the plant-based dish. For seniors, being less concerned about living in a security area is a personal characteristic that positively increases the odds of choosing the plant-based dish, together with the sensory properties of food. However, both adolescents and seniors with higher odds of selecting the plant-based options are those more concerned about other people and the environment. For the sensory characteristics, only food neophobia seemed to play a role in the liking of the plant-based dish (a higher food neophobia is inversely associated with the liking of the plant-based dish).

In relation to results from FCQ for adolescents, it was found in a previous study that consumers with greater health concerns, including the origin of food ingredients, will show different food choice motives and better attitudes towards healthy eating (Sun, 2008), making them more prone to choose the plant-based dish. For seniors, sensory characteristics of the food are very important for selecting the plant-based dish (the dish must taste and smell good and have a pleasant texture). Our results for Human Values Scale showed that people selecting the plant-based dish seems to have other concerns, such as equality, the nature and the importance to listen to people and that being powerful and rich are not considered important. In addition, they do not show conservation as a way to protect themselves against possible threats nor their personal goals as a means to regulate the pursuit of their own interests (Schwartz, 2012).

Among the variables included for mapping the determinants of vegetable acceptability through sensory characteristics, only food neophobia seems to be crucial for the liking of the plant-based dish. Again it was found that familiarity plays a key role for the acceptance and liking of the dish. Our respondents tended to avoid or reported a lower liking for dishes that they are not used to.

The findings of this work package can contribute to a better understanding of the complexity of food intake, as well as the findings from the previous work packages. Work Package 2, evaluated the sensory characteristics of the vegetables commonly available in the market (specially canned peas and sweet corn) that would influence their choice by different age groups, aiming to better understand consumer perception of the product sensory variations according to their characteristics (i.e. age, gender, nationality) leading to recommendations for product range rationalisation and design. The results of this WP showed that both seniors and adolescents are able to sort vegetable samples in relation to sensory properties that are relevant for their hedonic judgment about the product. The actual liking of adolescents and seniors across the four European countries for canned peas and sweet corn was also evaluated. Results confirm that familiarity plays a key role in the liking of vegetables. The more familiar respondents are with a specific food, the more they will like and prefer it.

Work Package 3 has developed and tested the acceptability of recipes for the dish used in the WP4 intervention study. A total of 13 recipes were developed by Masters students at the Institut Paul Bocuse and a jury of experts elected five out of thirteen recipes. In addition, the jury required some improvements and/ or changes in the recipes. After the improvement based on jury remarks, the recipes were tested by consumers in order to select the three most appreciated recipes. The acceptability and liking were rated to compare the preference for the recipes in order to increase the vegetable intake among adolescents and older people. The three selected recipes were sweet corn soup, pea pie and vegetable steak. The vegetable steak shaped as small balls served with tomato sauce was the dish selected for the intervention with seniors in WP4 and it was decided later that the same dish would also be used for adolescents, (it was well rated by them and it was more practical to prepare the same dish for both age groups).

The objective of Work Package 4 was to apply the dish of the day nudging strategy in field work to promote the VeggiEAT dish in Denmark, France, Italy and the United Kingdom. It was concluded that under the experimental conditions, no differences were found in the choice of the dish between control and intervention groups for both adolescents and seniors. This result could be partly attributed to the fact that the alternative dishes were very familiar to our sample in comparison to the VeggiEAT dish. WP2 proved that familiarity plays an important role for the selection and liking of the dish. Additional explanations can be highlighted, such as high food neophobia found among adolescents and seniors studied. Among seniors, an additional reason for inconclusive results could be the association of plant-based meals with poverty in seniors who grew up post Second World War. Among adolescents, a low intake of fruits and vegetables is often generally found by the male population because these foods are associated with ‘female’ characteristics (Fisher, 2015).

Implementation of nudges is difficult across countries due to cultural and practical differences, i.e., UK canteens are different from the lunchboxes in Denmark and so on. Each country has its own particularities, which makes it difficult to standardize experiments and expect the same results. In this study we tried to make all procedures as homogenous as possible, however some variations happened, such as the data collection that was held in school canteens, research restaurants and a university laboratory. Thus, although the VeggiEAt recipe was the same for all countries, the cooking team and the setting varied. The same can be highlighted in relation to the questionnaires, although they were the same in all countries, the answers can vary according to regional and cultural differences and to some differences due to interpretation, once they were self-administrated.

# CONCLUSION

The implementation of the dish of the day in different countries was not successful in promoting a plant-based dish under the study conditions. The different factors that influence the choice of the plant-based dish found in this Work Package can be used as inspiration when designing future interventions. Notwithstanding, a further study was conducted to elucidate the nuances of the nudge reported within this project, further detail is reported in WP4 report.

# REFERENCES

Ajzen I. (1985) From intentions to actions: A theory of planned behavior. In: (Eds.) JBJK, editor. Action control, from cognition to behavior: Springer-Verlag;. p. 11-39.

Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R., & Vlaev, I. (2012). Influencing behaviour: The mindspace way. *Journal of Economic Psychology*, **33**, 264–277.

EUFIC (2006). The determinants of food choice. (URL: http://www.eufic.org/en/healthy-living/article/the-determinants-of-food-choice). (retrieved August 2017)

Evans JSBT. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. Annu Rev Psychol ;59:255-78.

Fischer,O. 2015. Masculinity and Meat Consumption-Historical Approchaes to a Current Health Issue,Medizinhist Journal 50, 42-65.

Lwanga S.K. & Lemeshow S. (1991). Sample Size Determination in Health Studies: A Practical Manual. Geneva, World Health Organization.

Martínez-González, M. A., García-Arellano, A., Toledo, E., Salas-Salvadó, J., Buil-Cosiales, P., Corella, D., Covas, M. I., Schröder, H., Arós, F., Gómez-Gracia, E., Fiol, M., Ruiz-Gutiérrez, V., Lapetra, J., Lamuela-Raventos, R. M., Serra-Majem, L., Pintó, X., Muñoz, M. A., Wärnberg, J., Ros, E., Estruch, R., & for the, P. S. I. (2012). A 14-Item Mediterranean Diet Assessment Tool and Obesity Indexes among High-Risk Subjects: The PREDIMED Trial. *PLOS ONE,* **7**, e43134.

Nørnberg, T. R., Skov, L. R., Houlby, L., & Pérez-Cueto, F. J. A. (2016). Attitudes and Acceptability of Behavior Change Techniques to Promote Healthy Food Choices Among Danish Adolescents. *Family and Consumer Sciences Research Journal, 44*(3), 264-279.

Ominchanski, L. 1992. The Centre for Health Promotion and Wellness MIT Medical from You Count, Calories Don’t. URL. (https://medical.mit.edu/sites/default/files/hunger\_scale.pdf) (Retrieved July 2017).

Peduzzi, P., Concato, J., Kemper, E., Holford, T. R., & Feinstein, A. R. (1996). A simulation study of the number of events per variable in logistic regression analysis. *Journal of Clinical Epidemiology, 49*(12), 1373-1379.

Pliner, P., & Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite,* **19**, 105-120.

Prochaska JO, DiClemente CC. (1994). The transtheoretical approach: Crossing traditional boundaries of therapy. United States: Krieger Publications.

Rosenstock IM. (1974) Historical origins of the health belief model. Health Education & Behavior. 1974;2(4):328-35.

Schwartz SH. (2012). An Overview of the Schwartz Theory of Basic Values. Online Readings in Psychology and Culture;2(1).

Schwartz, S. H. (2009). Draft users 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.

Schwartz, S.H. (2003). A proposal for measuring value orientations across nations [Chapter 7 in the Questionnaire Development Report of the European Social Survey]. Web site: <http://www.europeansocialsurvey.org/index.php?option=com_docman&task=doc_view&gid=126&itemid=80>

Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efﬁcacy scale. In J. Weinman, S. Wright, & M. Johnston, (Eds.), Measures in health psychology: a user’s portfolio. Causal and control beliefs, Vol. 1 (pp. 35–37). Windsor, UK: Nfer-Nelson.

Skov, L. R., Lourenço, S., Hansen, G. L., Mikkelsen, B. E., & Schofield, C. (2013). Choice architecture as a means to change eating behaviour in self-service settings: a systematic review. *Obesity Reviews, 14*(3), 187-196.

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.

Sun YH. Health concern, food choice motives, and attitudes toward healthy eating: the mediating role of food choice motives. Appetite. 2008;51(1):42-9.

VeggiEAT (2017). URL: (https://microsites.bournemouth.ac.uk/veggieat/) (retrieved July 2017).