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2 PERCEPTIONS TOWARDS A HEALTHY DIET AMONG A SAMPLE

3 OF UNIVERSITY PEOPLE IN PORTUGAL

4 **Running Title: PERCEPTIONS TOWARDS A HEALTHY DIET**

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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.

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

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

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

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

INTRODUCTION

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

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

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

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

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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

4

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

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

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

Sample Characterization

Table 1 summarizes the demographical data for the sample studied. In this survey participated 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 kg/m^2), normal weight ($18.50 \leq$ BMI ≤ 24.99

180   kg/m^2), overweight ($25.00 \leq$ BMI ≤ 29.99 kg/m^2) and obese (BMI ≥ 30.00 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

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

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

Table 3 presents the dietary regimen practiced by the participants, and the results showed that most of the participants (82.2%) did not practice any specific voluntary dietary regimen, being this percentage higher for men (92.0%) when compared to women (79.2%). None of the participants followed a vegan or raw foodism dietary regimen. As it can be observed, 10.5% of the participants followed a caloric restriction as their dietary regimen. When seen by gender, 13.0% of the women indicated following a caloric restriction diet, against only 2.3% of men. The results of the Chi square test proved that these differences between genders were significant, meaning that *gender* influenced *dietary regimen* (χ^2 = 15.494; p = 0.017), although, the values of Cramer's coefficient indicated that 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 ($18y \leq age \leq 30y$). 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 (χ^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 (χ^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 (χ^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 (Hendrieet 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 <u>Social and professional factors</u>

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 <u>BMI and physical activity</u>

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.

15

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

16

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

441

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<div align="center">Table 1. Sociodemographical characterization of the sample at study.</div>

Sociodemographic Data		Frequency (N)	Percentage (%)
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**

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<div align="center">Table 2. BMI according to gender.</div>

BMI class (kg/m^2)	Global	Women	Men	Chi square test[1]	Cramer´s Coefficient[2]
	N (%)	N (%)	N (%)	*p-value*	V
Underweight (BMI< 18.50)	21 (5.7)	21 (7.4)	0 (0.0)		
Normal weight (18.50 ≤ BMI ≤ 24.99)	272 (73.3)	208 (73.0)	64 (74.4)	0.058	0.142
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.
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743 <div align="center">Table 3. Voluntary dietary regimen practice by the participants, according to gender.</div>

Specific dietary regimen	Global	Women	Men	Chi square test[1]	Cramer´s Coefficient[2]
	N (%)	N (%)	N (%)	*p-value*	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 [1] Used to assess the relations between the variables under study (level of significance 5%).
745 [2] Used to evaluate the strength of the significant relations found between the variables at study.
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748 Table 4. Participants' chronic diseases.

Chronic diseases	Global		Women		Men		Chi square test[1]	Cramer's coefficient[2]
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	*p-value*	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.
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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 (%)	*p-value*	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.
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Table 6. Participants' eating disorders.

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

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

	Student	1.05±0.34	
	Retired	1.00±0.00	
	Working student	0.99±0.48	
Work or studies related areas	Nutrition	1.48±0.36	*0.147[1]*
	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 [1]ANOVA for comparison of 3 or more groups (Level of significance 5%).Mean values
763 with the same letter are not statistically different ($p < 0.05$).
764 [2]Student's t-test for independent samples for comparison of 2 groups (Level of
765 significance 5%).
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769   Table 8. Relations between anthropometric data, behavioural and health related elements and the
770   *perceptions towards a healthy diet* (scale from -2 = perceptions not at all compliant with a healthy
771   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	

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	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	

[1] ANOVA 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%).