

Published article.

Citation:

Ferrão AC, Guiné RPF, Correia P, Ferreira M, Cardoso AP, Duarte J, Lima J. (2018) Perceptions towards a healthy diet among a sample of university people in Portugal. *Nutrition & Food Science*, 48(4), 669-688.

Author version

1

2

PERCEPTIONS TOWARDS A HEALTHY DIET AMONG A SAMPLE

3

OF UNIVERSITY PEOPLE IN PORTUGAL

4

Running Title: PERCEPTIONS TOWARDS A HEALTHY DIET

5

6

7

Ana Cristina Ferrão^{1*}, Raquel P. F. Guiné^{1,2}, Paula Correia¹, Manuela Ferreira¹, Ana Paula Cardoso¹,

8

João Duarte¹, João Lima³

9

10

¹CI&DETS Research Centre, Polytechnic Institute of Viseu, Campus Politécnico, Repesees, Viseu, Portugal.

11

²CITAB Research Centre, University of Trás-os-Montes, Vila Real, Portugal.

12

³Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto.

13

14

15

***Corresponding author:**

16

Ana Cristina Ferrão

17

Escola Superior Agrária de Viseu, Quinta da Alagoa, Estrada de Nelas, Ranhados, 3500-606 Viseu,

18

Portugal.

19

Tel: + 351 232 446 640; Fax: +351 232 426 536

20

E-mail: acristinaferrao@gmail.com

21

22

Abstract

23

Purpose: A healthy diet has been recognized as one of the most important factors associated with the

24

maintenance of human health as well as to help preventing the development of some chronic

25

diseases. Therefore, this work aimed at studying the perceptions of a sample of university people

26

regarding a healthy diet.

27 **Methodology:** It was undertaken a descriptive cross-sectional study on a non-probabilistic sample of
28 382 participants. The data was collected among a sample of Portuguese university people and
29 measured if people's perceptions were compliant with a healthy diet.

30 **Findings:** The results revealed that the participants' perceptions were, in general, compliant with a
31 healthy diet (scores between 0.5 and 1.5, on a scale from -2 to +2). However, were found significant
32 differences between age groups ($p=0.004$), with a higher average score for young adults, and also
33 between groups with different levels of education ($p=0.025$), with a higher score for university
34 degree. The variable chronic diseases also showed significant differences ($p=0.017$), so that people
35 who did not have any chronic diseases obtained a higher score.

36 **Originality/Value:** This study is considered important because it provides evidences about the
37 relation between nutrition knowledge and the perceptions towards a healthy diet. The study allowed
38 concluding that the participants were aware about some nutritional aspects of their diets and,
39 therefore, their perceptions were compliant with a healthy diet. This finding is very relevant, because
40 it could be a support for health policy initiatives directed at promoting healthy eating behaviours.

41

42 **Keywords:** Chronic diseases, healthy diet, nutrition knowledge, perceptions, survey.

43

44 INTRODUCTION

45 It is well established that an inadequate diet and low levels of physical activity are associated with
46 many non-communicable diseases, besides having many social and economic consequences
47 (Campbell, 2003; Naughton et al., 2015; Ogden et al., 2007; World Health Organization, 2000).

48 Food behaviour is a complex process influenced by many factors, such as socioeconomic status,
49 demographics, taste, convenience, food cost, lifestyle characteristics, security, cultural and religious
50 beliefs or nutrition knowledge (Deshmukh-Taskar et al., 2007; Spronk et al., 2014). Nutrition
51 knowledge is a multifactorial construct and it is affected by several aspects such as age, sex, level of

52 education and socio-economic status (Hendrie, Cox, et al., 2008; Parmenter et al., 2000; Spronk et
53 al., 2014). Therefore, the specific contribution of nutrition knowledge to dietary behaviour in view of
54 a healthy diet is considered complex (Wardle et al., 2000) and some scientific evidences suggest that
55 nutrition knowledge is a major factor in promoting favourable health and dietary changes (Dammann
56 and Smith, 2011; Petrovici and Ritson, 2006; Rustad and Smith, 2013).

57 According to the recommendations, a healthy diet should contain a high amount of fruit,
58 vegetables and dairy products, a good portion of starchy foods like bread, potatoes and pasta, a
59 moderate portion of meat or fish, and not too much saturated fatty acids, added sugars or refined
60 grains. It is also important the adequate intake of water and the energy intake should be according to
61 individual's needs (Guenther et al., 2013; Vereecken et al., 2009). Since nutrition knowledge is one
62 of the factors influencing a healthy diet, numerous studies have investigated the association between
63 nutrition knowledge and people's dietary behaviour. Some of those studies suggested that individuals
64 with higher nutrition knowledge are more likely to follow a healthy diet (Grafova, 2006; Parmenter
65 et al., 2000; Worsley, 2002). Other studies, however, showed weak associations between nutrition
66 knowledge and healthy eating habits (Dickson-Spillmann and Siegrist, 2011; Sapp and Jensen, 1997;
67 Shepherd and Towler, 1992; Wardle et al., 2000). In fact, people's perceptions about a healthy eating
68 are complex and reflect their personal, social and cultural experiences, as well as their living
69 environment. Furthermore, some people can understand the concept of a healthy diet, but
70 nevertheless may be unwilling or unable to adopt it (Bisogni et al., 2012). Eating habits among
71 young adults are an important health concern, because in most cases involve a transition from
72 secondary school to university where they need to adapt to a new social environment that often
73 translates into poor eating habits (Deliens et al., 2014; Eves et al., 1995; Ganasegeran et al., 2012;
74 Rodrigues et al., 2013). Because the information about Portuguese's eating habits, especially among
75 university people, is limited, it is crucial to perform more studies in this area, in order to promote
76 more efficient health strategies among this group.

77 This study is included in the project entitled “Psycho-social motivations associated with food
78 choices and eating practices (EATMOT)” which intends to perform a research on different countries
79 about some psychic and social motivations that determine people’s eating patterns in relation to their
80 choices or eating habits.

81 The main goal of this particular study was to evaluate if people’s perceptions corresponded to a
82 healthy diet, for a sample of Portuguese university people, including staff, teachers and students. It
83 was also analysed in what way factors such as gender, level of education, living environment, and
84 anthropometric data or behavioural and health related elements could influence the participants’
85 perceptions about a healthy diet. The research hypothesis was therefore as follows: Are the
86 perceptions of the participants compliant with practices of a healthy diet?

87

88 MATERIALS AND METHODS

89 **Instrument**

90 To undertake this study was prepared a questionnaire to access information about several issues
91 related to dietary practices, and which included the following sections: Part I – Sociodemographic
92 data; Part II – Anthropometric data and behavioural and health related elements; Part III –
93 Perceptions about a healthy eating. To measure the perceptions about healthy eating, were included
94 in part III questions about which the respondents were asked to state their accordance measured on a
95 5-point Likert scale varying from 1 to 5: 1 (totally disagree), 2 (disagree), 3 (neither agree nor
96 disagree), 4 (agree) and 5 (strongly agree) (Likert, 1932). Hence, the respondents were asked to
97 indicate their extent of agreement towards the following statements: 1. “A healthy diet is based on
98 calorie count”, 2. “We should never consume sugary products”, 3. “Fruit and vegetables are very
99 important to a practice of a healthy eating”, 4. “A healthy diet should be balanced, varied and
100 complete”, 5. “We can eat everything, as long as it is in small quantities”, 6. “I believe that food
101 produced in a biological way is healthier” and 7. “We should never consume fat products”. The

102 statements for the perceptions about a healthy eating were created through a review of previous
103 research (Aikman et al., 2006; Jackson et al., 2003; Lindeman and Väänänen, 2000; Renner et al.,
104 2012; Roininen et al., 1999; Steptoe et al., 1995; van Strien et al., 1986) and discussions between the
105 project team members. The Portuguese team was composed by six members from the areas of food
106 science, nutrition, health sciences, statistics, education sciences and psychology.

107

108 **Data collection**

109 This descriptive cross-sectional study was undertaken on a non-probabilistic sample of 382
110 participants living in Portugal and belonging to the university community, including staff, teachers
111 and students.

112 The questionnaires were applied by personal interview, after verbal informed consent only to
113 adults (aged 18 or over). The data collection was carried out between January and June 2017. All
114 ethical issues were verified when formulating and applying the questionnaire, which was approved
115 by the Ethical Committee with reference nº 04/2017.

116

117 **Statistical Analysis**

118 Basic descriptive statistical tools were used for exploratory analysis of the data. In order to analyse
119 the relations between the different sociodemographic variables and the perceptions towards a healthy
120 diet, as well as the relations between the different variables of the anthropometric data and
121 behavioural and health related elements and the perceptions towards a healthy diet, it was necessary
122 to calculate an average of the scores obtained for all the items included in part III of the
123 questionnaire. For this, the scale used was reformulated to allow the calculation of an average score
124 without the influence of the score attributed to the mean point of the Likert scale (3 = neither agree
125 nor disagree). Therefore, the items were recoded into a new scale as follows: -2 (totally disagree), -1
126 (disagree), 0 (neither agree nor disagree), 1 (agree) and 2 (strongly agree). These scores were then

127 used to calculate the average score obtained for each participant, thus giving the variable *perceptions*
128 *towards a healthy eating*. Note that before calculating the average, items 1, 2 and 7 were inverted.
129 The variable *perceptions towards a healthy eating* corresponds to values varying from -2 to +2, and
130 which could be interpreted as follows: values ≥ -2.0 & < -1.5 = perceptions not at all compliant with
131 a healthy diet; values ≥ -1.5 & < -0.5 = perceptions not compliant with a healthy diet; values ≥ -0.5
132 & < 0.5 = perceptions poorly compliant with a healthy diet; values ≥ 0.5 & < 1.5 = perceptions
133 compliant with a healthy diet; values ≥ 1.5 & ≤ 2.0 = perceptions fully compliant with a healthy diet.

134 The Student's t-test for independent samples and one-way ANOVA were used to compare the
135 means of two groups and the means of three or more groups, respectively. In the case of ANOVA,
136 the post-hoc Tukey HSD test was used to assess the differences between groups. The Tukey's test,
137 also known as the Tukey's HSD (Honestly Significant Difference) test is a statistical test to find out
138 which means are significantly different from each other, and consists in a single-step multiple
139 comparison procedure, coupled to ANOVA (Guiné et al., 2015). In this test the difference between
140 means is evaluated to see whether or not it is greater than the standard error (Guiné et al., 2014;
141 Rodrigues et al., 2014; Santos et al., 2014). Also the crosstabs and the chi square test were used to
142 assess the relations between some of the variables under study. Cramer's V was used in some cases
143 to evaluate the strength of the significant relations found between some of the variables at study.
144 This coefficient varies from 0 to 1, and for $V \approx 0.1$ the association is considered weak, for $V \approx 0.3$
145 the association is moderate and for $V \approx 0.5$ or over, the association is strong (Witten and Witte,
146 2009). In all tests the level of significance considered was 5% ($p < 0.05$) and for all data analyses was
147 used the SPSS software from IBM Inc. (version 24).

148

149 **Sample Characterization**

150 Table 1 summarizes the demographical data for the sample studied. In this survey participated
151 382 adults, from which 77% were women and 23% were men. The average age of the participants

152 was 26±11 years, ranging from 18 to 70 years. The average age of women was lower (25±10 years)
153 when compared to the average age of men (28±13 years). The participants were classified into age
154 groups according to: young adults (18y ≤ age ≤ 30y), accounting for 82.2%; average adults (31y ≤
155 age ≤ 50y), corresponding to 13.1%; senior adults (51y ≤ age ≤ 64y), representing 3.9%; and finally
156 elderly (≥ 65y), which accounted for 0.8% of the sample. The majority of the participants, 79.6%,
157 had completed secondary school, 20.2% had a university degree and only 0.3% had the lowest level
158 of education (primary school) as their terminal education. As for the civil state, 82.2% of the
159 participants were single, 14.7% were married or lived together as a marital couple, 2.6% were
160 separated or legally divorced and 0.5% were widowed. Regarding the living environment, 46.3% of
161 the participants lived in an urban environment, 41.4% lived in rural areas and 12.3% lived in a
162 suburban area. Concerning the professional status, most of the participants were students (74.3%),
163 17.5% were employed, 7.3% were working students, 0.5% were unemployed and 0.3% were retired.

164 When the participants were asked if their professional activity or studies were related to
165 nutrition, food, agriculture, sports, psychology or other health related activity, 36.3% answered no,
166 30.2% indicated that they had a professional activity or field of studies related to health, 12.4% to
167 sport, 11.5% to food science, 4.4% to psychology, 4.4% to agriculture and only 0.8% had an activity
168 or studies in the area of nutrition. When analysed by gender, a higher percentage of the women
169 (34.8%) had a professional activity or field of studies related to health when compared to men
170 (15.3%). The majority of the participants indicated that they were responsible for buying their own
171 food (83.1%), against 16.9% that answered that they were not.

172

173 RESULTS AND DISCUSSION

174 **Anthropometric data, behavioural aspects and health related elements**

175 Because anthropometric data and some behavioural aspects are intimately related to people's food
176 behaviour, these aspects were also included in the questionnaire. Height and weight were obtained by

177 self-response, allowing then to calculate the body mass index (BMI), as weight (kg) divided by
178 height squared (m^2). The results of the BMI were classified according to the standards of the
179 International Classification: underweight ($BMI < 18.50 \text{ kg/m}^2$), normal weight ($18.50 \leq BMI \leq 24.99$
180 kg/m^2), overweight ($25.00 \leq BMI \leq 29.99 \text{ kg/m}^2$) and obese ($BMI \geq 30.00 \text{ kg/m}^2$) (World health
181 Organization, 2006). There were also included questions about the intensity of physical activity,
182 dietary regimen, chronic diseases, food allergies/intolerances and information about episodes of
183 eating disorders.

184 Table 2 shows the prevalence of BMI in the population studied and shows that the majority of
185 the participants had a normal weight (73.3%), 18.1%, were overweighted, 5.7% were underweighted
186 and 3.0% were obese. According to gender, the majority had a normal weight, being this percentage
187 73.0% for women and 74.4% for men. The results of the Chi square test made to the association
188 between the variables *BMI* and *Gender*, showed no significant differences, meaning that gender did
189 not influenced *BMI*. As to the possible association between the variables *BMI* and *practice of*
190 *physical activity*, it was not found a significant association between these variables, and therefore the
191 *practice of physical activity* did not influence *BMI*.

192 When asked about the frequency of practicing physical activity, 27.2% of the participants
193 answered that they practiced physical activity moderately (2-3 times/week) and 10.5% practiced
194 intensively (more than 3 times/week). With sporadic physical activity (less than once/week) were
195 27.0%, occasionally (once/week) 23.6% and never 11.8%, which is considered inappropriate.
196 Physical inactivity is one of the important risk factors for morbidity and mortality worldwide (Reiner
197 et al., 2013; World Health Organization, 2009). When seen by gender, the results were quite
198 different. While 31.0% of the women practiced physical activity sporadically (never: 13.9%,
199 sporadically: 31.0%, occasionally: 25.9%, moderately: 25.5%, intensively: 3.7%), for men there
200 seems to be a slight trend to increase intensity of physical activity (never: 4.5%, sporadically: 13.6%,
201 occasionally: 15.9%, moderately: 33.0%, intensively: 33.0%). These differences between genders

202 were statistically significant ($\chi^2 = 72.030$; $p < 0.05$), and gender proved to influence the practice of
203 physical activity, with a moderate association (Cramer's $V = 0.434$). These findings are consistent
204 with previous scientific research, where it was found that men tend to practice more exercise than
205 women (Chalabaev et al., 2013).

206 It was also evaluated if the participants considered practicing a balanced diet. The results
207 indicated that most of the participants (51.0%) thought that they did it sometimes, 39.5% did it
208 frequently, 7.1% did it rarely, 1.6% did it always, and only 0.8% responded that they never practiced
209 a balanced diet. These trends were not much different for both genders, women (never: 1.0%, rarely:
210 7.8%, sometimes: 49.7%, frequently: 40.1%, always: 14%) and men (never: 0.0%, rarely: 4.5%,
211 sometimes: 55.7%, frequently: 37.5%, always: 2.3%). As it was expected in view of these results, it
212 was not found an association between the variables *balanced diet* and *gender*. There were also
213 investigated other possible associations, namely the influence of variables like *level of education* and
214 *civil state* on the practice of a *balanced diet*. It was observed that the *level of education* did not
215 influence the practice of a *balanced diet*, but *civil state* did ($\chi^2 = 34.231$; $p = 0.001$). Nevertheless,
216 the association between the variables *balanced diet* and *civil state* was weak ($V = 0.173$).

217 Table 3 presents the dietary regimen practiced by the participants, and the results showed that
218 most of the participants (82.2%) did not practice any specific voluntary dietary regimen, being this
219 percentage higher for men (92.0%) when compared to women (79.2%). None of the participants
220 followed a vegan or raw foodism dietary regimen. As it can be observed, 10.5% of the participants
221 followed a caloric restriction as their dietary regimen. When seen by gender, 13.0% of the women
222 indicated following a caloric restriction diet, against only 2.3% of men. The results of the Chi square
223 test proved that these differences between genders were significant, meaning that *gender* influenced
224 *dietary regimen* ($\chi^2 = 15.494$; $p = 0.017$), although, the values of Cramer's coefficient indicated that
225 this association was weak ($V = 0.202$). In fact, women tend to have more body image disturbances

226 and dissatisfaction with body image has been seen as a factor for conditioning food intake, namely in
227 terms of restriction (Fett et al., 2009; Vocks et al., 2007).

228 As to the possible association between the variables specific *dietary regimen* and *BMI*, it was
229 found that the variables were not correlated, and therefore *BMI* did not influence the practice of a
230 specific voluntary *dietary regimen*.

231 Table 4 presents the participants' chronic diseases. As it can be observed, most of the
232 participants (84.9%) indicated that they did not have any chronic disease and 8.2% affirmed that they
233 had other chronic diseases not specified in the question, such as asthma or allergic rhinitis. All the
234 other chronic diseases affected a low percentage of participants, which is not surprising since 82.2%
235 of the participants were young adults ($18y \leq \text{age} \leq 30y$). To assess the relation between the variables
236 *absence of chronic diseases* and *age category*, also the Chi square test was used ($\chi^2 = 26.521$; $p =$
237 0.004) and significant differences were encountered, which demonstrated that there was an
238 association between *absence of chronic diseases* and *age category*, so that the prevalence of chronic
239 diseases tended to increase with age. The association between these variables was weak to moderated
240 ($V = 0.265$). According to the evidences, ageing is an important risk factor for the development of
241 most diseases and conditions the quality of life (Kennedy et al., 2014).

242 Also the *BMI* class has proven to influence the *absence of chronic diseases* (Chi square test: χ^2
243 $= 13.556$; $p = 0.004$) and people with higher BMI tended to have at least one chronic disease.
244 However, in this case the association between the variables was weak ($V = 0.192$). In fact,
245 overweight and obesity are major contributors to the global burden of disease (Kearns et al., 2014;
246 World Health Organization, 2016).

247 Table 5 presents the participants' food allergies or intolerances, and the results showed that most
248 of the participants (89.7%) indicated that they did not have any food allergy or intolerance and only
249 6.3% indicated they suffered from lactose intolerance. All the other food allergies/intolerances had a
250 low percentage of incidence among the enquired. When seen by gender, it was observed that there

251 were significant differences between men and women for lactose intolerance ($\chi^2=4.077$; $p = 0.005$),
252 with no men suffering from this food intolerance against 8.3% women who suffered from it.
253 However, the association was weak ($V = 0.143$). According to the evidences, approximately 75% of
254 the world's human population is lactose intolerant (Silanikove et al., 2015).

255 When the participants were asked if they, at any time of their life, experienced any eating
256 disorders, 93.2% answered that they did not, being this percentage higher for men (97.7%) when
257 compared to women (91.8%), as it can be observed in Table 6. Nevertheless, when the association
258 between the variables *eating disorders* and *gender* was tested by the Chi square test, no significant
259 differences were found, meaning that these variables were not associated ($\chi^2=4.077$; $p = 0.396$).
260 Other epidemiological studies have shown that women have higher tendency to suffer from bulimia
261 and anorexia nervosa than men (Hoek, 2006; Striegel-Moore and Bulik, 2007). However, the
262 prevalence of binge-eating has been reported as similar for women and men (Hudson et al., 2007;
263 Striegel-Moore et al., 2009). In fact, women are usually more concerned about body image and for
264 some of them the body changes that occurs with ageing are perceived as negative (Marshall et al.,
265 2014).

266 It was also tested the possible association between the variables *eating disorders* and *dietary*
267 *regimen*, and in this case significant differences were found ($\chi^2=100.640$; $p < 0.05$) with a weak to
268 moderate association ($V = 0.257$), which means that the participants who had already experienced an
269 episode of any eating disorder were more likely to adopt a specific dietary regimen.

270

271 **Perceptions towards a healthy eating**

272 Individual's characteristics

273 Table 7 presents the results for the relations between sociodemographical characteristics and the
274 *perceptions towards a healthy diet*, and as it can be observed for young adults the mean score was
275 1.05 ± 0.35 , for average adults was 1.02 ± 0.45 , for elderly the value was equal to 1.00 ± 0.29 and with

276 a lowest score came the group of senior adults (0.69 ± 0.57), meaning that, in general, for those
277 participants the perceptions were compliant with a healthy diet. The results of the ANOVA test
278 showed that there was a significant difference in the perceptions towards a healthy eating among age
279 groups. This finding is not consistent with the ones obtained in previous studies, where it was found
280 that healthy eating motivation becomes stronger with increasing age (Hearty et al., 2007; Kearney et
281 al., 1998; Naughton et al., 2015; Roininen et al., 1999). Furthermore, in another study it was
282 suggested that as people get older and more susceptible to various diseases they may be more
283 interested in health issues and healthy eating (Maddock et al., 1999).

284 As for gender, it was found that both women and men had perceptions compliant with a
285 healthy diet (1.05 ± 0.38 for women and 0.99 ± 0.38 for men) and the results of Student's t-test
286 showed no significant difference between genders. These results are not consistent with those
287 obtained in other studies, in which was suggested that women tended to have a healthier eating
288 behaviour than men (Hendrie et al., 2008; Kiefer et al., 2005; Prättälä et al., 2007).

289 Social relationships are an important aspect of a person's life, which affect health and can also
290 influence dietary behaviour (Conklin et al., 2014). Several studies suggested that marital status is an
291 important determinant for health-promoting behaviours including healthier eating habits (Hartmann
292 et al., 2014; Johnson et al., 2000; Joung et al., 1995; Pollard et al., 2001; Roos et al., 1998;
293 Umberson, 1992; Wickrama et al., 1995; Yannakoulia et al., 2008). However, in this study all mean
294 scores for the different marital status had values between 0.5 and 1.5, which indicate that single,
295 married/living together and divorced/separated or even the widowed participants had perceptions
296 compliant with a healthy diet. In fact, the highest score achieved was for the single participants
297 (1.05 ± 0.36), but no significant differences were found between the different civil state groups
298 regarding the perceptions towards a healthy eating.

299 As for the level of education, it was observed that the participants with a university degree
300 were those who achieved the highest score in healthy diet perceptions (1.13 ± 0.38), followed by the

301 participants that had completed secondary school (1.01 ± 0.37) and finally the participants with the
302 lowest level of education (primary school) as their terminal education (0.57 ± 0.0), with values
303 corresponding to perceptions compliant with a healthy eating in all cases. As it was expected, were
304 found significant differences between the levels of education concerning the perceptions towards a
305 healthy eating. In general, a higher educational level is associated with a healthier diet (Lê et al.,
306 2013).

307

308 Social and professional factors

309 Regarding the relations between social or professional factors and the *perceptions towards a healthy*
310 *diet*, the results showed that there were no significant differences between the participants who were
311 responsible for buying their own food against the participants who were not, as it can be observed in
312 Table 7. For both groups the scores were higher than 0.5 and lower than 1.0, which means that the
313 participants' perceptions were compliant with a healthy diet.

314 Poor dietary patterns and obesity have been associated with neighbourhood deprivation,
315 neighbourhood minority composition, and low area population density (usually found in rural areas)
316 (Araújo, 2008; Chang, 2006; Diez-Roux et al., 1999; Larson et al., 2009; Lopez, 2007; Nelson et al.,
317 2006; Robert and Reither, 2004; Rundle et al., 2007; Stimpson et al., 2007). However, in this study
318 were not found significant differences in the scores representing the perceptions towards a healthy
319 diet among the participants that lived in different areas. In fact, with a higher score came the
320 participants who lived in rural areas (1.04 ± 0.36), followed by the participants who lived in urban
321 areas (1.03 ± 0.41) and finally the ones who lived in suburban areas (0.99 ± 0.35). These results
322 revealed that in the three cases the participant's perceptions were compliant with a healthy diet.

323 In most industrialized countries it persists a pattern of social inequalities in diet quality and in
324 health (Darmon and Drewnowski, 2015; Estaquio et al., 2008; Harrington et al., 2011; Kant and
325 Graubard, 2007; Lallukka et al., 2007; Malon et al., 2010; McNaughton et al., 2008; Mullie et al.,

326 2010; Northstone and Emmett, 2010; Raffensperger et al., 2010), and groups of lower socioeconomic
327 status tend to adopt diets with poorer nutritional value and of lower quality (Darmon and
328 Drewnowski, 2015). For the sample at study, the scores obtained for *the perceptions towards a*
329 *healthy diet* according to the professional status were 1.05 ± 0.34 for students, 1.00 ± 0.00 for retired,
330 0.99 ± 0.48 for working students, 0.97 ± 0.47 for employed participants and 0.79 ± 0.91 for unemployed
331 participants, which means that the participants in all of these professional groups had perceptions
332 compliant with a healthy diet. However, there were no significant differences in the perceptions
333 among the different professional status. This finding is consistent with other study, in which was
334 shown that students are usually more slightly aware about nutritional issues (Barzegari et al., 2011).
335 On the contrary, according to the results of the study of Dunne and Somerset (2004), unhealthy
336 eating habits are common among university students.

337 Regarding the area of studies or work, as it was expected the participants who had a work or
338 studies related to nutrition were the ones obtaining a highest score (1.48 ± 0.36). For all the other
339 groups, the scores were very similar and revealed that the perceptions were still compliant with a
340 healthy diet. Furthermore, there were no significant differences among the areas of study/work. In a
341 recent study, it was also found that people who had studies or professional activity in the area of
342 nutrition tended to have healthier eating habits (Kobayashi et al., 2015) Furthermore, in a study
343 developed by Nani (2016), it was demonstrated that nutritional knowledge contributes to better food
344 choices and more adequate nutritional intake.

345

346 BMI and physical activity

347 Table 8 shows the relations between anthropometric data, behavioural and health related elements
348 and the *perceptions towards a healthy diet*. As it can be observed, as BMI increased, the healthy diet
349 perception scores decreased, being the highest value for the underweight class (underweight:
350 1.07 ± 0.39 , normal weight: 1.05 ± 0.37 , overweight: 0.96 ± 0.46 , obesity: 0.91 ± 0.21). These results

351 mean that independently of the BMI class, the participant's perceptions were still compliant with a
352 healthy diet. It is however important to note that in the sample at study the prevalence of
353 underweight or obesity was small. Nevertheless, no significant differences were found across the
354 BMI classes. This finding is consistent with the one obtained in the study of Fyler et al. (2014),
355 where it was also found that there was no significant differences across BMI classes.

356 Physical activity plays an important role in some aspects of food choices and it has been
357 associated with a better diet quality and higher intake of fruits and vegetables (Bellisle, 1999; King,
358 1998; Naughton et al., 2015). However, in this study the scores for all levels of physical activity
359 were very similar and corresponded to perceptions compliant with a healthy eating (never:
360 1.00 ± 0.41 , sporadically: 1.05 ± 0.35 , occasionally: 1.04 ± 0.40 , moderately: 1.00 ± 0.37 , intensively:
361 1.08 ± 0.43). Therefore, there were no significant differences between the different levels of physical
362 activity.

363

364 Eating practices

365 As it can be seen in Table 8, most of the mean scores obtained for each level of practice of a healthy
366 diet were very similar (never: 1.10 ± 0.50 , rarely: 1.05 ± 0.34 , sometimes: 1.01 ± 0.38 , always:
367 1.03 ± 0.38), with only the exception for the participants who considered practicing a balanced diet
368 frequently (0.64 ± 0.46). This seems rather surprising, since the participants who assumed they
369 frequently have a healthy diet revealed a slightly lower score for the *perceptions towards a healthy*
370 *diet*, meaning that they might not be fully conscientious of their behaviours. Nevertheless, even for
371 that group the score corresponds to perceptions compliant with a healthy diet. To examine the
372 differences in healthy diet perceptions based on the eating practices, ANOVA was conducted and the
373 results revealed that there were no significant differences. This finding is contrary to that of Fyler et
374 al. (2014), according to which the participants with higher diet quality had proper healthy eating
375 attitudes.

376 As for healthy diet perceptions based on special food regimens, the results revealed that the
377 lowest score was obtained for caloric restrictions (0.89 ± 0.41). Still, since all scores were between 0.5
378 and 1.5, it can be concluded that despite the special food regimen, the participants' perceptions were
379 compliant with a healthy diet. Furthermore, no significant differences were found across the different
380 food regime groups. Other studies suggested that vegetarians tend to have more consciousness about
381 health aspects when compared with omnivores (Dinu et al., 2017; Kwok et al., 2014).

382

383 Health factors

384 The participants who suffered from chronic diseases as well as those who did not, revealed
385 perceptions compliant with a healthy diet (Table 8). Nevertheless, the score was higher for the
386 participants who did not have any chronic disease (1.05 ± 0.38) when compared to those who had
387 (0.92 ± 0.42), with significant differences between them ($p < 0.05$). According to Böhn et al. (2013)
388 the presence of multiple food intolerances can have a negative impact on quality of life, because
389 multiple dietary exclusions can lead to a highly restrictive diet and deficient in essential
390 micronutrients (Zheng et al., 2015). For the sample at study, the participants who indicated having a
391 food allergy or intolerance demonstrated to have perceptions compliant with a healthy diet
392 (1.06 ± 0.47), being this trend similar for the participants who did not have any food allergy or
393 intolerance (1.03 ± 0.37). The results of the t-test showed that there were no significant differences in
394 the healthy diet perception scores between these two groups.

395 As for the relation between eating disorders and the perceptions towards a healthy eating, the
396 results showed that the highest healthy diet perception score was for the participants who already had
397 experienced an episode of binge-eating (1.14 ± 0.48), followed by the participants that never had any
398 eating disorder (1.04 ± 0.37), participants who had experienced an episode of anorexia nervosa
399 (0.95 ± 0.49), other eating disorders (0.86 ± 0.49) and finally the ones who had experienced an episode
400 of bulimia nervosa (0.57 ± 0.49). Since all of the scores were between 0.5 and 1.5, it can be

401 considered that all of the participants in the eating disorder groups demonstrated, nevertheless,
402 perceptions compliant with a healthy diet. The results of the ANOVA test revealed that no significant
403 differences were found across the eating disorders groups. This finding is not consistent with
404 previous research, where it was suggested that people who have an eating disorder have a series of
405 inadequate and dysfunctional attitudes towards eating, with a complex relationship with food
406 (Alvarenga et al., 2014). This difference might be due to the small amount of participants who
407 suffered from these disorders among the sample at study.

408

409 CONCLUSION

410 This work allowed obtaining interesting results about the sample of population at study, namely in
411 terms of some behavioural aspects and the perceptions towards a healthy eating. Among the most
412 relevant results is the fact that, in general, the participants revealed positive perceptions towards a
413 healthy diet. There were no significant differences in healthy diet perception scores regarding
414 gender, civil state, the fact that the participants were responsible for buying their own food or not, the
415 living environment, the professional status, the fields of work/studies, the BMI classes, the level of
416 physical activity, the self-report of practicing a healthy diet or not, the practice of special food
417 regimens, the incidence of food intolerances/allergies, or the experience of eating disorders. On the
418 other hand, there were significant differences among age groups, for which young adults obtained the
419 highest score for the perceptions compliant with a healthy diet and senior adults the lowest; and also
420 regarding the level of education, with participants who had a university degree showing better
421 perceptions towards a healthy diet. It was also found a significant difference in average scores from
422 those who did not have any chronic disease and those who had, with a highest score for the
423 participants who did not have any chronic disease.

424 Overall, the results allowed concluding that the participants in the study had knowledge about
425 some nutritional aspects of their diet, and therefore their perceptions were compliant with a healthy

426 diet. These findings are very important, because they allow to identify how people interpret a healthy
427 eating, which is fundamental to promote and implement strategies that may contribute to healthier
428 eating habits among this group of population.

429 One limitation of this study is related to the fact that height and weight values have been self-
430 reported, which means that they might not be as accurate as physical anthropometric measurements.
431 Another limitation is the relatively low number of participants representing the targeted population
432 and also the fact that they were mostly students. Nevertheless, the relative proportions of these
433 groups (students, staff and professors) are indicative of the real proportions in the Portuguese
434 universities. Finally, some possible improvements for future studies could be to include a larger
435 number of university people from different institutions, possibly including more staff and professors,
436 and to access the height and weight through direct measurement.

437

438 ACKNOWLEDGMENT

439 This work was prepared in the ambit of the multinational project EATMOT from CI&DETS
440 Research Centre (IPV - Viseu, Portugal) with reference PROJ/CI&DETS/CGD/0012.

441

442 REFERENCES

443 Aikman, S.N., Crites, S.L. and Fabrigar, L.R. (2006), “Beyond Affect and Cognition: Identification
444 of the Informational Bases of Food Attitudes1”, *Journal of Applied Social Psychology*, Vol.
445 36 No. 2, pp. 340–382.

446 Alvarenga, M.S., Koritar, P., Pisciolaro, F., Mancini, M., Cordás, T.A. and Scagliusi, F.B. (2014),
447 “Eating attitudes of anorexia nervosa, bulimia nervosa, binge eating disorder and obesity
448 without eating disorder female patients: differences and similarities”, *Physiology & Behavior*,
449 Vol. 131, pp. 99–104.

450 Araújo, W. (2008), *Alquimia Dos Alimentos*, Vol. 2, Senac, Brasilia.

- 451 Barzegari, A., Ebrahimi, M., Azizi, M. and Ranjbar, K. (2011), “A study of Nutrition knowledge,
452 attitudes and food habits of college students”, *World Applied Sciences Journal*, Vol. 15 No.
453 7, pp. 1012–1017.
- 454 Bellisle, F. (1999), “Food choice, appetite and physical activity”, *Public Health Nutrition*, Vol. 2 No.
455 3A, pp. 357–361.
- 456 Bisogni, C.A., Jastran, M., Seligson, M. and Thompson, A. (2012), “How People Interpret Healthy
457 Eating: Contributions of Qualitative Research”, *Journal of Nutrition Education and Behavior*,
458 Vol. 44 No. 4, pp. 282–301.
- 459 Böhn, L., Störsrud, S., Törnblom, H., Bengtsson, U. and Simrén, M. (2013), “Self-reported food-
460 related gastrointestinal symptoms in IBS are common and associated with more severe
461 symptoms and reduced quality of life”, *The American Journal of Gastroenterology*, Vol. 108
462 No. 5, pp. 634–641.
- 463 Campbell, I. (2003), “The obesity epidemic: can we turn the tide?”, *Heart*, Vol. 89 No. Suppl 2, pp.
464 ii22-ii24.
- 465 Chalabaev, A., Sarrazin, P., Fontayne, P., Boiché, J. and Clément-Guillot, C. (2013), “The
466 influence of sex stereotypes and gender roles on participation and performance in sport and
467 exercise: Review and future directions”, *Psychology of Sport and Exercise*, Vol. 14 No. 2, pp.
468 136–144.
- 469 Chang, V.W. (2006), “Racial residential segregation and weight status among US adults”, *Social
470 Science & Medicine (1982)*, Vol. 63 No. 5, pp. 1289–1303.
- 471 Conklin, A.I., Forouhi, N.G., Surtees, P., Khaw, K.-T., Wareham, N.J. and Monsivais, P. (2014),
472 “Social relationships and healthful dietary behaviour: Evidence from over-50s in the EPIC
473 cohort, UK”, *Social Science & Medicine*, Vol. 100, pp. 167–175.
- 474 Dammann, K.W. and Smith, C. (2011), “Food-related environmental, behavioral, and personal
475 factors associated with body mass index among urban, low-income African-American,
476 American Indian, and Caucasian women”, *American Journal of Health Promotion: AJHP*,
477 Vol. 25 No. 6, pp. e1–e10.
- 478 Darmon, N. and Drewnowski, A. (2015), “Contribution of food prices and diet cost to
479 socioeconomic disparities in diet quality and health: a systematic review and analysis”,
480 *Nutrition Reviews*, Vol. 73 No. 10, pp. 643–660.

- 481 Deliens, T., Clarys, P., De Bourdeaudhuij, I. and Deforche, B. (2014), “Determinants of eating
482 behaviour in university students: a qualitative study using focus group discussions”, *BMC*
483 *Public Health*, Vol. 14, p. 53.
- 484 Deshmukh-Taskar, P., Nicklas, T.A., Yang, S.-J. and Berenson, G.S. (2007), “Does Food Group
485 Consumption Vary by Differences in Socioeconomic, Demographic, and Lifestyle Factors in
486 Young Adults? The Bogalusa Heart Study”, *Journal of the American Dietetic Association*,
487 Vol. 107 No. 2, pp. 223–234.
- 488 Dickson-Spillmann, M. and Siegrist, M. (2011), “Consumers’ knowledge of healthy diets and its
489 correlation with dietary behaviour”, *Journal of Human Nutrition and Dietetics*, Vol. 24 No. 1,
490 pp. 54–60.
- 491 Diez-Roux, A.V., Nieto, F.J., Caulfield, L., Tyroler, H.A., Watson, R.L. and Szklo, M. (1999),
492 “Neighbourhood differences in diet: the Atherosclerosis Risk in Communities (ARIC)
493 Study”, *Journal of Epidemiology and Community Health*, Vol. 53 No. 1, pp. 55–63.
- 494 Dinu, M., Abbate, R., Gensini, G.F., Casini, A. and Sofi, F. (2017), “Vegetarian, vegan diets and
495 multiple health outcomes: A systematic review with meta-analysis of observational studies”,
496 *Critical Reviews in Food Science and Nutrition*, Vol. 57 No. 17, pp. 3640–3649.
- 497 Dunne, C. and Somerset, M. (2004), “Health promotion in university: what do students want?”,
498 *Health Education*, Vol. 104 No. 6, pp. 360–370.
- 499 Estaquio, C., Druesne-Pecollo, N., Latino-Martel, P., Dauchet, L., Hercberg, S. and Bertrais, S.
500 (2008), “Socioeconomic differences in fruit and vegetable consumption among middle-aged
501 French adults: adherence to the 5 A Day recommendation”, *Journal of the American Dietetic*
502 *Association*, Vol. 108 No. 12, pp. 2021–2030.
- 503 Eves, A., Kipps, M. and Parlett, G. (1995), “Undernourished students – myth or reality?”, *Nutrition*
504 *& Food Science*, Vol. 95 No. 2, pp. 5–11.
- 505 Fett, A.-K., Lattimore, P., Roefs, A., Geschwind, N. and Jansen, A. (2009), “Food cue exposure and
506 body image satisfaction: The moderating role of BMI and dietary restraint”, *Body Image*,
507 Vol. 6 No. 1, pp. 14–18.
- 508 Fyler, M., Schumacher, J., Banning, J. and Gam, H.J. (2014), “Influence of Body Satisfaction, Body
509 Mass Index, and Diet Quality on Healthy Eating Attitudes among College Students”, *Family*
510 *and Consumer Sciences Research Journal*, Vol. 42 No. 4, pp. 330–340.

- 511 Ganasegeran, K., Al-Dubai, S.A., Qureshi, A.M., Al-abed, A.A., AM, R. and Aljunid, S.M. (2012),
512 “Social and psychological factors affecting eating habits among university students in a
513 Malaysian medical school: a cross-sectional study”, *Nutrition Journal*, Vol. 11, p. 48.
- 514 Grafova, I.B. (2006), “Obesity and Nutritional Knowledge”, available at:
515 [http://citation.allacademic.com/meta/p_mla_apa_research_citation/0/9/0/2/9/p90292_index.ht](http://citation.allacademic.com/meta/p_mla_apa_research_citation/0/9/0/2/9/p90292_index.html)
516 [ml](http://citation.allacademic.com/meta/p_mla_apa_research_citation/0/9/0/2/9/p90292_index.html) (accessed 25 July 2017).
- 517 Guenther, P.M., Casavale, K.O., Reedy, J., Kirkpatrick, S.I., Hiza, H.A.B., Kuczynski, K.J., Kahle,
518 L.L., et al. (2013), “Update of the Healthy Eating Index: HEI-2010”, *Journal of the Academy*
519 *of Nutrition and Dietetics*, Vol. 113 No. 4, pp. 569–580.
- 520 Guiné, R.P.F., Almeida, I.C., Correia, A.C. and Gonçalves, F.J. (2015), “Evaluation of the physical,
521 chemical and sensory properties of raisins produced from grapes of the cultivar Crimson”,
522 *Journal of Food Measurement and Characterization*, Vol. 9 No. 3, pp. 337–346.
- 523 Guiné, R.P.F., Henriques, F. and Barroca, M.J. (2014), “Influence of drying treatments on the
524 physical and chemical properties of cucumber”, *Journal of Food Measurement and*
525 *Characterization*, Vol. 8 No. 3, pp. 195–206.
- 526 Harrington, J., Fitzgerald, A.P., Layte, R., Lutomski, J., Molcho, M. and Perry, I.J. (2011),
527 “Sociodemographic, health and lifestyle predictors of poor diets”, *Public Health Nutrition*,
528 Vol. 14 No. 12, pp. 2166–2175.
- 529 Hartmann, C., Dohle, S. and Siegrist, M. (2014), “Time for change? Food choices in the transition to
530 cohabitation and parenthood”, *Public Health Nutrition*, Vol. 17 No. 12, pp. 2730–2739.
- 531 Hearty, Á.P., McCarthy, S.N., Kearney, J.M. and Gibney, M.J. (2007), “Relationship between
532 attitudes towards healthy eating and dietary behaviour, lifestyle and demographic factors in a
533 representative sample of Irish adults”, *Appetite*, Vol. 48 No. 1, pp. 1–11.
- 534 Hendrie, G.A., Coveney, J. and Cox, D. (2008), “Exploring nutrition knowledge and the
535 demographic variation in knowledge levels in an Australian community sample”, *Public*
536 *Health Nutrition*, Vol. 11 No. 12, pp. 1365–1371.
- 537 Hendrie, G.A., Cox, D.N. and Coveney, J. (2008), “Validation of the General Nutrition Knowledge
538 Questionnaire in an Australian community sample”, *Nutrition & Dietetics*, Vol. 65 No. 1, pp.
539 72–77.
- 540 Hoek, H.W. (2006), “Incidence, prevalence and mortality of anorexia nervosa and other eating
541 disorders”, *Current Opinion in Psychiatry*, Vol. 19 No. 4, pp. 389–394.

- 542 Hudson, J.I., Hiripi, E., Pope, H.G. and Kessler, R.C. (2007), “The Prevalence and Correlates of
543 Eating Disorders in the National Comorbidity Survey Replication”, *Biological Psychiatry*,
544 Vol. 61 No. 3, pp. 348–358.
- 545 Jackson, B., Lynne Cooper, M., Mintz, L. and Albino, A. (2003), “Motivations to eat: Scale
546 development and validation”, *Journal of Research in Personality*, Vol. 37 No. 4, pp. 297–
547 318.
- 548 Johnson, N.J., Backlund, E., Sorlie, P.D. and Loveless, C.A. (2000), “Marital Status and Mortality”,
549 *Annals of Epidemiology*, Vol. 10 No. 4, pp. 224–238.
- 550 Joung, I.M., Stronks, K., van de Mheen, H. and Mackenbach, J.P. (1995), “Health behaviours
551 explain part of the differences in self reported health associated with partner/marital status in
552 The Netherlands.”, *Journal of Epidemiology and Community Health*, Vol. 49 No. 5, pp. 482–
553 488.
- 554 Kant, A.K. and Graubard, B.I. (2007), “Secular trends in the association of socio-economic position
555 with self-reported dietary attributes and biomarkers in the US population: National Health
556 and Nutrition Examination Survey (NHANES) 1971-1975 to NHANES 1999-2002”, *Public
557 Health Nutrition*, Vol. 10 No. 2, pp. 158–167.
- 558 Kearney, M., Kelly, A. and Gibney, M.J. (1998), “Attitudes toward and Beliefs about Nutrition and
559 Health among a Nationally Representative Sample of Irish Adults: Application of Logistic
560 Regression Modelling”, *Journal of Nutrition Education*, Vol. 30 No. 3, pp. 139–148.
- 561 Kearns, K., Dee, A., Fitzgerald, A.P., Doherty, E. and Perry, I.J. (2014), “Chronic disease burden
562 associated with overweight and obesity in Ireland: the effects of a small BMI reduction at
563 population level”, *BMC Public Health*, Vol. 14, p. 143.
- 564 Kennedy, B.K., Berger, S.L., Brunet, A., Campisi, J., Cuervo, A.M., Epel, E.S., Franceschi, C., et al.
565 (2014), “Geroscience: Linking Aging to Chronic Disease”, *Cell*, Vol. 159 No. 4, pp. 709–
566 713.
- 567 Kiefer, I., Rathmanner, T. and Kunze, M. (2005), “Eating and dieting differences in men and
568 women”, *The Journal of Men’s Health & Gender*, Vol. 2 No. 2, pp. 194–201.
- 569 King, N.A. (1998), “The relationship between physical activity and food intake”, *Proceedings of the
570 Nutrition Society*, Vol. 57 No. 1, pp. 77–84.
- 571 Kobayashi, M., Uesugi, S., Hikosaka, R. and Aikawa, R. (2015), “Relationship between professional
572 experience as a practicing dietitian and lifestyle and dietary habits among graduates of a

- 573 department of food science and nutrition”, *Nutrition & Food Science*, Vol. 45 No. 5, pp. 716–
574 727.
- 575 Kwok, C.S., Umar, S., Myint, P.K., Mamas, M.A. and Loke, Y.K. (2014), “Vegetarian diet, Seventh
576 Day Adventists and risk of cardiovascular mortality: A systematic review and meta-analysis”,
577 *International Journal of Cardiology*, Vol. 176 No. 3, pp. 680–686.
- 578 Lallukka, T., Laaksonen, M., Rahkonen, O., Roos, E. and Lahelma, E. (2007), “Multiple socio-
579 economic circumstances and healthy food habits”, *European Journal of Clinical Nutrition*,
580 Vol. 61 No. 6, pp. 701–710.
- 581 Larson, N.I., Story, M.T. and Nelson, M.C. (2009), “Neighborhood Environments”, *American*
582 *Journal of Preventive Medicine*, Vol. 36 No. 1, p. 74–81.e10.
- 583 Lê, J., Dallongeville, J., Wagner, A., Arveiler, D., Haas, B., Cottel, D., Simon, C., et al. (2013),
584 “Attitudes toward healthy eating: a mediator of the educational level-diet relationship”,
585 *European Journal of Clinical Nutrition*, Vol. 67 No. 8, pp. 808–814.
- 586 Likert, R. (1932), “A technique for the measurement of attitudes”, *Archives of Psychology*, Vol. 22
587 140, p. 55.
- 588 Lindeman, M. and Väänänen, M. (2000), “Measurement of ethical food choice motives”, *Appetite*,
589 Vol. 34 No. 1, pp. 55–59.
- 590 Lopez, R.P. (2007), “Neighborhood risk factors for obesity”, *Obesity (Silver Spring, Md.)*, Vol. 15
591 No. 8, pp. 2111–2119.
- 592 Maddock, S., Leek, S. and Foxall, G. (1999), “Healthy eating or chips with everything?”, *Nutrition*
593 *& Food Science*, Vol. 99 No. 6, pp. 270–277.
- 594 Malon, A., Deschamps, V., Salanave, B., Vernay, M., Szego, E., Estaquio, C., Kesse-Guyot, E., et al.
595 (2010), “Compliance with French nutrition and health program recommendations is strongly
596 associated with socioeconomic characteristics in the general adult population”, *Journal of the*
597 *American Dietetic Association*, Vol. 110 No. 6, pp. 848–856.
- 598 Marshall, C.E., Lengyel, C.O. and Menec, V.H. (2014), “Body image and body work among older
599 women: a review”, *Ethnicity and Inequalities in Health and Social Care*, Vol. 7 No. 4, pp.
600 198–210.
- 601 McNaughton, S.A., Ball, K., Crawford, D. and Mishra, G.D. (2008), “An index of diet and eating
602 patterns is a valid measure of diet quality in an Australian population”, *The Journal of*
603 *Nutrition*, Vol. 138 No. 1, pp. 86–93.

- 604 Mullie, P., Clarys, P., Hulens, M. and Vansant, G. (2010), “Dietary patterns and socioeconomic
605 position”, *European Journal of Clinical Nutrition*, Vol. 64 No. 3, pp. 231–238.
- 606 Nani, M. (2016), *Relationship between Nutrition Knowledge and Food Intake of College Students*,
607 Thesis submitted to the Kent State University College of Education, Health, and Human
608 Services in partial fulfillment of the requirements for the degree of Master of Nutrition, Kent
609 State University College of Education, p. 130.
- 610 Naughton, P., McCarthy, S.N. and McCarthy, M.B. (2015), “The creation of a healthy eating
611 motivation score and its association with food choice and physical activity in a cross sectional
612 sample of Irish adults”, *The International Journal of Behavioral Nutrition and Physical
613 Activity*, Vol. 12, available at:<https://doi.org/10.1186/s12966-015-0234-0>.
- 614 Nelson, M.C., Gordon-Larsen, P., Song, Y. and Popkin, B.M. (2006), “Built and social environments
615 associations with adolescent overweight and activity”, *American Journal of Preventive
616 Medicine*, Vol. 31 No. 2, pp. 109–117.
- 617 Northstone, K. and Emmett, P.M. (2010), “Dietary patterns of men in ALSPAC: associations with
618 socio-demographic and lifestyle characteristics, nutrient intake and comparison with
619 women’s dietary patterns”, *European Journal of Clinical Nutrition*, Vol. 64 No. 9, pp. 978–
620 986.
- 621 Ogden, C.L., Carroll, M.D., McDowell, M.A. and Flegal, K.M. (2007), “Obesity among adults in the
622 United States--no statistically significant change since 2003-2004”, *NCHS Data Brief*, No. 1,
623 pp. 1–8.
- 624 Parmenter, K., Waller, J. and Wardle, J. (2000), “Demographic variation in nutrition knowledge in
625 England”, *Health Education Research*, Vol. 15 No. 2, pp. 163–174.
- 626 Petrovici, D.A. and Ritson, C. (2006), “Factors influencing consumer dietary health preventative
627 behaviours”, *BMC Public Health*, Vol. 6, p. 222.
- 628 Pollard, J., Greenwood, D., Kirk, S. and Cade, J. (2001), “Lifestyle factors affecting fruit and
629 vegetable consumption in the UK Women’s Cohort Study”, *Appetite*, Vol. 37 No. 1, pp. 71–
630 79.
- 631 Prättälä, R., Paalanen, L., Grinberga, D., Helasoja, V., Kasmel, A. and Petkeviciene, J. (2007),
632 “Gender differences in the consumption of meat, fruit and vegetables are similar in Finland
633 and the Baltic countries”, *European Journal of Public Health*, Vol. 17 No. 5, pp. 520–525.
- 634 Raffensperger, S., Kuczmarski, M.F., Hotchkiss, L., Cotugna, N., Evans, M.K. and Zonderman, A.B.
635 (2010), “Effect of race and predictors of socioeconomic status on diet quality in the

- 636 HANDLS Study sample”, *Journal of the National Medical Association*, Vol. 102 No. 10, pp.
637 923–930.
- 638 Reiner, M., Niermann, C., Jekauc, D. and Woll, A. (2013), “Long-term health benefits of physical
639 activity – a systematic review of longitudinal studies”, *BMC Public Health*, No. 13, p. 813.
- 640 Renner, B., Sproesser, G., Strohbach, S. and Schupp, H.T. (2012), “Why we eat what we eat. The
641 Eating Motivation Survey (TEMS)”, *Appetite*, Vol. 59 No. 1, pp. 117–128.
- 642 Robert, S.A. and Reither, E.N. (2004), “A multilevel analysis of race, community disadvantage, and
643 body mass index among adults in the US”, *Social Science & Medicine* (1982), Vol. 59 No.
644 12, pp. 2421–2434.
- 645 Rodrigues, Â., Correia, P. and Guiné, R. (2014), “Physical, chemical and sensorial properties of
646 healthy and mixture breads in Portugal”, *Journal of Food Measurement and
647 Characterization*, Vol. 8, pp. 70–80.
- 648 Rodrigues, T., Lima, M.J., Guiné, R. and Lemos, E. (2013), “Evaluation of Eating Habits among
649 Portuguese University Students: A Preliminary Study”, *World Academy of Science,
650 Engineering and Technology*, Vol. 79, pp. 481–485.
- 651 Roininen, K., Lähteenmäki, L. and Tuorila, H. (1999), “Quantification of Consumer Attitudes to
652 Health and Hedonic Characteristics of Foods”, *Appetite*, Vol. 33 No. 1, pp. 71–88.
- 653 Roos, E., Lahelma, E., Virtanen, M., Prättälä, R. and Pietinen, P. (1998), “Gender, socioeconomic
654 status and family status as determinants of food behaviour”, *Social Science & Medicine*, Vol.
655 46 No. 12, pp. 1519–1529.
- 656 Rundle, A., Diez Roux, A.V., Free, L.M., Miller, D., Neckerman, K.M. and Weiss, C.C. (2007),
657 “The urban built environment and obesity in New York City: a multilevel analysis”,
658 *American Journal of Health Promotion: AJHP*, Vol. 21 No. 4 Suppl, pp. 326–334.
- 659 Rustad, C. and Smith, C. (2013), “Nutrition Knowledge and Associated Behavior Changes in a
660 Holistic, Short-term Nutrition Education Intervention with Low-income Women”, *Journal of
661 Nutrition Education and Behavior*, Vol. 45 No. 6, pp. 490–498.
- 662 Santos, S.C.R.V.L., Guiné, R.P.F. and Barros, A. (2014), “Effect of drying temperatures on the
663 phenolic composition and antioxidant activity of pears of Rocha variety (*Pyrus communis
664 L.*)”, *Journal of Food Measurement and Characterization*, Vol. 8 No. 2, pp. 105–112.

- 665 Sapp, S.G. and Jensen, H.H. (1997), “Reliability and Validity of Nutrition Knowledge and Diet-
666 Health Awareness Tests Developed from the 1989–1991 Diet and Health Knowledge
667 Surveys”, *Journal of Nutrition Education*, Vol. 29 No. 2, pp. 63–72.
- 668 Shepherd, R. and Towler, G. (1992), “Nutrition knowledge, attitudes and fat intake: application of
669 the theory of reasoned action”, *Journal of Human Nutrition and Dietetics*, Vol. 5 No. 6, pp.
670 387–397.
- 671 Silanikove, N., Leitner, G. and Merin, U. (2015), “The Interrelationships between Lactose
672 Intolerance and the Modern Dairy Industry: Global Perspectives in Evolutional and Historical
673 Backgrounds”, *Nutrients*, Vol. 7 No. 9, pp. 7312–7331.
- 674 Spronk, I., Kullen, C., Burdon, C. and O’Connor, H. (2014), “Relationship between nutrition
675 knowledge and dietary intake”, *The British Journal of Nutrition*, Vol. 111 No. 10, pp. 1713–
676 1726.
- 677 Steptoe, A., Pollard, T.M. and Wardle, J. (1995), “Development of a measure of the motives
678 underlying the selection of food: the food choice questionnaire”, *Appetite*, Vol. 25 No. 3, pp.
679 267–284.
- 680 Stimpson, J.P., Nash, A.C., Ju, H. and Eschbach, K. (2007), “Neighborhood Deprivation is
681 associated with lower levels of serum carotenoids among adults participating in the Third
682 National Health and Nutrition Examination Survey”, *Journal of the American Dietetic
683 Association*, Vol. 107 No. 11, pp. 1895–1902.
- 684 Striegel-Moore, R.H. and Bulik, C.M. (2007), “Risk factors for eating disorders”, *The American
685 Psychologist*, Vol. 62 No. 3, pp. 181–198.
- 686 Striegel-Moore, R.H., Rosselli, F., Perrin, N., DeBar, L., Wilson, G.T., May, A. and Kraemer, H.C.
687 (2009), “Gender Difference in the Prevalence of Eating Disorder Symptoms”, *The
688 International Journal of Eating Disorders*, Vol. 42 No. 5, pp. 471–474.
- 689 van Strien, T., Frijters, J.E.R., Bergers, G.P.A. and Defares, P.B. (1986), “The Dutch Eating
690 Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating
691 behavior”, *International Journal of Eating Disorders*, Vol. 5 No. 2, pp. 295–315.
- 692 Umberson, D. (1992), “Gender, marital status and the social control of health behavior”, *Social
693 Science & Medicine*, Vol. 34 No. 8, pp. 907–917.
- 694 Vereecken, C., Henauw, S.D., Maes, L., Moreno, L., Manios, Y., Phillipp, K., Plada, M., et al.
695 (2009), “Reliability and validity of a healthy diet determinants questionnaire for adolescents”,
696 *Public Health Nutrition*, Vol. 12 No. 10, pp. 1830–1838.

- 697 Vocks, S., Legenbauer, T. and Heil, A. (2007), “Food intake affects state body image: Impact of
698 restrained eating patterns and concerns about eating, weight and shape”, *Appetite*, Vol. 49
699 No. 2, pp. 467–475.
- 700 Wardle, J., Parmenter, K. and Waller, J. (2000), “Nutrition knowledge and food intake”, *Appetite*,
701 Vol. 34 No. 3, pp. 269–275.
- 702 Wickrama, K., Conger, R.D. and Lorenz, F.O. (1995), “Work, marriage, lifestyle, and changes in
703 men’s physical health”, *Journal of Behavioral Medicine*, Vol. 18 No. 2, pp. 97–111.
- 704 Witten, R. and Witte, J. (2009), *Statistics*, 9th ed., Wiley, NJ.
- 705 World Health Organization. (2000), “Obesity: preventing and managing the global epidemic”, *WHO*,
706 available at:
707 http://www.who.int/entity/nutrition/publications/obesity/WHO_TRS_894/en/index.html
708 (accessed 24 July 2017).
- 709 World Health Organization. (2006), “Global Database on Body Mass Index”, available at:
710 http://apps.who.int/bmi/index.jsp?introPage=intro_3.html (accessed 26 July 2017).
- 711 World Health Organization. (2009), *Global Health Risks: Mortality and Burden of Disease*
712 *Attributable to Selected Major Risks*, Geneva: World Health Organization, available at:
713 <http://www.who.int/iris/handle/10665/44203> (accessed 27 July 2017).
- 714 World Health Organization. (2016), “Obesity and overweight”, *WHO*, available at:
715 <http://www.who.int/mediacentre/factsheets/fs311/en/> (accessed 28 July 2017).
- 716 Worsley, A. (2002), “Nutrition knowledge and food consumption: can nutrition knowledge change
717 food behaviour?”, *Asia Pacific Journal of Clinical Nutrition*, Vol. 11 Suppl 3, pp. S579-585.
- 718 Yannakoulia, M., Panagiotakos, D., Pitsavos, C., Skoumas, Y. and Stefanadis, C. (2008), “Eating
719 patterns may mediate the association between marital status, body mass index, and blood
720 cholesterol levels in apparently healthy men and women from the ATTICA study”, *Social*
721 *Science & Medicine*, Vol. 66 No. 11, pp. 2230–2239.
- 722 Zheng, X., Chu, H., Cong, Y., Deng, Y., Long, Y., Zhu, Y., Pohl, D., et al. (2015), “Self-reported
723 lactose intolerance in clinic patients with functional gastrointestinal symptoms: prevalence,
724 risk factors, and impact on food choices”, *Neurogastroenterology & Motility*, Vol. 27 No. 8,
725 pp. 1138–1146.

726
727

728

729

Table 1. Sociodemographical characterization of the sample at study.

| Sociodemographic Data | | Frequency | Percentage |
|-------------------------------------|-------------------------|------------------|-------------------|
| | | (N) | (%) |
| Age | 18y ≤ age ≤ 30y | 314 | 82.2 |
| | 31y ≤ age ≤ 50y | 50 | 13.1 |
| | 51y ≤ age ≤ 64y | 15 | 3.9 |
| | Age ≥ 65y | 3 | 0.8 |
| Gender | Women | 294 | 77.0 |
| | Men | 88 | 23.0 |
| Highest Level of Education | Primary School | 1 | 0.3 |
| | Secondary School | 304 | 79.6 |
| | University Degree | 77 | 20.2 |
| Civil State | Single | 314 | 82.2 |
| | Married/Living Together | 56 | 14.7 |
| | Divorced/Separated | 10 | 2.6 |
| | Widow | 2 | 2.6 |
| Profession | Student | 284 | 74.3 |
| | Employed | 67 | 17.5 |
| | Unemployed | 2 | 0.5 |
| | Retired | 1 | 0.3 |
| | Working student | 28 | 7.3 |
| Total Number of Participants | | 382 | 100.0 |

730

731

732
733
734
735
736
737
738
739

Table 2. BMI according to gender.

| BMI class (kg/m ²) | Global | Women | Men | Chi square test ¹ | Cramer's Coefficient ² |
|--|------------|------------|-----------|---------------------------------|--------------------------------------|
| | N (%) | N (%) | N (%) | <i>p-value</i> | V |
| Underweight (BMI < 18.50) | 21 (5.7) | 21 (7.4) | 0 (0.0) | 0.058 | 0.142 |
| Normal weight (18.50 ≤ BMI ≤ 24.99) | 272 (73.3) | 208 (73.0) | 64 (74.4) | | |
| Overweight (25.00 ≤ BMI ≤ 29.99) | 67 (18.1) | 48 (16.8) | 19 (22.1) | | |
| Obesity (≥ 30.00) | 11 (3.0) | 8 (2.8) | 3 (3.5) | | |

740 ¹ Used to assess the relations between the variables under study (level of significance 5%).

741 ² Used to evaluate the strength of the significant relations found between the variables at study.

742

743 Table 3. Voluntary dietary regimen practice by the participants, according to gender.

| Specific dietary regimen | Global | Women | Men | Chi square test ¹ | Cramer's Coefficient ² |
|-----------------------------|--------|-------|-------|---------------------------------|--------------------------------------|
| | N (%) | N (%) | N (%) | <i>p-value</i> | V |

| | | | | | |
|-----------------------|------------|------------|-----------|-------|-------|
| Raw foodism | 0 (0.0) | 0 (0.0) | 0 (0.0) | | |
| Fruitarianism | 2 (0.5) | 2 (0.7) | 0 (0.0) | | |
| Vegetarianism | 11 (2.9) | 10 (3.4) | 1 (1.1) | | |
| Veganism | 0 (0.0) | 0 (0.0) | 0 (0.0) | | |
| Flexitarianism | 8 (2.1) | 7 (2.4) | 1 (1.1) | 0.017 | 0.202 |
| Caloric restriction | 40 (10.5) | 38 (13.0) | 2 (2.3) | | |
| Religious restriction | 2 (0.5) | 2 (0.7) | 0 (0.0) | | |
| Other | 5 (1.3) | 2 (0.7) | 3 (3.4) | | |
| None | 313 (82.2) | 232 (79.2) | 81 (92.0) | | |

744
745
746

¹ Used to assess the relations between the variables under study (level of significance 5%).

² Used to evaluate the strength of the significant relations found between the variables at study.

747

Table 4. Participants' chronic diseases.

| Chronic diseases | Global | | Women | | Men | | Chi square test ¹ | Cramer's coefficient ² |
|-------------------------|---------|--------|---------|--------|---------|--------|------------------------------|-----------------------------------|
| | Yes (%) | No (%) | Yes (%) | No (%) | Yes (%) | No (%) | <i>p-value</i> | V |
| Cardiovascular diseases | 1.1 | 98.9 | 1.0 | 99.0 | 1.1 | 98.9 | 0.927 | 0.005 |
| Diabetes | 0.8 | 99.2 | 0.7 | 99.3 | 1.1 | 98.9 | 0.672 | 0.022 |
| High cholesterol | 2.4 | 97.6 | 3.1 | 96.9 | 0.0 | 100.0 | 0.096 | 0.086 |
| Arterial hypertension | 2.1 | 97.9 | 1.4 | 98.6 | 4.6 | 95.4 | 0.068 | 0.094 |
| Gastric disorders | 0.5 | 99.5 | 0.7 | 99.3 | 0.0 | 100.0 | 0.437 | 0.040 |
| Intestinal disorders | 0.3 | 99.7 | 0.3 | 99.7 | 0.0 | 100.0 | 0.583 | 0.028 |
| Obesity | 1.1 | 98.9 | 0.7 | 99.3 | 2.3 | 97.7 | 0.199 | 0.066 |
| Others | 8.2 | 91.8 | 8.6 | 91.4 | 6.9 | 93.1 | 0.608 | 0.026 |
| None | 84.9 | 15.1 | 85.2 | 14.8 | 83.9 | 16.1 | 0.773 | 0.015 |

749 ¹ Used to assess the relations between the variables under study (level of significance 5%).

750 ² Used to evaluate the strength of the significant relations found between the variables at study.

751

752

Table 5. Participants' food allergies/intolerances.

| Food allergies/intolerances | Global | | Women | | Men | | Chi square test ¹ | Cramer's coefficient ² |
|-----------------------------|---------|--------|---------|--------|---------|--------|------------------------------|-----------------------------------|
| | Yes (%) | No (%) | Yes (%) | No (%) | Yes (%) | No (%) | <i>p-value</i> | V |
| Lactose intolerance | 6.3 | 93.7 | 8.3 | 91.7 | 0.0 | 100.0 | 0.005 | 0.143 |
| Casein | 0.3 | 99.7 | 0.3 | 99.7 | 0.0 | 100.0 | 0.581 | 0.028 |
| Gluten | 1.1 | 98.9 | 1.0 | 99.0 | 1.1 | 98.9 | 0.935 | 0.004 |
| Nuts | 0.3 | 99.7 | 0.0 | 100.0 | 1.1 | 98.9 | 0.069 | 0.093 |
| Shellfish | 2.1 | 97.9 | 2.1 | 97.9 | 2.3 | 97.7 | 0.907 | 0.006 |
| Others | 1.9 | 98.1 | 2.1 | 97.9 | 1.1 | 98.9 | 0.570 | 0.029 |
| None | 89.7 | 10.3 | 88.3 | 11.7 | 94.3 | 5.7 | 0.103 | 0.084 |

753 ¹ Used to assess the relations between the variables under study (level of significance 5%).

754 ² Used to evaluate the strength of the significant relations found between the variables at study.

755

Table 6. Participants' eating disorders.

| Eating disorders | Global | Women | Men | Chi square test ¹ | Cramer's Coefficient ² |
|------------------|------------|------------|-----------|------------------------------|-----------------------------------|
| | N (%) | N (%) | N (%) | <i>p-value</i> | V |
| Bulimia | 3 (0.8) | 3 (1.0) | 0 (0.0) | 0.396 | 0.103 |
| Anorexia | 13 (3.4) | 12 (4.1) | 1 (1.1) | | |
| Binge-eating | 7 (1.8) | 6 (2.0) | 1 (1.1) | | |
| Other | 3 (0.8) | 3 (1.0) | 0 (0.0) | | |
| None | 356 (93.2) | 270 (91.8) | 86 (97.7) | | |

759 Table 7. Relations between sociodemographical characteristics and the *perceptions towards a*
 760 *healthy diet* (scale from -2 = perceptions not at all compliant with a healthy diet to +2 = perceptions
 761 fully compliant with a healthy diet).

| Variable | | Mean \pm SD | <i>p</i> -value |
|------------------------------------|---------------------------|------------------|--------------------|
| Age group | 18y \leq age \leq 30y | 1.05 \pm 0.35b | 0.004 ¹ |
| | 31y \leq age \leq 50y | 1.02 \pm 0.45b | |
| | 51y \leq age \leq 64y | 0.69 \pm 0.57a | |
| | Age \geq 65y | 1.00 \pm 0.29b | |
| Gender | Women | 1.05 \pm 0.38 | 0.197 ² |
| | Men | 0.99 \pm 0.38 | |
| Civil state | Single | 1.05 \pm 0.36 | 0.158 ¹ |
| | Married/Living together | 0.94 \pm 0.45 | |
| | Divorced/Separated | 0.91 \pm 0.70 | |
| | Widowed | 0.86 \pm 0.20 | |
| Level of Education | Primary School | 0.57 \pm 0.00a | 0.025 ¹ |
| | Secondary School | 1.01 \pm 0.37b | |
| | University | 1.13 \pm 0.38b | |
| Is responsible for buying the food | Yes | 1.02 \pm 0.39 | 0.438 ² |
| | No | 1.06 \pm 0.35 | |
| Living Environment | Rural | 1.04 \pm 0.36 | 0.750 ¹ |
| | Urban | 1.03 \pm 0.41 | |
| | Suburban | 0.99 \pm 0.35 | |
| Professional status | Employed | 0.97 \pm 0.47 | 0.444 ¹ |
| | Unemployed | 0.79 \pm 0.91 | |

| | | | |
|-----------------|-----------------|-----------|--------------------|
| | Student | 1.05±0.34 | |
| | Retired | 1.00±0.00 | |
| | Working student | 0.99±0.48 | |
| Work or studies | Nutrition | 1.48±0.36 | 0.147 ¹ |
| related areas | Food | 1.07±0.43 | |
| | Agriculture | 1.06±0.40 | |
| | Sport | 1.06±0.35 | |
| | Psychology | 1.13±0.29 | |
| | Health | 1.05±0.33 | |
| | Others | 0.97±0.38 | |

762
763
764
765
766

¹ANOVA for comparison of 3 or more groups (Level of significance 5%). Mean values with the same letter are not statistically different ($p < 0.05$).

²Student's t-test for independent samples for comparison of 2 groups (Level of significance 5%).

767
768

769
770
771

Table 8. Relations between anthropometric data, behavioural and health related elements and the perceptions towards a healthy diet (scale from -2 = perceptions not at all compliant with a healthy diet to +2 = perceptions fully compliant with a healthy diet).

| Variable | | Mean ± SD | p-value |
|--|--|--------------------|--------------------|
| BMI class (kg/m ²) | Underweight (BMI < 18.50) | 1.07±0.39 | 0.223 ¹ |
| | Normal weight (18.50 ≤ BMI ≤ 24.99) | 1.05±0.37 | |
| | Overweight (25.00 ≤ BMI ≤ 29.99) | 0.96±0.46 | |
| | Obesity (≥ 30.00) | 0.91±0.21 | |
| Physical activity ² | Never | 1.00±0.41 | 0.753 ¹ |
| | Sporadically | 1.05±0.35 | |
| | Occasionally | 1.04±0.40 | |
| | Moderately | 1.00±0.37 | |
| | Intensively | 1.08±0.43 | |
| Considers to practice a healthy diet | Never | 1.10±0.50 | 0.093 ¹ |
| | Rarely | 1.05±0.34 | |
| | Sometimes | 1.01±0.38 | |
| | Frequently | 0.64±0.46 | |
| | Always | 1.03±0.38 | |
| Special food regimen | Raw foodism | ----- ³ | 0.177 ¹ |
| | Frutarianism | 0.93±0.30 | |
| | Vegetarianism | 1.14±0.39 | |

| Veganism | | ----- ³ | |
|----------------------------|-----------------------|--------------------|--------------------|
| | Flexitarianism | 1.02±0.49 | |
| | Caloric restriction | 0.89±0.41 | |
| | Religion restrictions | 0.93±0.91 | |
| | Other | 1.26±0.27 | |
| | No special regimen | 1.04±0.37 | |
| Chronic diseases | No | 1.05±0.38 | 0.017 ⁴ |
| | Yes | 0.92±0.42 | |
| Allergies and intolerances | No | 1.03±0.37 | 0.610 ⁴ |
| | Yes | 1.06±0.47 | |
| Eating disorders | Bulimia | 0.57±0.49 | 0.177 ¹ |
| | Anorexia | 0.95±0.49 | |
| | Binge-eating | 1.14±0.48 | |
| | Other | 0.86±0.49 | |
| | None | 1.04±0.37 | |

772
773
774
775
776
777
778
779
780
781

¹ANOVA for comparison of 3 or more groups (Level of significance 5%).

² Physical activity: never – no physical activity besides the daily life activities; sporadically – less than once/week; occasionally – once/week; moderately – 2-3 times/week; intensively – > 3 times/week.

³ There were no occurrences.

⁴ Student's t-test for independent samples for comparison of 2 groups (Level of significance 5%).