Research Article

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Food choice motivations and perception of a healthy diet in a developing Mediterranean country

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Abstract: This study investigated the Lebanese consumers' knowledge about healthy food perception and their food motivations according to gender and also to environmental, social, and health behaviors. The survey consisted of a longitudinal study undertaken on a sample of 450 participants from which only 410 questionnaires were considered to be valid. For the analysis of the data, basic descriptive statistics were used, complemented with statistical tests (Student *t*-test for comparisons between two groups and ANOVA for comparisons between three or more groups). Finally, analyses were done to evaluate the importance of healthy food perception among these people, and the possible sociodemographic variables are as follows: age group, level of education, gender, and living environment. The results allowed identifying which types of factors mostly influence people's food choices. They revealed that both the economic and availability motivations (mean scores 2.83 and 2.98 for female and male participants, respectively) and the social and cultural motivations (mean scores 2.90 and 3.09) have less impact on the perception of a healthy diet than the healthy motivations (mean scores 3.48 and 3.29) and the environmental and political motivations (mean scores 3.35 and 3.43), this last being also the highest expression and without statistical gender differences. This work is relevant because it highlights the food motivation factors that influence people's perception about a healthy diet in a developing country, facing social and economic crisis in addition to many gender inequalities, yet having the highest education levels in the region in addition to its multiethnical diversity and religiosity.

Keywords: Lebanese consumers, healthy food perception, food motivation

1 Introduction

People's behavior toward food is very complex and is influenced by diverse factors, such as the biological need of nutrients and energy, hunger, socioeconomic status, demographic variables, personal taste, lifestyles, health factors, emotions, security, convenience, food prices, ethical concerns, cultural and religious influences, or nutrition knowledge (Liu et al. 2017; Sami et al. 2017; Ferrão et al. 2018; Bartkiene et al. 2019; Cînpeanu et al. 2019).

In a typical day, and including while performing their shopping, people are faced with many food choices, which are compelled by motives that they even don't realize. The process of selecting foods is very complex and is influenced by numerous factors; some of them are related to the products (like the organoleptic characteristics) while some others are related to the consumers (such as personal preferences or restrictions of some sort), and still, others are depending on the consumption context (cultural or religious influences, health preoccupations, convenience and cost, biological needs, emotional status, marketing influences, or political and environmental concerns). One of the domains that greatly influences food choices is culture and accounts for wide differences in food preferences across countries and cultures. Indeed, food habits are closely associated with the society surrounding the individuals, also contributing for their identity as a member of a group (Kaya 2016; Barauskaite et al. 2018; Stasi et al. 2018; Guiné et al. 2019b, 2019a; Ferrão et al. 2020).

Knowledge about food and nutrition is a construct embracing many factors and is variable according to many aspects, such as age, sex, education level, and socioeconomic status. Hence, the definite contribution of nutrition knowledge to shape dietary behaviors,

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particularly aiming at a healthy diet, is rather multifaceted, but some published research seems to highlight that nutrition knowledge is the main determinant to favor dietary changes toward a healthier diet. Various studies have focused on the relation between nutrition knowledge and people's dietary patterns, and some of them highlighted that there might be a positive correlation between higher nutrition knowledge and the adoption of healthier diets. Nevertheless, other works were not so decisive about this association (Rustad and Smith 2013; Spronk et al. 2014; Ferrão et al. 2018).

A healthy diet contributes to actively protect the body against all forms of malnutrition and also some noncommunicable chronic diseases, such as obesity, type-II diabetes, heart diseases, or cancer. Presently, people are becoming more aware of the positive or negative associations between diet and health. Nonetheless, even those consumers who are aware of these implications often end up making unhealthy food choices. It has been demonstrated that knowledge about healthy eating does not always lead to dietary changes or better eating habits. How people interpret the concept of healthy eating is variable and reflects personal, social, and cultural involvements, along with the particular person's living environment. Additionally, even though some people can comprehend the concept healthy diet, still they might not be willing or able to adopt it in practice (Mai and Hoffmann 2015; Liu et al. 2017; van Buul et al. 2017; Ferrão et al. 2018, 2019a; WWO 2020).

Lebanon is situated on the eastern shore of the Mediterranean Sea and is one of the countries following the Mediterranean diet (MD). In this way, when eating a Lebanese dish, olive oil, fresh vegetables, fruit, and legumes are normally present in far greater amounts than meats and high-fat dairy ingredients. The MD is a dietary pattern traditionally followed by people of some countries that surround the Mediterranean Sea. The MD encompasses a high consumption of fruits, vegetables, whole-grain cereals and cereal products, legumes, nuts, and seeds, allied to the vast use of olive oil (the preferred source of dietary fat), relatively low consumption of foods of animal origin and by regular but moderate consumption of red wine accompanying the principal meals. Besides food items, the MD is also characterized by social aspects such as the importance of people eating with company, among family and friends, in a social confraternization. The MD has been linked with many beneficial health effects, but some people are driving away from the traditional MD, consuming higher convenience and readily available fast, but unhealthier, foods (Organ et al. 2015; Ostan et al. 2015; Boccardi et al. 2018; Thodis et al. 2018; Guiné et al. 2019a).

The information about Lebanese eating habits is limited, and therefore, it is very important to develop studies in this area, to become aware of Lebanese eating practices and also to promote efficient health strategies. This study is an extension of the multinational project entitled "Psycho-social motivations associated with food choices and eating practices (EATMOT)," carried out in different countries to study some psychic and social motivations that influence people's food choices and eating behaviors (Ferrão et al. 2019b; Guiné et al. 2019a, 2019b). The main objective of this specific study was to evaluate whether Lebanese people were motivated toward a healthy diet and in what way their sociodemographic differences could influence their perception on it. In addition, the analysis also targets the assessment of the relationship between many of the variables that can lead to more food motivations in an emerging country. The authors, in particular, based their research on three independent variables in relation to a dependent one being defined as healthy food perception.

The independent variables are as follows: (1) environmental and political motivation, (2) social and cultural motivation on the other hand, and (3) healthy food motivations among these Lebanese Mediterranean people.

The research questions applied in this study were the following:

- RQ1. In what way, sociodemographic factors could influence the participants' perceptions about a healthy diet in Lebanon?
- RQ2. The questionnaire validation of the eating motivation items applies to the Lebanese population, and are there gender differences?
- RQ3. Are the environmental and political motivations, the social and cultural motivations, and the healthy motivations major determinants of healthy food perception?

2 Materials and methods

2.1 Instrument

For this research, the questionnaire used was structured in 10 different parts englobing 84 questions, distributed as follows:

- Part I – Sociodemographic data (9 questions)
- Part II – Anthropometric data and behavioral and health-related elements (9 questions)

- Part III – Attitudes relating to healthy food (10 questions)
- Part IV – Sources of information about a healthy diet (7 questions)
- Part V – Healthy motivations (10 questions)
- Part VI – Emotional motivations (9 questions)
- Part VII – Economic and availability motivations (7 questions)
- Part VIII – Social and cultural motivations (9 questions)
- Part IX – Environmental and political motivations (7 questions)
- Part X – Marketing and commercial motivations (7 questions)

Globally, 55 statements related to eating habits and the choice of certain food were compiled according to different motivations. These types of motivations were chosen because many different studies somehow have indicated that eating habits and/or food choices are dependable on factors such as the ones investigated through this questionnaire, which was developed, validated at first on a sample of Portuguese people (Ferrão et al. 2019b), and then was extended into other countries. A five-point Likert scale was used to measure the participants' opinions regarding the different types of motivations: 1 (totally disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), and 5 (strongly agree). In this study, the variables of parts III, V, VIII, and IX were carefully examined, tested, and studied.

2.2 Data collection

This is a descriptive cross-sectional study, which was carried out on a nonprobabilistic sample of 410 participants residing in Lebanon. The questionnaires were applied first by personal interview but then, due to confinement (during the period of COVID 19) and to secure more respondents, google forms link was shared through social media. The data collection were carried out between November 2019 and March 2020. The ethical matters and constraints of the questionnaire were verified until approval by the ethical committee (reference no 2020-89 (USJ)) has been obtained.

2.3 Statistical analysis

The exploratory analysis of the data was made using basic descriptive statistical tools. Data centralization was done using Microsoft Excel 2013, and statistical processing was performed using IBM SPSS Statistics v.20 (IBM Corp., Armonk, NY, USA).

It was necessary to calculate the average of scores obtained on responses of Parts III, V, VIII, and IX to analyze the following relations:

- Different sociodemographic variables and the perception of a healthy diet versus motivations toward healthy eating,
- The different variables of the environmental, political, social, and cultural motivation versus a healthy diet motivation.

The items were coded as previously stated on a Likert scale varying from 1 (totally disagree) to 5 (strongly agree). The scores for the different items was calculated, an average score for each measuring variable for each participant. The scale for motivations varied from 1 to 5, in which the value less than 3 is for "no influence" and the value exceeding 3 is for "influence." Although the questionnaire was previously validated, the authors conducted a reliability analysis with Cronbach's alpha for the data in the Lebanese sample for the three food motivation variables along with the dependent variable.

The mean values obtained for each group were compared using the Student's t-test for independent samples and analysis of variance, one-way ANOVA, when there were two and three or more groups to compare, respectively. The use of parametric tests was possible because the conditions were verified, including the normality of the distribution. Additionally, the Pearson correlation coefficients were calculated for evaluation of the relations between some variables at study (Guiné et al. 2014, 2015; Rodrigues et al. 2014; Santos et al. 2014). For all statistical analyses, the level of significance considered was 5% ($p < 0.05$).

3 Results

3.1 Sample characterization

The demographical data for the sample studied are summarized in Table 1, highlighting the highest percentages for each demographical variable, in the corresponding column. In this survey, 410 adults participated, from which 74.1% were females and 25.9% were males. The participants were, on average, 37 years old, with ages varying from 18 to 72 years. They were

classified into age groups as follows: young adults (18–30 years), representing 32.4%; average adults (31–50 years), corresponding to 57.3%; senior adults (51–64 years), representing 8.3%; and finally, elderly (older than 65 years), which accounted for 2% of the sample. A vast part of the participants, almost 95%, had a university degree. As for the marital status, 40% of the participants were single, 56.8% were married (or living together), 2.7% were divorced (or separated), and 0.5% were widowed. As for the living environment, 30% of the participants lived in urban areas, 15.1% lived in rural areas, and 54.9% lived in suburban areas. As for the present professional activity, the majority of the participants were employed (68%), 13.2% were students, 2.7% were students and working at the same time, 14.4% were unemployed, and 1.7% were retired. One other question was about the participant's professional activity or studies, in particular who were related to some particular areas: nutrition, food, agriculture, sports, psychology, or other health-related activities. To this question, 70.2% answered that their professional areas were not any of the mentioned ones. Finally, it was also observed that 75.1% of participants are responsible for buying their food.

3.2 Results for research question one

As previously presented, the first of our research questions was: "In what way sociodemographic factors could influence the participants' perceptions about a healthy diet in Lebanon?" To address this research questions, Table 2 presents the results for the relations

Table 1: Sociodemographic characterization of the sample studied.

Variable	Group	Frequency (N)	Percentage (%)
Age	Young adults: 18 ≤ age ≤ 30 years	133	32.4
	Average adults: 31 ≤ age ≤ 50 years	235	**57.3**
	Senior adults: 51 ≤ age ≤ 64 years	34	8.3
	Elderly: older than 65 years	8	2.0
Gender	Female	304	**74.1**
	Male	106	25.9
Highest level of education	University degree	390	95.1
	Primary school	2	0.5
	Secondary school	18	4.4
Living environment	Rural	62	15.1
	Urban	123	30.0
	Sub-urban	225	**54.9**
Marital status	Single	164	40.0
	Married/living together	233	**56.8**
	Divorced/separated	11	2.7
	Widow	2	0.5
Job situation	Employed	279	**68.0**
	Unemployed	59	14.4
	Student	54	13.2
	Retired	7	1.7
	Working student	11	2.7
Professional area	Nutrition	26	6.3
	Food	5	1.2
	Agriculture	2	0.5
	Sport	57	13.9
	Psychology	3	0.7
	Health	29	7.1
	Not related to any of the above areas[a]	288	**70.2**
Food buying responsibility	Yes	308	**75.1**
	No	102	24.9
Total		410	100

[a] From the participants in the study, some were from specific areas identified, but the rest were regular people and therefore not related to any of the areas identified. Bold numbers highlight the highest percentages for each variable.

between sociodemographic characteristics and the perceptions toward a healthy diet, measured on a scale from 1 (wrong perception of a healthy diet) to 5 (correct perception of a healthy diet). Starting with variable age, the mean scores observed were as follows, for young adults 3.26 ± 0.861, for average adults 3.45 ± 0.942, for senior adults 3.56 ± 0.759, and the lowest score was observed for the elderly, 3.25 ± 1.389. Nevertheless, this group is small since it represents only 2% out of the population studied (8 in count). For the senior adults, who represent 8.3% of total participants, the results showed that they have the most correct perception about a healthy diet when compared with other age groups. ANOVA results showed that there was no significant difference in the perceptions about healthy eating among age groups (p-value 0.172 > 0.05). This result is similar to that reported by Ferrão et al. (2019a) for the same type of research made for the Portuguese population, but it is contradictory to that reported by Ferrão et al. (2018) for a similar survey conducted on a sample of Portuguese university students, which maybe because those participants were selected form a different and more limited age range, i.e., mostly young adults.

Regarding gender differences (Table 2), we observed that women and men had, in general, correct perceptions about a healthy diet (3.45 ± 0.907 for women and 3.23 ± 0.949 for men) without significant differences between them according to the results of Student's t-test ($p = 0.921$). This was an interesting observation, because some other studies reported contradictory findings, suggesting that women usually have a healthier eating behavior than men (Kiefer et al. 2005; Hendrie et al. 2008).

Table 2: Relations between sociodemographic characteristics and the perceptions about a healthy diet

Variable	Group	Mean value[a]	Standard deviation	*P*-value
Age[b]	Young adults: 18 ≤ age ≤ 30 years	3.26	0.861	0.172
	Average adults: 31 ≤ age ≤ 50 years	3.45	0.942	
	Senior adults: 51 ≤ age ≤ 64 years	3.56	0.759	
	Elderly: older than 65 years	3.25	1.389	
Gender[c]	Female	3.45	0.907	0.921
	Male	3.23	0.949	
Highest level of education[b]	University degree	3.39	0.919	0.811
	Primary school	3.00	0.000	
	Secondary school	3.44	1.042	
Living environment[b]	Rural	3.23	1.137	0.083
	Urban	3.36	0.930	
	Sub-urban	3.53	0.761	
Marital status[b]	Single	3.24	0.871	0.014
	Married/living together	3.49	0.952	
	Divorced/separated	3.27	0.647	
	Widow	4.50	0.707	
Job situation[b]	Employed	3.42	0.948	0.024
	Unemployed	3.39	0.871	
	Student	3.13	0.870	
	Retired	4.29	0.488	
	Working student	3.45	0.522	
Professional area[b]	Nutrition	3.19	0.749	0.028
	Food	3.20	0.837	
	Agriculture	3.00	0.000	
	Sport	3.42	0.925	
	Psychology	3.67	0.577	
	Health	3.97	0.823	
	Not related to any of the above areas	3.35	0.936	
Food buying responsibility[c]	Yes	3.47	0.929	0.040
	No	3.15	0.861	

[a] Scale from 1 (wrong perception of a healthy diet) to 5 (correct perception of a healthy diet). [b] Comparisons of means between groups by ANOVA ($p < 0.05$). [c] Comparisons of means between groups by Students' t-test ($p < 0.05$).

As for the level of education (Table 2), it was observed that the majority of participants 95% held a university degree and are those who achieved the highest score in healthy diet perceptions (3.44 ± 1.042), followed by the participants who had completed primary school and finally the participants with secondary school. Significant differences were not detected between the levels of education concerning the perceptions toward healthy eating, since the majority of the participants have the same level of education, the university degree (p-value = 0.811).

No significant differences were obtained for the scores representing the perceptions about a healthy diet among the participants who lived in different areas (p-value = 0.083) (Table 2). Nevertheless, the mean scores were slightly different and the participants who lived in suburban areas scored highest (3.53 ± 0.761), then came the participants who lived in urban areas (3.36 ± 0.930) and in last the ones who lived in rural areas (3.23 ± 1.137). According to the obtained results, independently of the participant's residing area, their perceptions about a healthy diet were correct in general. In more industrialized countries, a pattern of social differences in diet and health quality is somehow established, so that groups of the lower socioeconomic status usually follow lower quality diets with inferior nutritional values (Malon et al. 2010; Mullie et al. 2010; Harrington et al. 2011; Darmon and Drewnowski 2015). Additionally, it has been reported that poor dietary patterns and high obesity prevalence are closely related to neighborhood deprivation, neighborhood minority composition, and low-density population areas; all of these factors are usually found in rural areas. Finally, the access to healthy foods is also variable according to neighborhood environments (Nelson et al. 2006; Lopez 2007; Rundle et al. 2007; Larson et al. 2009; Sallis et al. 2009).

Regarding marital status (Table 2), the mean score values are between 3.24 and 4.50, which indicated that in all groups, the participants had a correct perception of a healthy diet. Interestingly, the widowed showed the highest score, with a mean of 4.5 ± 0.707, which is a very good perception of a healthy food diet. Still, this group represents only 0.5% of our population. The group with the second-best perception about a healthy diet was the group of married participants (3.49 ± 0.952). The results showed significant differences between groups, as demonstrated by one-way ANOVA ($F(3, 406) = 3.562$, p-value = 0.014).

The scores obtained for the perceptions about a healthy diet according to job situation were 3.13 ± 0.870 for students, 4.29 ± 0.488 for retired, 3.45 ± 0.522 for working students, 3.42 ± 0.948 for employed participants, and 3.39 ± 0.871 for unemployed participants, which means that the participants in all of these professional groups had correct perceptions about what a healthy diet should be. However, the mean values were different between groups, and the differences were significant (p-value = 0.024) as seen by one-way ANOVA ($F(4, 405) = 2.848$, p-value = 0.024).

Regarding the effect of professional area on the perception about a healthy diet, it was observed that the

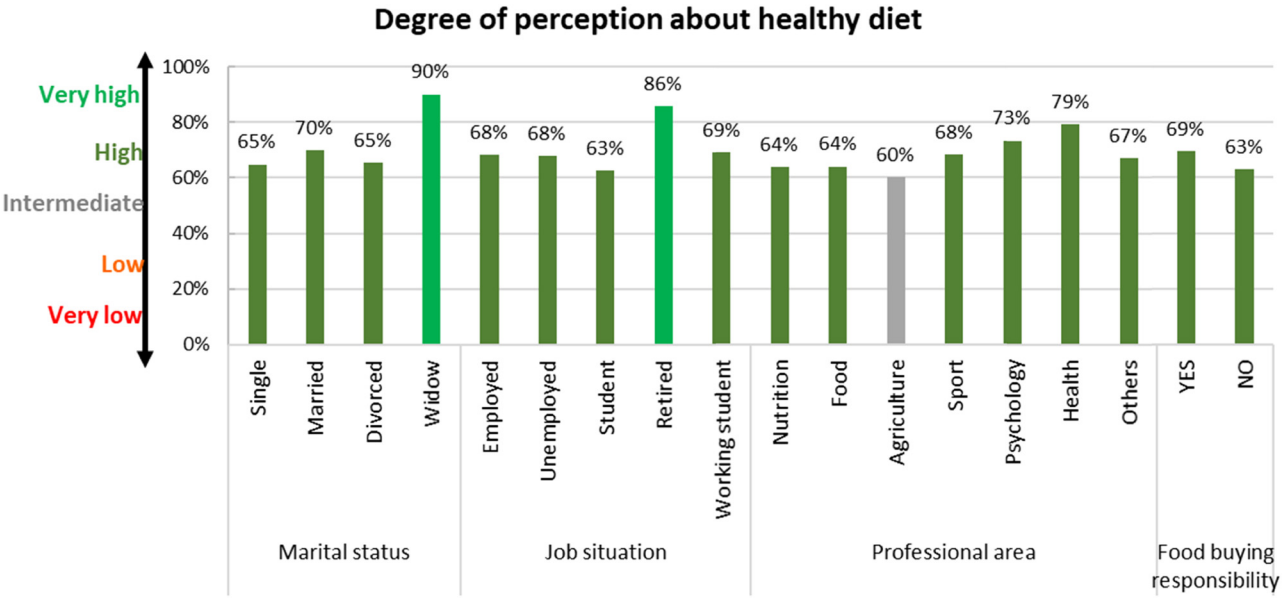

Figure 1: Degree of perception about a healthy diet according to some sociodemographic variables.

participants who worked in health professions obtaining the highest mean score (3.97 ± 0.823), revealing a correct perception of a healthy diet. For all the other groups, the scores were more or less similar and revealed that the participant's perceptions about a healthy diet were still correct. The results showed significant differences between the groups of areas of study or work in the perceptions of healthy eating as demonstrated by one-way ANOVA ($F(6, 403) = 2.385$, p-value = 0.028).

Finally, the results showed that there were significant differences between the perceptions about a healthy diet in the participants who were responsible for buying their own food than for those who were not (p-value = 0.04). For both groups, the scores were higher than 3, which indicates that the participants' perceptions about a healthy diet were somehow correct.

Figure 1 highlights the degree of perception about a healthy diet, expressed as a percentage, for those variables with statistically significant differences between groups: marital status, job situation, professional area, and food buying responsibility. The degree of perception was classified into very low [0–20%], low [20–40%], intermediate [40–60%], high [60–80%], and very high [80–100%]. The results show that the widowed and the retired are with a very high knowledge about a healthy diet, respectively, with 90% and 86%, whereas on the other extreme are the farmers, with an intermediate degree of perception about a healthy diet, only 60%.

3.3 Reliability analysis of the eating motivation items and gender differences

Research question 2: "The questionnaire validation of the eating motivation items applies to the Lebanese population, and are there gender differences?"

Although the questionnaire was previously validated (Ferrão et al. 2019b), the authors tested the reliability of the items in the six variables that account for the different types of food motivations, plus the perception about healthy eating, for the responses of the Lebanese participants. The results of the Cronbach alpha are listed in Table 3, and most values are close to 0.7 or higher, which means that there is internal consistency within each of the variables tested. Additionally, it was observed that the constructs with the highest alpha are the emotional motivations (α = 0.811) followed by social and cultural motivations (α = 0.805), whereas the construct with lowest internal consistency was the marketing and commercials motivations (α = 0.551).

Lebanon is known for its high gender inequality ratios, extending to practically all areas, including, politics, management positions, civil status, and rights, among others. According to the Gender Gap Index (GGI), Lebanon's ranking position is close to the last (rank 14 out of 19), considering the countries in the Middle East and North Africa region (GGI = 145), only above Saudi Arabia, Iran, Syria, Iraq, and Yemen which have a worse gender gap ranking (WEF 2020). Therefore, one other aspect investigated was the possible gender differences as to the types of food motivations studied, and the results are listed in Table 4. The obtained results for the t-tests show that for most types of eating motivations, no gender differences were found. Nevertheless, significant differences were found for emotional motivations and for social and cultural motivations. Regarding emotions, it is observed that women attribute higher importance (score = 3.42 ± 0.978) to emotional aspects when making food choices and consuming foods when compared with men (score = 3.05 ± 1.008), and this can also be attributed to social or cultural constrains that impact more strongly to men. This is in agreement with the other obtained results that the social and cultural motivations were higher for men (score = 3.09 ± 0.737) than for women (score = 2.90 ± 0.804).

Table 3: Reliability analysis to the variables food motivations and perception of healthy eating

Variables	Cronbach's Alpha	Cronbach's Alpha based on standardized items	*N* of items
Perception of healthy eating (part III)	0.736	0.736	10
Healthy motivations (part V)	0.792	0.800	10
Emotional motivations (part VI)	0.811	0.805	9
Economic and availability motivations (part VII)	0.659	0.655	7
Social and cultural motivations (part VIII)	0.696	0.694	9
Environmental and political motivations (part IX)	0.805	0.805	7
Marketing and commercials motivations (part X)	0.551	0.550	7

Table 4: Participants' eating motivations with respect to gender.

Eating motivations	Gender	Mean[a]	Std. deviation	*t*-test	
				t	*p*-value
Healthy motivations	Female	3.48	0.856	1.898[b]	0.058
	Male	3.29	0.936		
Emotional motivations	Female	3.42	0.978	3.332[b]	0.001
	Male	3.05	1.008		
Economic and availability motivations	Female	2.83	0.883	−1.796[c]	0.074
	Male	2.98	0.676		
Social and cultural motivations	Female	2.90	0.804	−2.211[b]	0.028
	Male	3.09	0.737		
Environmental and political motivations	Female	3.35	0.815	−0.921[b]	0.358
	Male	3.43	0.840		
Marketing and commercial motivations	Female	3.32	0.788	1.667[b]	0.096
	Male	3.17	0.810		

[a] Scale for motivations: values from 1 to 5; value less than 3 is for "no influence" and value exceeding 3 for "influence". [b] Equal variances assumed according to Levene's test for equality of variances. [c] Equal variances not assumed according to Levene's test for equality of variances.

Globally, it was found that for women the principal motivations for food are linked with health, emotions, and environment/politics (3.48 ± 0.856, 3.42 ± 0.978 and 3.35 ± 0.815, respectively) while for men the most important are environmental/political aspects (3.43 ± 0.840) and also health (3.29 ± 0.936) (Table 4).

Figure 2 evidences the level of influence of some eating motivations according to gender, in the cases in which the gender differences were statistically significant: the emotional motivations and the social and cultural motivations. The results indicate clearly that Lebanese women tend to shape their eating patterns more influence by emotional factors than men, while being less susceptible to social and cultural influences.

3.4 Results for research question three and model hypothesis testing

For a deeper understanding of the Lebanese people's perception of healthy food, the authors accounted for some food motivations that globally scored highest. Therefore, the research question 3 was established "Are the environmental and political motivations, the social and cultural motivations and the healthy motivations major determinants of healthy food perception?" This tries to find a relation between the following variables:

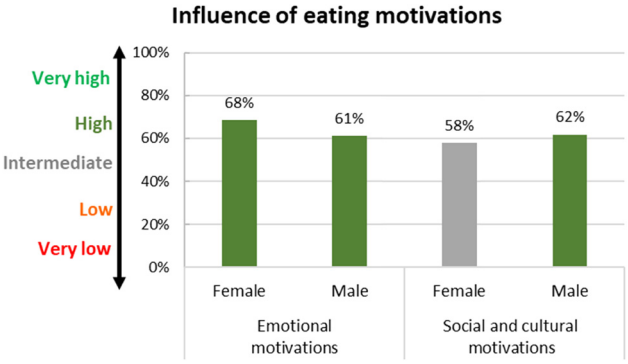

Figure 2: Level of influence of eating motivations according to gender.

- Perception of healthy eating among Lebanese people (dependent variable)
- Environmental and political motivations (independent variable)
- Social and cultural motivations (independent variable)
- Healthy motivations (independent variable)

The following model hypotheses aim to answer the research question 3, expressed in the model showed in Figure 3:

(1) Null hypothesis 2: Healthy diet motivations do not have a major influence on healthy food perception among Lebanese people;

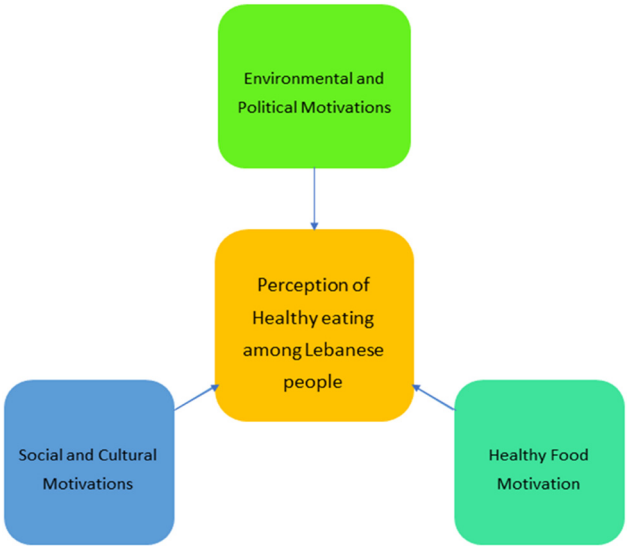

Figure 3: A research model for research question 3.

Table 5: Correlations between the variable perception of healthy eating and three food motivations in the research model

	Perceptions of a healthy diet	Healthy motivations	Environmental and political motivations	Social and cultural motivations
Perceptions of a healthy diet	1.000			
Healthy motivations	0.925	1.000		
Environmental and political motivations	0.080	0.089	1.000	
Social and cultural motivations	0.158	0.186	0.112	1.000

(2) Null hypothesis 1: Environmental and political motivations do not have a major influence on healthy food perception among Lebanese people;
(3) Null hypothesis 3: Social and cultural motivations do not have a major influence on healthy food perception among Lebanese people.

The research model was tested in terms of the strength of the linear regressions between the sets of individual variables, by performing a regression matrix with Pearson coefficients, as listed in Table 5. As was expected, there was a very strong correlation between the healthy motivations and the perceptions of a healthy diet, being this the highest coefficient (0.925). All other relations were weak as the regression coefficients show, being under 0.2 in all other cases.

Moreover, while testing the strength of the relations in the research model, the authors noted that there were significant differences in the perceptions of healthy food due to two major food motivations that are healthy motivation (p-value almost 0) and social and cultural motivations (p-value = 0.001), whereas the environmental and political motivations had a nonsignificant p-value (equal to 0.077) as demonstrated by the results of one-way ANOVA listed in Table 6. The research model accounting for the three variables is significant, as demonstrated by one-way ANOVA ($F(3, 406) = 806.786$, p-value = 0.000). According to the results listed in Table 6, it was concluded that the null hypothesis 1 and 3 are rejected and null hypothesis 2 is accepted, which means that healthy motivations and social and cultural motivations are the aspects that have a major influence on the perception of a healthy diet among Lebanese people.

4 Conclusions

This study provided interesting insights on behavioral and perception aspects in relation to eating motivations, and particularly those related to health aspects, along with the perceptions about a healthy diet. In general, participants revealed correct perceptions toward a healthy diet, with no significant differences in the scores according to gender, age group, living environment, and level of education. On the other hand, there were significant differences between the participants who were responsible and those who were not responsible for buying their own food and also between groups according to the job situation and professional area. The results revealed that the economic and availability motivations and the social and cultural motivations have less impact on the perception of a healthy diet than

Table 6: One-way ANOVA results of the research model

		Sum of squares	Degrees of freedom	Mean square	F	p-value
Healthy diet motivations	Between groups	299.428	4	74.857	629.858	0.000
	Within groups	48.133	405	0.119		
	Total	347.561	409			
Environmental and political motivations	Between groups	7.132	4	1.783	2.121	0.077
	Within groups	340.429	405	0.841		
	Total	347.561	409			
Social and cultural motivations	Between groups	15.083	4	3.771	4.593	0.001
	Within groups	332.478	405	0.821		
	Total	347.561	409			

the healthy motivations and the environmental and political motivations. The most expressive is the environmental and political motivation, and no statistical differences were found between genders.

Overall, the results helped to conclude that participants in this research were knowledgeable enough about some nutritional aspects of their diet. Therefore, their perceptions were aligned with a healthy diet. These findings are very important because they can help to recognize how people interpret healthy eating issues, which are fundamental to implement strategies designed to promote healthier eating habits among the Lebanese population.

Present outcomes showed that among these participants, there were no gender differences in terms of food motivations in the domains of health, economy and availability, environment and politics, marketing and commercials, and perception and also showed that the impact of healthy eating motivation is perceived as a healthy behavior. However, gender differences were found for emotional and for social and cultural motivations.

This work also allowed identifying some motivations that were most influential on the eating behaviors of the participants, namely health, environment, and politics. These can be used to adopt and apply interventions that contribute to better awareness of the role and importance of the environment and recycling. Additionally, the perceptions about a healthy diet were significantly associated with health as well as with social and cultural motivations.

Suggestions for future work include the extension of the research to a wider sample and possibly cover other surrounding countries and the comparison of the food motivations and behavior of the Lebanese population with other Mediterranean populations.

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References

[1] Barauskaite D, Gineikiene J, Fennis BM, Auruskeviciene V, Yamaguchi M, Kondo N. Eating healthy to impress: How conspicuous consumption, perceived self-control motivation, and descriptive normative influence determine functional food choices. Appetite. 2018;131:59–67. doi: 10.1016/j.appet.2018.08.015.

[2] Bartkiene E, Steibliene V, Adomaitiene V, Juodeikiene G, Cernauskas D, Lele V, et al. Factors affecting consumer food preferences: food taste and depression-based evoked emotional expressions with the use of face reading technology. BioMed Res Int. 2019;2097415:1–10. doi: 10.1155/2019/2097415.

[3] Boccardi V, Calvani R, Limongi F, Marseglia A, Mason A, Noale M, et al. Consensus paper on the "executive summary of the international conference on Mediterranean diet and health: a lifelong approach" an Italian initiative supported by the Mediterranean Diet Foundation and the Menarini Foundation. Nutrition. 2018;51–52:38–45. doi: 10.1016/j.nut.2017.12.002.

[4] Cînpeanu O-C, Tarcea M, Cojan P, Iorga D, Olah P, Guiné RPF. Perception of healthy eating among Romanian adults. J Interdiscip Med. 2019;4:77–86. doi: 10.2478/jim-2019-0008.

[5] Darmon N, Drewnowski A. Contribution of food prices and diet cost to socioeconomic disparities in diet quality and health: a systematic review and analysis. Nutr Rev. 2015;73:643–60. doi: 10.1093/nutrit/nuv027.

[6] Ferrão AC, Guiné RPF, Correia P, Ferreira M, Cardoso AP, Duarte J, et al. Perceptions towards a healthy diet among a sample of university people in Portugal. Nutr & Food Sci. 2018;48:669–88. doi: 10.1108/NFS-10-2017-0205.

[7] Ferrão AC, Correia P, Ferreira M, Guiné RPF. Perceptions towards healthy diet of the Portuguese according to area of work or studies. Zdr Varst. 2019a;58:40–6. doi: 10.2478/sjph-2019-0005.

[8] Ferrão AC, Guine RPF, Correia PMR, Ferreira M, Lima J, Duarte J. Development of a questionnaire to assess people's food choices determinants. Curr Nutr & Food Sci. 2019b;15:281–95.

[9] Ferrão AC, Guiné RPF, Ferreira P, Ferreira M. Influence of environmental and political determinants on food choices in a sample of Portuguese population. Curr Nutr & Food Sci. 2020;16:689–97.

[10] Guiné RPF, Henriques F, Barroca MJ. Influence of drying treatments on the physical and chemical properties of cucumber. Food Measure. 2014;8:195–206. doi: 10.1007/s11694-014-9180-9.

[11] Guiné RPF, Almeida IC, Correia AC, Gonçalves FJ. Evaluation of the physical, chemical and sensory properties of raisins produced from grapes of the cultivar Crimson. Food Measure. 2015;9:337–46. doi: 10.1007/s11694-015-9241-8.

[12] Guiné R, Ferrão AC, Ferreira M, Correia P, Cardoso AP, Duarte J, et al. The motivations that define eating patterns in some Mediterranean countries. Nutr & Food Sci. 2019a;49:1126–41. doi: 10.1108/NFS-12-2018-0360.

[13] Guiné R, Florença SG, Ferrão AC, Correia PM. Investigation about the consumption of edible flowers in Portugal. Indian J Traditional Knowl (IJTK). 2019b;18:579–88.

[14] Harrington J, Fitzgerald AP, Layte R, Lutomski J, Molcho M, Perry IJ. Sociodemographic, health and lifestyle predictors of poor diets. Public Health Nutr. 2011;14:2166–75. doi: 10.1017/S136898001100098X.

[15] Hendrie GA, Cox DN, Coveney J. Validation of the general nutrition knowledge questionnaire in an Australian community

sample. Nutr & Dietetics. 2008;65:72–7. doi: 10.1111/j.1747-0080.2007.00218.x.
[16] Kaya IH. Motivation factors of consumers' food choice. Food Nutr Sci. 2016;7:149–54. doi: 10.4236/fns.2016.73016.
[17] Kiefer I, Rathmanner T, Kunze M. Eating and dieting differences in men and women. J Men's Health & Gend. 2005;2:194–201. doi: 10.1016/j.jmhg.2005.04.010.
[18] Larson NI, Story MT, Nelson MC. Neighborhood environments: disparities in access to healthy foods in the U.S. Am J Prev Med. 2009;36:74–81. doi: 10.1016/j.amepre.2008.09.025
[19] Liu AG, Ford NA, Hu FB, Zelman KM, Mozaffarian D, Kris-Etherton PM. A healthy approach to dietary fats: understanding the science and taking action to reduce consumer confusion. Nutr J. 2017;16:53. doi: 10.1186/s12937-017-0271-4.
[20] Lopez RP. Neighborhood risk factors for obesity. Obesity (Silver Spring). 2007;15:2111–9. doi: 10.1038/oby.2007.251.
[21] Mai R, Hoffmann S. How to combat the unhealthy = tasty intuition: the influencing role of health consciousness. J Public Policy & Mark. 2015;34:63–83. doi: 10.1509/jppm.14.006.
[22] Malon A, Deschamps V, Salanave B, Vernay M, Szego E, Estaquio C, et al. Compliance with French nutrition and health program recommendations is strongly associated with socio-economic characteristics in the general adult population. J Am Diet Assoc. 2010;110:848–56. doi: 10.1016/j.jada.2010.03.027.
[23] Mullie P, Clarys P, Hulens M, Vansant G. Dietary patterns and socioeconomic position. Eur J Clin Nutr. 2010;64:231–8. doi: 10.1038/ejcn.2009.145.
[24] Nelson MC, Gordon-Larsen P, Song Y, Popkin BM. Built and social environments associations with adolescent overweight and activity. Am J Prev Med. 2006;31:109–17. doi: 10.1016/j.amepre.2006.03.026.
[25] Organ K, Koenig-Lewis N, Palmer A, Probert J. Festivals as agents for behaviour change: a study of food festival engagement and subsequent food choices. Tour Manag. 2015;48:84–99. doi: 10.1016/j.tourman.2014.10.021.
[26] Ostan R, Lanzarini C, Pini E, Scurti M, Vianello D, Bertarelli C, et al. Inflammaging and cancer: a challenge for the Mediterranean diet. Nutrients. 2015;7:2589–621. doi: 10.3390/nu7042589.
[27] Rodrigues Â, Correia P, Guiné R. Physical, chemical and sensorial properties of healthy and mixture breads in Portugal. J Food Meas Charact. 2014;8:70–80.
[28] Rundle A, Diez Roux AV, Free LM, Miller D, Neckerman KM, Weiss CC. The urban built environment and obesity in New York city: a multilevel analysis. Am J Health Promot. 2007;21:326–34. doi: 10.4278/0890-1171-21.4s.326.
[29] Rustad C, Smith C. Nutrition knowledge and associated behavior changes in a holistic, short-term nutrition education intervention with low-income women. J Nutr Educ Behav. 2013;45:490–8. doi: 10.1016/j.jneb.2013.06.009.
[30] Sallis JF, Bowles HR, Bauman A, Ainsworth BE, Bull FC, Craig CL, et al. Neighborhood environments and physical activity among adults in 11 countries. Am J Prev Med. 2009;36:484–90. doi: 10.1016/j.amepre.2009.01.031.
[31] Sami W, Ansari T, Butt NS, Hamid MRA. Effect of diet on type 2 diabetes mellitus: a review. Int J Health Sci (Qassim). 2017;11:65–71.
[32] Santos SCRVL, Guiné RPF, Barros A. Effect of drying temperatures on the phenolic composition and antioxidant activity of pears of Rocha variety (Pyrus communis L.). Food Measure. 2014;8:105–12. doi: 10.1007/s11694-014-9170-y.
[33] Spronk I, Kullen C, Burdon C, O'Connor H. Relationship between nutrition knowledge and dietary intake. Br J Nutr. 2014;111:1713–26.
[34] Stasi A, Songa G, Mauri M, Ciceri A, Diotallevi F, Nardone G, et al. Neuromarketing empirical approaches and food choice: a systematic review. Food Res Int. 2018;108:650–64. doi: 10.1016/j.foodres.2017.11.049.
[35] Thodis A, Itsiopoulos C, Kouris-Blazos A, Brazionis L, Tyrovolas S, Polychronopoulos E, et al. Observational study of adherence to a traditional Mediterranean diet, sociocultural characteristics and cardiovascular disease risk factors of older Greek Australians from MEDiterranean ISlands (MEDIS-Australia study): protocol and rationale. Nutr Diet. 2018;75:44–51. doi: 10.1111/1747-0080.12360.
[36] van Buul VJ, Bolman CAW, Brouns FJPH, Lechner L. Back-of-pack information in substitutive food choices: a process-tracking study in participants intending to eat healthy. Appetite. 2017;116:173–83. doi: 10.1016/j.appet.2017.04.036.
[37] WEF. Global Gender Gap Report. Geneva, Switzerland: World Economic Forum; 2020.
[38] WWO. 2020. Healthy diet. WHO fact sheet on healthy diet with key facts and information on essential dietary elements, practical advice, salt, sodium and potassium, sugars, health diet promotion, WHO response. [WWW Document]. URL https://www.who.int/news-room/fact-sheets/detail/healthy-diet (accessed 6.6.20).