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The Relation between Attitudes toward Functional Foods and Satisfaction with Food-Related Life

1

1   **Abstract**

2   **Purpose** – To assess the effect of attitudes towards functional foods (FF) on university students'

3   satisfaction with food-related life and to distinguish student typologies, considering that the

4   attitudes towards FF are not homogeneous among consumers.

5   **Design/methodology** - A survey was applied to 372 university students (mean age=20.4 years,

6   SD=2.4) in southern Chile. The questionnaire included the Attitudes towards Functional Foods

7   (AFF) questionnaire and the Satisfaction with Food-related Life (SWFL) scale, questions about

8   consumption and knowledge about FF and socio-demographic characteristics.

9   **Findings** – Using Confirmatory Factor Analysis (CFA) and Structural Equation Modelling, it

10 was found that attitudes toward functional foods directly and significantly influence students'

11 satisfaction with food-related life. A cluster analysis applied to the Z-scores from the factors

12 obtained by the CFA classified three typologies: Positive towards FF (36.3%), moderately

13 positive towards FF (43.0%) and negative towards FF (20.7%). The positive towards FF type

14 had a significantly greater SWFL score than the negative towards FF type. The types differ

15 according to consumption and knowledge about FF.

16 **Research limitations/implications** – This study was conducted in the context of only one

17 country in South America.

18 **Originality/value** – This study is the first that assesses the effect of AFF on satisfaction with

19 food-related life in a sample of university students. Fostering positive attitudes towards FF will

20 allow for a growth in the degree of satisfaction with food-related life of university students with

21 features similar to those of the study sample.

22 **Keywords:** Functional foods, attitudes, satisfaction with food-related life, university students.

23 **Paper type:** Research paper.

24

The Relation between Attitudes toward Functional Foods and Satisfaction with Food-Related Life

Introduction

Functional food (FF) is an engaging research topic due to new trends in nutrition (Kljusurić and Čačić, 2014). Although numerous studies have been conducted that analyse the acceptance of FF in relation to age (for examples, see Siegrist *et al*., 2015; Annunziata *et al*., 2015; Kljusurić *et al*., 2015; Bruschi *et al*., 2015; Ares and Gámbaro, 2007; Barrios *et al*., 2008; Krystallis *et al*., 2008; Teratanavat and Hooker, 2006; Hellyer *et al*., 2012; Brečić *et al*., 2014; Büyükkaragöz *et al*., 2014), there are few studies that focus on Attitudes towards Functional Foods (AFF) of young people, such as university students (Kljusurić and Čačić, 2014).

While some authors indicate that young people are less interested in healthy food (Urala and Läthenmäki, 2007; Barrios *et al*., 2008; Büyükkaragöz *et al*., 2014), others suggest that they constitute an interesting group because they represent the future of consumers (Kolodinsky *et al*., 2008; Kljusurić and Čačić, 2014) and are more likely to accept novel products (Teratanavat and Hooker, 2006; Zychowicz-Jezewska, 2009; Brečić *et al*., 2014). The majority of studies on young people have focused on evaluating knowledge of FF (Labrecque *et al.,* 2006; Kolodinsky *et al.,* 2008; Markovina *et al.,* 2011; Savurdan and Aktas, 2011; Bilgiç and Yüksel, 2012; Kljusurić and Čačić, 2014), willingness to buy them (Zychowicz-Jezewska, 2009; Markovina et al., 2011; Kljusurić and Čačić, 2014), attitudes towards them (Labrecque *et al.,* 2006; Devcich *et al.,* 2007; Kolodinsky *et al*., 2008; O'Connor and White, 2010; Markovina *et al*., 2011; Bilgiç and Yüksel, 2012; Bruschi *et al.,* 2015), consumption (Naylor *et al*., 2009; O'Connor and White, 2010; Bilgiç and Yüksel, 2012; Kljusurić and Čačić *et al.,* 2015) and willingness to pay for them (Bruschi *et al.,* 2015).

Young people are a relevant group from a public health perspective in terms of long-term effects of healthy eating (Bruschi *et al*., 2015). Studies done on university students indicate that a large portion do not have healthy diets (Racette *et al*., 2008; Dubuisson *et al*., 2010;

52   Schnettler *et al*., 2013, 2015a), which is linked to a high prevalence of obesity (Smith-Jackson

53   and Reel, 2012), chronic diseases (Winkleby and Cubbin, 2004; Costa Silva *et al*., 2011), and

54   psychological effects (Schnettler *et al*., 2013; 2015a; El Ansari *et al*., 2015). The university

55   period is a critical stage in the development of eating habits that affect future health (Barić *et*

56   *al*., 2003).

57   Current literature suggests that AFF is not homogenous within consumers (Ares and

58   Gámbaro, 2007; Herath *et al*., 2008; Krystallis *et al*., 2008; Schnettler *et al.,* 2015a), that there

59   are differences associated with demographic variables in young people, such as gender

60   (Kolodinsky *et al*., 2008; Bilgiç and Yüksel, 2012) and income level (Markovina *et al*., 2011);

61   while others report a low or null association between these variables (O'Connor and White,

62   2010; Bruschi *et al*., 2015). Some authors suggest that cultural factors play a significant role in

63   AFF (Siegrist *et al*., 2015; Labrecque *et al*., 2006; Kolodinsky *et al*., 2008).

64   Although in the developing countries of South America there is a growing interest in

65   learning about consumer acceptance of FF (Soto *et al*., 2006; Ares and Gámbaro, 2007; Ares *et*

66   *al*., 2008, 2009, 2010; Schnettler *et al*., 2010, 2015b; Harrar *et al*., 2011; Cruz *et al*., 2013; van

67   Vliet *et al*., 2015), studies on young people have been scarce, with the exception of Jiménez *et*

68   *al.* (2010), who studied the knowledge and intent of consumption in Argentina.

69   More than just a basic necessity, eating is associated with a search for happiness and

70   well-being (Carrillo *et al*., 2013). Subjective well-being (SWB) is an assessment people make of

71   their own lives, including happiness, pleasurable emotions, satisfaction with life and the relative

72   absence of unpleasant emotional states. The cognitive component of SWB is satisfaction with

73   life, whether overall or by specific domains (Diener *et al*., 1985, 1999). In the food domain,

74   satisfaction with food-related life (SWFL) is defined as a person's overall assessment regarding

75   eating habits (Grunert *et al*., 2007). Studies indicate that SWFL relates to healthier eating habits.

76   In Korea, Kim *et al*. (2012) concluded that elderly people who were more satisfied with their

77   food-related lives had balanced diets. Within adults in two regions in Chile, Schnettler *et al.*

78   (2011, 2012) found that the probability of high SWFL increased if people practiced healthy

79   eating behaviours. Schnettler *et al.* (2013; 2015a) also determined that university students with

80   healthier eating habits exhibit greater SWFL.

81   Studies have linked AFF with general well-being, satisfaction with life and food-related

82   satisfaction (Menrad, 2003; Niva, 2007; Hailu *et al.,* 2009; Siró *et al.,* 2008). In Spain, Carrillo

83   *et al.* (2013) reported that satisfaction with life influenced positive AFF. In Chile, Schnettler *et*

84   *al.* (2015b) found that people who are more inclined to buy FF are more satisfied with their

85   lives. However, the relationship between AFF and well-being in the food domain has not yet

86   been studied in young people.

87   Although studies indicate that distinct components of SWB affect AFF, others suggest

88   that the relation is the inverse (Menrad, 2003; Niva, 2007; Hailu *et al*., 2009; Siró *et al*., 2008;

89   Silvi *et al*., 2014). In this study, the latter approach is adopted. Upon revising the definition of

90   SWFL (Grunert *et al*., 2007), it is expected that a person's assessment regarding their food and

91   eating habits would be positive if their eating habits favourably impact their health. Therefore,

92   considering health conscious young consumers are more likely to have positive AFF (Naylor *et*

93   *al*., 2009; Kljusurić and Čačić, 2014), and that university students with healthier diets have

94   greater SWFL (Schnettler *et al*., 2013, 2015a), we hypothesise that AFF directly and

95   significantly influence students' SWFL. Therefore, the aims of this study were to test this causal

96   relationship using Structural Equation Modelling (SEM), and to distinguish university student

97   typologies according to their AFF, SWFL, general knowledge of FF and socio-demographic

98   characteristics.

99

100   **Methods**

101   *Sample and procedure*

102   The students were contacted on campus and only those who agreed to participate were

103   surveyed. Thus a non-probabilistic sample was formed of 372 university students belonging to

104   the six faculties of the University of La Frontera in Temuco, Chile. The inclusion criterion in the

105   sample was enrolment status at the institution at the time of the survey.

106   Once students voluntarily agreed to participate, they signed an informed consent prior to

107 completing the survey. A trained surveyor administered the questionnaires during October and

108 November 2014, and the anonymity of the respondents was ensured. A pilot test of the

109 questionnaire was conducted with 10% of the survey sample from the same university,

110 following the same method of addressing the participants as in the definitive survey.

111 Participants deemed the content of the questionnaire and its items as clear and appropriate. As

112 the pilot test of the instrument was satisfactory, no changes were required in either the

113 questionnaire or the interview procedure. The execution of the study was approved by the Ethics

114 Committee of the Faculty de Agriculture and Forestry of the University de La Frontera.

115

116 *Questionnaire.*

117   The questionnaire contained closed questions. The first two questions referred to

118 students' general knowledge about FF; Question 1: "Have you heard, seen or read about

119 functional foods?" (Yes/No), Question 2: "Do you know what it means for food to be

120 functional?" (Yes/No). Then the interviewer read the definition of FF provided by the Institute

121 of Nutrition and Food Technology (INTA, in Spanish, nd) accepted in Chile: "Functional foods

122 are foods that in natural or processed form contain components that have beneficial health

123 effects beyond nutrition". After this, the respondents were asked if they consume FF.

124   Next, the students responded to questions on AFF, using the following scales:

125   The AFF questionnaire developed by Urala and Lähteenmäki (2007) consists of 25

126 items grouped into four factors: "Reward from using FF" (REW, 8 items); "Necessity for FF"

127 (NEC, 8 items); "Confidence in FF" (CON, 4 items) and "Safety of FF" (SAF, 5 items) (Table

128 1). The respondents were asked to indicate their degree of agreement with the statements using a

129 6-level Likert scale (1 = disagree completely), to 6 (agree completely). Urala and Lähteenmäki

130 (2007) reported Cronbach's α of 0.75-0.85 for the factors. More recently, using exploratory and

131 confirmatory factor analysis, Carrillo *et al.* (2013) confirmed the structure of four factors of

132 AFF with 21 items and Cronbach's α of 0.651-0.823 for the factors. Although Carrillo *et al.*

133 (2013) had previously been conducted the AFF in Spanish, we chose to translate the AFF

134 questionnaire from Urala and Lähteenmäki´s (2007) original English version to adapt it to

135 Chilean culture. Two bilingual translators translated the original items of the AFF questionnaire

136 from English to Spanish. A third bilingual translator then back-translated the Spanish version of

137 the scale into English. The differences found were resolved through discussion, with all

138 translators arriving at an agreed final version of the scales (Table 1).

139   The SWFL scale was developed by Grunert *et al*. (2007). It evaluates cognitive

140 judgements on the person's food-related life. It consists of five items grouped into a single

141 dimension: F1. Food and meals are positive elements; F2. I am generally pleased with my food;

142 F3. My life in relation to food and meals is close to ideal; F4. With regard to food, the

143 conditions of my life are excellent; F5. Food and meals give me satisfaction in daily life.

144 Respondents were asked to indicate their degree of agreement with the statements using a 6-

145 point Likert scale (1: disagree completely 6: agree completely). A Spanish-language version of

146 the SWFL was used in this study, which showed good levels of internal consistency with

147 previous studies with university students in Chile (Schnettler *et al.,* 2013; 2015a). In this study,

148 the SWFL presented an adequate level of internal consistency (Cronbach's $\alpha= 0.868$) and the

149 existence of a single factor for all the items (explained variance: 62.3%). The mean SWFL score

150 of all participants was 21.2 (SD = 5.1, range = 5-30).

151   Scales without midpoint (i.e. 6 point Likert scales) were used, as previous testing of the

152 instruments suggested a tendency by university students to concentrate answers at the midpoint

153 (Schnettler et al., 2013; 2015a).

154   Classification questions were included to establish gender, age, area of residence, place

155 of residence during the semester and the education level and occupation of the head of the

156 household. The last two variables are used to determine socioeconomic status (SES),

157 categorized as high, upper middle, middle-middle, lower middle, low, and very low. These

158 variables, conceptually, are related to income, cultural level and the stock of wealth

159 accumulated by the family group, allowing a simple but adequate estimate of the socio-

160 economic level of Chilean households (Adimark, 2004).

161 *Statistical analyses*

162 The effect of AFF on the student's SWFL was assessed by SEM, which tests the causal

163 relationship of a series of regression equations simultaneously separated and interdependent,

164 and includes the factor analysis to explain latent constructs (which are not directly observable),

165 specified in a theoretical model (Hair *et al*., 2007).

166 Anderson and Gerbing (1988) recommended the use of SEM through a two-step

167 approach. First of all, a measurement model was estimated using Confirmatory Factor Analysis

168 (CFA), and SEM was used to test causal relationships. To evaluate the goodness of fit of the

169 model, diverse indicators were used: Chi-square to df ratio ($\chi 2/df < 5.0$); comparative fit index

170 (CFI close to 0.9 or 1.0), goodness of fit index (GFI close to 0.9 or 1.0) and normed fit index

171 (NFI close to 0.9 or 1.0) and the robustness of mean squared error approximation (RMSEA)

172 with values lower than 0.08 (Hair *et al*., 2007; Kline, 2011). The analysis was performed with

173 AMOS 20 and IBM SPSS 20.

174 In terms of construct validity, we assessed convergent validity calculating the

175 standardized factor loadings (ideally values > 0.3), composite reliability (values > 0.6), average

176 variance extracted (values > 0.5) and Cronbach's alpha internal reliability coefficient (values >

177 0.7) (Bagozzi *et al*., 1991; Fornell and Larcker, 1981; Hair *et al*., 2007).

178 A bootstrap procedure was applied to assess the stability of parameters estimated in the

179 model. Five thousand subsamples were created from the original following the procedure

180 proposed by Byrne (2010).

181 A cluster analysis (hierarchical conglomerates) was used to determine typologies of

182 university students according to their AFF, with linkage by Ward's method and the squared

183 Euclidian distance as the measure of similarity between objects (Hair *et al*., 2007). This analysis

184 was applied to the Z-scores resulting from the factor analysis of the AFF questionnaire, only

185 considering items that remained on the scale according to the results of the CFA. The number of

186 groups was obtained by the percentage change of the recomposed conglomeration coefficients.

187 To describe the segments, Pearson's Chi[2] test was applied to the discrete variables and analyses

188 of variance for the continuous variables. Because Levene's test indicated non-homogenous

189 variances, the averages of variables with significant differences (P≤0.001 or P≤0.05) were

190 separated according to Dunnett's T3 test for multiple comparisons.

191

192 **Results**

193 The mean age of the sample was 20.4 years. In terms of gender, 56.5% were women,

194 and 90.3% resided in an urban area (Table 2). The sample was similar to the student population

195 in Chile in 2013 in terms of gender, area of residence (CNED, 2014) and age (Navarrete *et al*.,

196 2013). It included students living with their parents all year round (35.5%) or only

197 weekends/during vacations (38.7%). Most students belonged to families, the head of which had

198 completed secondary school only (39.2%) and university studies (40.8%). In terms of socio-

199 economic situation, 32.5% belonged to the middle-middle SES and 35.5% to lower-middle

200 (Table 2). Of all respondents, 83.6% answered that they had no prior knowledge of FF. Of the

201 16.4% remaining, only 8.1% indicated knowledge of the meaning of FF. After reading the

202 definition, 70.4% of respondents indicated that they consume FF.

203

204 *Measurement and structural model*

205 The first step was to validate the scales through a CFA (AFF and SWFL). Following

206 Stevens (2009), items were eliminated that had factor loadings below 0.40. Therefore, the

207 following items were eliminated from the AFF: "I am prepared to compromise on the taste of a

208 food if the product is functional", "I actively seek out information about functional foods", "It is

209 great that modern technology allows the development of functional foods", "Health effects are

210 not appropriate in delicacies" and "Exaggerated information is given about health effects". The

211 results showed a good fit of the data (Table 3). The internal consistency of the model was

212 assessed by a composite reliability test. The majority of constructs were above 0.7, the average

213   variances extracted were close to or above 0.5 and the internal consistency (Cronbach's α close

214   to or above 0.7) showed good indicators of reliability and validity. Therefore, the measurement

215   model presented an adequate internal validity.

216   Once the scales were validated, the structural model was tested through the Maximum

217   Likelihood algorithm. The structural model had a good fit of the dataset and the indices were

218   within acceptable limits, and exceeded the minimum values recommend in the literature ($\chi2$ =

219   607.13, df = 265, p < 0.01, $\chi2$/df = 2.29, RMSEA = 0.06, CFI = 0.91, GFI = 0.88, NFI = 0.85).

220   Figure 1 shows the results of the model in which AFF is a second order dimension

221   composed by four underlying dimensions in the sample of university students. Considering that

222   all negatively worded statements from the AFF were reversed (Urala and Lähteenmäki, 2007),

223   we can suggest that the second order dimension composed by the four dimensions represent

224   positive AFF. The direct relationship between AFF and SWFL was confirmed (β = 0.17, t =

225   2.40, p = 0.05). Therefore, the results confirm that the SWFL was determined by the attitudes

226   toward FF in the university student sample under study.

227

228   *Typologies of university students*

229   Cluster analysis resulted in three student typologies with significant differences in the

230   average z-score values of the four AFF factors (p ≤ 0.001) (Table 4). The types also differed in

231   terms of the average SWFL score (p ≤ 0.05) (Table 5) and knowledge of FF and consumption (p

232   ≤ 0.05) (Table 6). They are as follows:

233   **Positive towards FF:** Group 1 (n = 135), which represent 36.3% of the sample,

234   presented the highest scores (significantly higher) on the four AFF factors (Table 4). Group 1

235   had the highest score on the SWFL, but did not differ statistically from Group 2 (Table 5).

236   Group 1 contained a greater portion of students with prior knowledge of FF (25.9%) and of the

237   meaning of FF (12.6%) (Table 6).

238   **Moderately positive towards FF:** Group 2, which represented 43.0% of the sample (n

239 = 160), had positive scores in the factors "REW" and "NEC", but negative scores in the other

240 two components of AFF (Table 4). This group presented a score on the SWFL that did not differ

241 from Groups 1 and 3 (Table 5).

242   **Negative towards FF:** Group 3 represented 20.7% of the sample (n = 77); it had AFF

243 factors scores significantly lower than the rest of the groups (Table 4). The score obtained on

244 the SWFL was significantly lower than Group 1 (Table 5). Group 3 contained a greater portion

245 of students who had no prior knowledge of FF (92.2%), nor its meaning (98.7%), and who had

246 no previous consumption (44.2%) (Table 6).

247

248 **Discussion**

249   This study is the first to assess the effect of university students' AFF in relation to

250 SWFL. The estimation of a causal model consisting of the AFF as an antecedent construct and

251 the SWFL as a consequent construct resulted in a positive and significant path coefficient.

252 Therefore, AFF directly and significantly influences students' SWFL. While these results are in

253 line with studies which suggest that FF contribute to consumer well-being (Menrad, 2003; Niva,

254 2007; Hailu *et al.,* 2009; Siró *et al.,* 2008; Silvi *et al.,* 2014), the causal character of the obtained

255 results is noteworthy. More specifically, a positive perception of components "REW," "NEC,"

256 "CON" and "SAF" (Urala and Läthenmäki, 2007) can positively affect well-being. However,

257 the path coefficient was low. This could be related to the low level of prior knowledge of FF

258 within the sample, since 83.6% had not previously heard of FF. This percentage is higher than

259 studies done in other parts of the world (Bilgiç and Yüksel, 2012; Markovina *et al*., 2011;

260 Kljusurić and Čačić, 2014), but are similar to results by Jiménez *et al.* (2010) in Chile's

261 neighbouring country, Argentina, who reported that only 21% of the sample had heard of FF in

262 a study conducted in 2006. The low level of prior knowledge of FF in the study sample may

263 require the intervention of government authorities (Ministries of Health and Education) through

264 communication campaigns while young consumers are still establishing food habits (Markovina

265   *et al*., 2011). Indeed, there is evidence that providing information about FF to young people

266   with limited prior knowledge of these foods improves their acceptance and even increases their

267   willingness to pay for FF (Hellyer *et al*., 2012). In this respect, however, it bears mentioning

268   that having included the definition of FF before the students responded to the AFF questionnaire

269   may have influenced our results. That is to say, the information provided may have affected a

270   positive attitude towards FF among the students, and we may expect less positive attitudes in

271   the study sample had we not given them the definition of FF. Therefore, further studies should

272   aim to further investigate the relationship between providing or not providing information on FF

273   and attitudes toward FF, amongst young people as much as those with little knowledge or

274   familiarity with FF.

275   The low path obtained within the AFF and the SWFL can also correspond to low

276   interest in young people (Urala and Läthenmäki, 2007; Barrios *et al.,* 2008; Büyükkaragöz *et*

277   *al.,* 2014), since the majority have not experienced serious health problems, and the relevance of

278   a healthy diet is perceived as low (Urala and Läthenmäki, 2007; Siró *et al.,* 2008). Future

279   studies should evaluate the weight of this relationship in older people, especially those who

280   have demonstrated a greater interest in FF.

281   In line with previous studies suggesting that acceptance of FF is not homogenous (Ares

282   and Gámbaro, 2007; Herath *et al.*, 2008; Krystallis *et al.*, 2008; Schnettler *et al.*, 2015a), we

283   distinguished three types of university student, based on their attitudes towards FF. In this

284   regard, the characteristics of the typologies permit posing another possible explanation

285   regarding the low relationship between the AFF and the SWFL. Although the type "Positive

286   towards FF" had scores significantly higher than the group "Negative towards FF" in the

287   SWFL, the typology "Moderately positive towards FF" was statistically similar to the other

288   groups. The attitude and level of SWFL of the "Positive towards FF" and "Negative towards

289   FF" supported results of a prior study on adults indicating that people who are more inclined to

290   buy FF have a higher SWFL (Schnettler *et al.,* 2015b). However, despite evidence suggesting

291   that higher levels of satisfaction with food-related life are related to healthier eating habits,

292   (Schnettler *et al.*, 2013, 2015b), the characteristics of the "moderately positive towards FF"

293   suggest that AFF is not among the variables with most influence on SWFL. This finding should

294   be investigated in future studies. Nevertheless, it can also be suggested that positive attitudes

295   towards the components "REW" and "NEC" have greater influence than positive attitudes

296   towards the factors "CON" and "SAF" on satisfaction with food-related life, which should also

297   be examined in further studies.

298   Generally speaking, the attitudes toward FF and the declared consumption of FF for the

299   three groups is in line with various authors' results, with regard to the relation between positive

300   attitudes to FF and greater consumption, both in samples of adults (Urala and Lähteenmäki,

301   2007) and young people (Kolodinsky *et al.*, 2008; O'Connor and White, 2010). However, a

302   detailed analysis of the link between AFF and consumption highlights which attitudes are most

303   influential in consumption. A study with similar results regarding AFF and consumption by

304   Urala and Lähteenmäki (2007) reported that the best predictors for FF consumption were

305   "REW" and "NEC" factors of which the type "Negative towards FF" had negative scores, while

306   the other two had positive scores. The negative scores of the group "Negative towards FF" in

307   the "CON" factor are notable as well. This suggests that a lower consumption rate can be

308   associated with the consumer not believing that FF would deliver the promised health benefits

309   (Siegrist *et al.,* 2015). Also, most students in this group had no prior information about FF or its

310   meaning, which suggests a link between a lack of knowledge of FF, a lack of belief in their

311   effects and a low or null consumption. In this regard, it is improbable that a person will believe

312   in the benefits of FF if they have a little knowledge of them (Bilgiç and Yüksel, 2012; Grunert

313   *et al.*, 2011; Schnettler *et al.*, 2015 b). Considering that Markovina *et al.* (2011) concluded in

314   Croatia that advertising has a high impact on knowledge of FF among university students, the

315   FF industry – which has a vested interest in marketing to university students with similar

316   characteristics to those in the sample of this study – should emphasise this marketing tool.

317   While aspects associated with "Reward" and "Necessity" FF should be communicated and

318   recapitulated to the three identified types, special emphasis must be placed on communicating

319   aspects associated with FF "Confidence" and "Safety" to the "Negative towards FF" type. This

320   would result in increased consumption of FF amongst this group, which had low scores in these

321   factors and the lowest percentage of students consuming FF. In addition, we might suggest that

322   advertising aimed at increasing the demand for FF in university students with similar

323   characteristics to the study sample, consider social networks as an important medium, as these

324   are widely used by this type of consumer in Chile.

325   It bears highlighting that the typologies distinguished did not differ statistically

326   according to socio-demographic variables; thus, the results support studies that suggest that

327   socio-demographic variables are not sufficient in explaining differences in AFF (O'Connor and

328   White, 2010; Bruschi *et al.*, 2015).

329   Considering that cultural factors play a significant role in the acceptance of FF

330   (Labrecque et al., 2006; Siegrist et al., 2015), a limitation of this study is that it was only

331   conducted in one country. Also, the non-probabilistic sample and its relatively small size do not

332   allow generalization of results. All data were self-reported, thus responses may be affected by

333   recall bias or social desirability. Also, this study did not include variables related to consumers'

334   perception of FFs, such as functional ingredients, taste and price, which is relevant due to

335   previous studies having shown that functional characteristics of FF can play an important role in

336   stimulating the interest of young consumers (Ares and Gámbaro, 2007, Krystallis *et al.,* 2008).

337   Therefore, future studies should link these variables with AFF and levels of SWFL.

338

Conclusions

340   The results of this study demonstrate that AFF directly and significantly influence the

341   SWFL in this non-probabilistic study sample. This finding is novel because students are a

342   vulnerable group from a nutritional point of view, and forming positive AFF can lead to

343   improved future health (Barić *et al.,* 2003). Therefore, our findings suggest that forming

344   positive AFF in students with similar characteristics to the study sample increases SWFL.

14

345   The characteristics of the three typologies indicate that positive AFF are related to

346 higher consumption, therefore, from a public health point of view as much as from the FF

347 industry's perspective, it is necessary to increase knowledge of FF to change attitudes and

348 increase consumption. This can result in lower future medical expenses and increase market

349 participation when students become responsible for purchasing. To achieve this goal, the FF

350 industry must generate effective advertising campaigns to educate young people about FF and

351 its benefits, spreading awareness about the importance and future benefits of a healthy diet.

352 Advertising campaigns should take aspects related to "Reward from using FF" and "Necessity

353 for FF" as much into account as those related to "Confidence in FF" and "Safety of FF", so as to

354 increase demand among the students with the lowest current consumption of FF. Also, they

355 must develop FF capable of replacing the advantages of sweets such as chocolate or cookies.

356 Schnettler *et al*. (2013) found that almost 90% of the sample of university students surveyed in

357 southern Chile consumes these products between meals. Therefore, attributes such as flavour,

358 convenience, and price must be carefully considered in marketing.

359

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22

554 **Table 1.**

555 Items and factors of AFF developed by Urala and Lähteenmäki (2007) and their Spanish

556 translation.

Code	Item
FF REW Reward from using functional foods	
REW1	Functional foods help to improve my mood
	Los alimentos funcionales ayudan a mejorar mi estado de ánimo
REW2	My performance improves when I eat functional foods
	Mi rendimiento mejora cuando como alimentos funcionales
REW3	Functional foods make it easier to follow a healthy lifestyle
	Los alimentos funcionales hacen que sea más fácil seguir un estilo de vida saludable
REW4	I can prevent disease by eating functional foods regularly
	Puedo prevenir enfermedades consumiendo alimentos funcionales con regularidad
REW5	The idea that I can take care of my health by eating functional foods gives me pleasure
	La idea de que puedo cuidar mi salud consumiendo alimentos funcionales me da placer
REW6	Functional foods can repair the damage caused by an unhealthy diet
	Los alimentos funcionales pueden reparar el daño causado por una dieta poco saludable
REW7	I am prepared to compromise on the taste of a food if the product is functional
	Estoy preparado a ceder en cuanto al sabor de un alimento si el producto es funcional
REW8	I actively seek out information about functional foods
	Busco activamente información sobre los alimentos funcionales
FF NEC Necessity for functional foods	
NEC1	Functional foods are completely unnecessary *
	Los alimentos funcionales son completamente innecesarios
NEC2	Functional foods are a total sham *
	Los alimentos funcionales son una farsa total
NEC3	The growing number of functional foods on the market is a bad trend for the future*
	El creciente número de alimentos funcionales en el mercado es una mala tendencia para el futuro
NEC4	For a healthy person it is worthless to use functional foods *
	Para una persona sana es inútil usar alimentos funcionales
NEC5	It is great that modern technology allows the development of functional foods
	Está muy bien que la tecnología moderna permita el desarrollo de alimentos funcionales
NEC6	I only want to eat foods that do not have any medicine-like effects *
	Sólo quiero comer alimentos que no tengan ningún efecto similar al de la medicina
NEC7	Health effects are not appropriate in delicacies *
	Los efectos sobre la salud no son apropiados en alimentos deliciosos
NEC8	Functional foods are consumed mostly by people who have no need for them *

23

Los alimentos funcionales son consumidos en su mayoría por personas que no necesitan de ellos

---

FF CON: Confidence in Functional Foods

CON1   Functional foods promote my well-being
        Los alimentos funcionales promueven mi bienestar
CON2   The safety of functional foods has been very thoroughly studied
        La seguridad de los alimentos funcionales se ha estudiado en profundidad
CON3   I believe that functional foods fulfil their promises
        Creo que los alimentos funcionales cumplen con lo que prometen
CON4   Functional foods are science-based top products
        Los alimentos funcionales son productos superiores basados en la ciencia

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FF SAF: Safety of functional foods

SAF1   If used in excess, functional foods can be harmful to health *
        Si se usan en exceso, los alimentos funcionales pueden ser perjudiciales para la salud
SAF2   In some cases functional foods may be harmful for healthy people *
        En algunos casos, los alimentos funcionales pueden ser perjudiciales para las personas sanas
SAF3   Using functional foods is completely safe
        El uso de alimentos funcionales es completamente seguro
SAF4   The new properties of functional foods carry unforeseen risks *
        Las nuevas propiedades de alimentos funcionales conllevan riesgos imprevistos
SAF5   Exaggerated information is given about health effects *
        Se proporciona información exagerada sobre los efectos en la salud

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557   * Indicates reversed scored items.
558
559

560 **Table 2.**
561 Socio-demographic characteristics of a university student sample in Chile, November 2014. (n =
562 372).

Characteristic	Total
Gender, %	
Female	56.5
Male	43.5
Age	20.4
Mean (SD)	(2.4)
Zone of residence, %	
Urban	90.3
Rural	9.7
Place of residence during study period, %	
With parents the entire year	35.5
With parents the entire year although he/she travels for the day to attend class	16.1
With their parents only on weekends or for vacations	38.7
Independent of parents	9.7
Education level of the head of the household, %	
Elementary	14.2
Secondary	39.2
University	40.8
Postgraduate	5.7
Socioeconomic level, %	
High and upper-middle[a]	14.8
Middle-middle[b]	32.5
Lower-middle[c]	35.0
Low[d]	22.8
Very low[e]	4.8

563 [a] *High and upper-middle* represents 7.2% of the population. The household head's education averages 16.2 years,
564 which typically indicates completed university studies. Monthly income in high and upper-middle homes ranges
565 between US$3,500 and $7,200 or more. [b] *Middle* represents 15.4% of the Chilean population. The household head's
566 education averages 14 years, which typically means completed technical studies or incomplete university studies.
567 Monthly income in middle homes ranges between US$1,400 and $2,500. [c] *Lower-middle* represents 22.4% of the
568 population. The household head's education averages 11.6 years, which typically means completed high school
569 studies. Monthly income in lower-middle homes ranges between US$830 and $1,050. [d] *Low* represents 34.8% of the
570 population. The household head's education averages 7.7 years, which typically means incomplete high school
571 studies. Monthly income in low homes ranges between US$415 and $620. [e] *Very low* represents 20.3% of the
572 population. The household head's education averages 3.7 years, which typically means incomplete elementary school
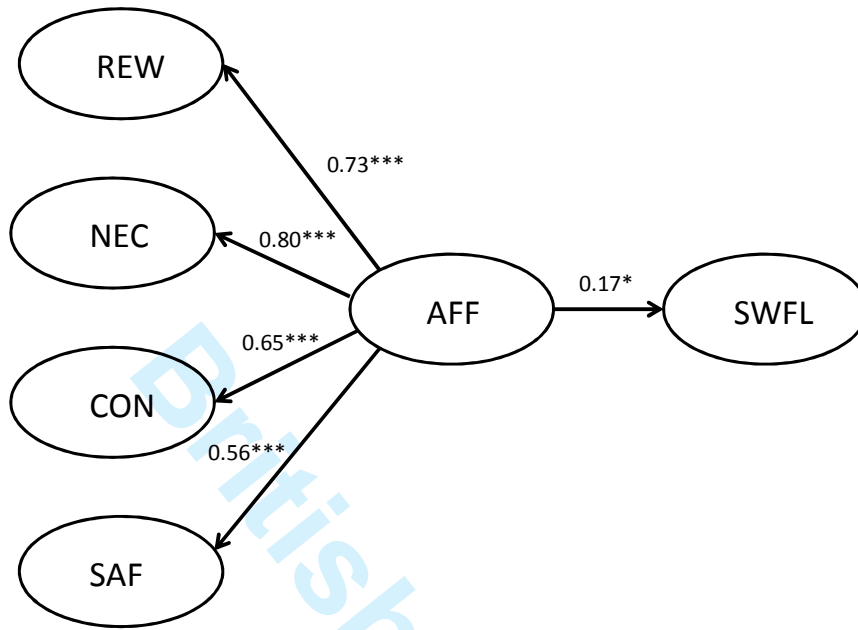573 studies. Monthly income in very low homes is ≤ US$330.

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*p = 0.05; **p = 0.01; ***p = 0.001

χ^2/df = 2.29; CFI=0.91; GFI=0.88; NFI=0.85; IFI=0.91; RMSEA=0.06

579

580 **Figure 1.**
581 Structural equation model that explains the effect of the Attitudes towards Functional Food
582 (AFF) on the student´s Satisfaction with food-related life (SWFL).
583

Table 3.
Reliability of the standardized confirmatory factor analysis (CFA)

Construct	Indicators	Standarized loadings (*t*-value)		Composite reliability (Average variance)		Measurement model
FF REW	Cronbach's α	0.87		0.87	(0.53)	χ2 = 605.882
	REW1	0.732	*(9.553)*			
	REW2	0.748	*(9.560)*			*df* = 261
	REW3	0.784	*(9.731)*			
	REW4	0.824	*(9.924)*			χ2 /*df* = 2.321
	REW5	0.676	*(10.194)*			
	REW6	0.560	*a*			*p* = 0.000
FF NEC	Cronbach's α	0.85		0.86	(0.53)	
	NEC1	0.838	*(9.917)*			*RMSEA* = 0.062
	NEC2	0.898	*(10.187)*			
	NEC3	0.838	*(9.913)*			*CFI* = 0.910
	NEC4	0.651	*(8.724)*			
	NEC6	0.499	*(7.364)*			*GFI* = 0.878
	NEC8	0.519	*a*			
FF CON	Cronbach's α	0.68		0.72	(0.40)	*NFI* = 0.853
	CON1	0.513	*(5.924))*			
	CON2	0.705	*(6.707)*			
	CON3	0.827	*(6.859)*			
	CON4	0.414	*a*			
FF SAF	Cronbach's α	0.73		0.74	(0.43)	
	SAF1	0.673	*(8.722)*			
	SAF2	0.820	*(9.283)*			
	SAF3	0.508	*(7.247)*			
	SAF4	0.566	*a*			

2

SWFL	Cronbach's α	0.816			0.82	(0.49)
	F1	0.411	*(6.865)*			
	F2	0.644	*(10.618)*			
	F3	0.676	*(12.697)*			
	F4	0.901	*(11.915)*			
	F5	0.784	*a*			

a	Fixed parameter	

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1

586   **Table 4.**
587   Z-scores averages from the components of the Attitude toward Functional Foods questionnaire
588   (AFF) of groups obtained from cluster analysis in a university student's sample of Chile,
589   November 2014.

Component	Group 1 (n = 135)	Group 2 (n = 160)	Group 3 (n = 77)	F	P-value
Reward for using FF (REW)	0.497 a	0.090 b	-1.059 c	89.314	0.000 **
Necessity for FF (NEC)	0.582 a	0.167 b	-1.368 c	203.156	0.000 **
Confidence in FF (CON)	0.883 a	-0.327 b	-0.868 c	174.575	0.000 **
Safety of FF (SAF)	0.656 a	-0.144 b	-0.851 c	85.189	0.000 **

590   **Significant at 1%.
591   Letters in horizontal orientation indicate statically significant differences according to Dunnett's T3 Comparison test
592    $(p \leq 0,001)$, for non-homogeneous variables.
593

594

2

595 **Table 5.**
596 Satisfaction with food-related life (SWFL) average score from cluster analysis in a university
597 student's sample of Chile, November 2014.

	Group 1 (n = 135)	Group 2 (n = 160)	Group 3 (n = 77)	F	P-value
SWFL	21.84 a	20.88 ab	19.68 b	6.306	0.002 *

598 *Significant at 5%.
599 Letters in horizontal orientation indicate statically significant differences according to Dunnett T3 Comparison test
600 (p≤0,001), for non-homogeneous variables.
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603 **Table 6.**
604 Characteristics with statistically significant differences in groups of university students of Chile
605 obtained by cluster analysis. November 2014.

	Group 1 (n = 135)	Group 2 (n = 160)	Group 3 (n = 77)
Has seen or read about FF		**P = 0.001**	
No	74.1	87.5	92.2
Yes	25.9	12.5	7.8
Knows what FF means		**P = 0.014**	
No	87.4	92.5	98.7
Yes	12.6	7.5	1.3
Consumes FF		**P = 0.005**	
No	23.7	27.5	44.2
Yes	76.3	72.5	55.8

606 P value corresponds to the (bilateral) asymptotic significance obtained in Pearson's Chi squared Test.
607

608