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MARKETING MOTIVATIONS INFLUENCING FOOD CHOICE IN 16 COUNTRIES: SEGMENTATION AND CLUSTER ANALYSIS*

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Abstract. Food behaviour is governed by different kinds of motivations, some of individual nature and others related with the external food environment. This study investigated the eating motivations in sixteen countries with respect to commercial and marketing influences on food choices. The questionnaire survey was developed between September 2017 and June 2018, via online tools, targeting a convenience sample of residents in sixteen countries (Argentina, Brazil, Croatia, Egypt, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Serbia, Slovenia and the United States of America). The number of valid responses received was 11,919 participants. The data were treated using SPSS software, and the main statistical techniques used included exploratory factor analysis, evaluation of internal reliability through Cronbach's alpha, cluster analysis (hierarchical and k-means) and logistic regression. The results obtained showed two groups of people: low motivated and notably motivated consumers. The results showed high asymmetries between countries, with highest percentage of highly motivated consumers in Egypt and the lowest percentage of highly motivated in Portugal. It was further observed that consumers more influenced by commercial and marketing aspects (the notably motivated) tend to be women, young, single, less educated, less likely to be professionally active, and those who live mostly in rural or suburban areas. Less exercise and overweight are also factors associated with greater propensity for commercial and marketing motivations. Furthermore, health problems such as shellfish or gluten intolerance, hypertension and high cholesterol confer less propensity to be in the segment of the notably motivated consumers. In conclusion, this work highlighted the role of geographic, sociodemographic and lifestyle factors as food choice determinants.

Keywords: marketing segmentation; food consumption; eating motivation; cluster analysis

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1. Introduction

Dietary patterns are greatly influenced by several kinds of motivations, including the interaction between individual factors with the external food environments that surround consumers. Among the individual factors for example are personal preferences, long time habits, health motivations or limitations, income and affordability, etc. (Bacărea et al., 2021; Bartkiene et al., 2019; Downs et al., 2022). On the other hand there are aspects such as the external food environment, which encompasses aspects such as the availability, convenience, marketing campaigns, promotions, quality, or even sustainability of the foods or food supply chains (Downs et al., 2020). It is also known that the sociocultural environment and political influences help shape consumer patterns in general, which is also applicable to the food choices (Turner et al., 2018).

Food advertising campaigns are responsible for part of the food market, since they directly influence consumers to buy certain types of food (Silva et al., 2021). Additionally, these marketing strategies are often directed to foods that are convenient, easy to consume, tasty, high in fat, sugar and salt, energy dense and very caloric but with a poor nutritional value (Carbonneau et al., 2021; Jiménez-Morales & Montaña Blasco, 2021; Martínez-Pastor et al., 2021). As a consequence, people tend to consume foods that are easy to purchase and cheap, but that contribute to the onset of many non-communicable diseases, leading to high social burdens also associated with obesity and related pathologies, like diabetes, high cholesterol, cardiovascular diseases and heart problems (Batschauer et al., 2020; Feriani et al., 2021; Lin et al., 2014; Loreto et al., 2021; Pan et al., 2021; Siu et al., 2007).

The advertisements focused on food products and beverages have proven to affect consumers' preferences, purchasing choices, and consumption patterns, also overlapping and/or influencing nutrition knowledge. To this matter, marketing campaigns on television in particular, have been promoting less healthy products (Cairns et al., 2013; Meiksin et al., 2021; Smith et al., 2019). However, in many countries some regulation has been implemented in order to restrict some types of advertisements of less healthy foods and incentive campaigns that

drive consumers to healthier food choices (Thompson et al., 2021). Many of these strategies address specifically the children, as a way to promote long-time effects and achieve a better public health in the future generations (Carters-White et al., 2021; Mehta & Bharadwaj, 2021; von Nordheim et al., 2022).

Attending to the effect of marketing strategies and/or advertising campaigns on consumer's patterns and considering that people shape their food behaviours under the influence of so many different factors, including social, cultural and political aspects that vary among countries, this study aimed to investigate the peoples' eating motivations in a set of different countries, particularly in what comes to commercial and marketing influences on their food choices. Additionally, it was intended to understand how the people's personal characteristics are related to the way they shape their food choices and if they are influenced by commercial or marketing factors.

2. Methodology

This research was part of the EATMOT project and the data collection was assessed using the questionnaire developed and validated for that purpose as described in the work by Ferrão et al. (2019). All ethical principles were strictly guaranteed in the design and application of the questionnaire, which was approved by the Ethical Committee (Reference N° 04/2017) before the data collection, which took place between September 2017 and June 2018. The participation was voluntary and included only adult citizens. All answers were kept anonymous and no personal data were collected to possibly relate to the answers, so as to protect the participants' anonymity. The questionnaire survey was distributed online to residents in sixteen countries spread along different parts of the globe, mostly Europe, but also America and Africa. The participating countries were: Argentina, Brazil, Croatia, Egypt, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Serbia, Slovenia and United States of America.

In addition to sociodemographic data, the questionnaire covered questions intended to characterize the respondents regarding anthropometric, behavioural and health related elements. This study focuses on commercial and marketing motivations related to food choices. Seven items were considered to measure marketing and commercials motivations. A five-point Likert-type scale was used, ranging from "Strongly disagree" to "Strongly agree" (Likert, 1932). The responses for two items were inverted so that higher scores consistently reflect higher level of commercial and marketing motivation.

Table 1. Commercial and marketing motivations for food choices

Code	Items for the Commercial and Marketing Motivations
M1	When I buy food I usually do not care about the marketing campaigns happening in the shop (Inverted)
M2	I eat what I eat, because I recognize it from advertisements or have seen it on TV
M3	I usually buy food that spontaneously appeals to me (e.g. situated at eye level, appealing colours, pleasant packaging)
M4	When I go shopping I prefer to read food labels instead of believing in advertising campaigns (Inverted)
M5	Food advertising campaigns increase my desire to eat certain foods
M6	Brands are important to me when making food choices
M7	I try to schedule my food shopping for when I know there are promotions or discounts

An exploratory factor analysis was applied to these items, by country, and the results were compared, in order to verify whether it would be possible to find a factor structure common to all countries. Three items were consistently aggregated in one factor for all countries, being then considered to define the factor "Advertising". Cronbach's alpha was used to assess reliability. The other items were studied individually. As a result of this analysis, five variables were considered to measure marketing and commercials motivations: Advertising, Brands, Promotions/Discounts, Marketing Campaigns and Advertising over Labels. Cluster analysis was applied to identify consumer segments based on these five motivation variables. Three hierarchical techniques were applied, Ward's method, single linkage and average linkage, whose solutions were considered as initial solutions for the k-means method. This approach of starting k-means from a solution given by an hierarchical method is often

recommended to obtain more accurate solutions (Hair et al., 2010). Additionally, the k-means method was applied to 50 bootstrap samples and the similarity of cluster solutions for different numbers of clusters was examined using the rand index (Dolnicar & Leisch, 2009). The rand index is a frequently used measure of agreement between cluster solutions, ranging from zero (none agreement) to one (total agreement). The two-group solution was found to be the most stable, with values of the rand index very close to its maximum value. Furthermore, the stability of the two-group solution was sustained by verifying that the solutions that emerged from the K-means after hierarchical methodology were fully co-incident (Hair et al., 2010). The two clusters separate respondents more motivated by commercial and marketing aspects from those less motivated. In order to characterize consumers with higher levels of commercial and marketing motivations, these two groups were then compared in relation to demographic, anthropometric, behavioural and health-related variables. Chi-square test and Mann-Whitney test were applied to make a first identification of the variables that differentiate the most motivated consumers. Logistic regression modelling was then used to identify the variables independently associated with higher levels of commercial and marketing motivations. Variables were chosen to enter in the model selection procedure if $p < 0.1$. Friedman's ANOVA and multiple comparisons by Bonferroni adjustment were applied to compare levels of the five motivational variables. Statistical analyses were performed using R package flexclust (Leisch, 2006; R Core Team, 2020) and IBM SPSS statistics (version 26). Significance was established for $p < 0.05$.

3. Results

3.1. Demographic Characteristics of the Sample

The sample includes responses of 11,919 consumers from sixteen countries. Croatia and Portugal accounted for 12.9% and 11% of the sample, respectively, followed by Slovenia and United States of America (9.2 and 7.5%, respectively). The remainder countries represented less than 7% of the sample (Table 2). The female gender is more represented in the sample, comprising 71.4% of the respondents. The mean age is 34, with a standard deviation of 13.9 years old. Moreover, half of the participants were less than 31 years old and 34% ranged between 31 and 50 years. In terms of Education, the majority (61.1%) had a university degree. Most of the respondents were living in an urban environment (66.9%), 16.8% in a suburban area and 16.3% in a rural zone. Also, 47.5% was married or living together and 46% were single.

Table 2. Countries represented in the sample

Country	Frequency	Percent
Croatia	1538	12.9
Portugal	1314	11.0
Slovenia	1092	9.2
United States of America (USA)	890	7.5
Romania	821	6.9
Egypt	790	6.6
Brazil	665	5.6
Latvia	636	5.3
Poland	586	4.9
Italy	541	4.5
Argentina	522	4.4
Netherlands	521	4.4
Lithuania	507	4.3
Hungary	500	4.2
Greece	498	4.2
Serbia	498	4.2
Total	11919	100

3.2. Segmentation by Commercial and Marketing Motivations

The seven items used to measure commercial and marketing motivations were subjected to an exploratory factor analysis by country. The three following items were consistently combined in one factor for all countries. The mean of these items was thus considered to define the factor called Advertisement.

- M2. I eat what I eat, because I recognize it from advertisements or have seen it on TV
- M3. I usually buy food that spontaneously appeals to me (e.g. situated at eye level, appealing colours, pleasant packaging)
- M5. Food advertising campaigns increase my desire to eat certain foods

The reliability of the scale is supported by Cronbach's alpha values which are not less than 0.6 (Table 3) in an analysis for each country, and equal to 0.7 in a global analysis with all data. Indeed, the general agreed upon lower limit for Cronbach's alpha is 0.7, but this may decrease to 0.6 in an exploratory research (Hair et al., 2010).

Table 3. Cronbach's alpha

Country	Argentina	Brazil	Croatia	Egypt	Greece	Hungary	Italy	Latvia
Cronbach's α	0.6	0.7	0.7	0.6	0.7	0.8	0.7	0.7
Country	Lithuania	Netherlands	Poland	Portugal	Romania	Serbia	Slovenia	USA
Cronbach's α	0.6	0.6	0.7	0.9	0.7	0.7	0.6	0.7

Regarding the other items, a common factor structure was not found in all countries and, therefore, they were studied separately. This study thus considers five variables to measure commercial and marketing motivations: Advertising (average of M2, M3 and M5), Brands (M6), Promotions/Discounts (M7), Marketing Campaigns (M1 – Inverted) and Advertising over Labels (M4 – Inverted).

As presented in Table 4, participants are more motivated by Brands and Promotions/Discounts, and then by Marketing Campaigns and Advertising, with significant differences between them all ($p < 0.005$ for all pairwise comparisons). Yet, none of the five motivational variables had a mean value above 3.5, meaning that, in general, consumers exhibited medium and low commercial and marketing motivations.

Table 4. Mean and Standard Deviation of Commercial and Marketing Motivations

	Mean	Standard Deviation
Advertising	2.51	0.86
Brands	3.07	1.09
Promotions/Discounts	3.00	1.07
Marketing Campaigns	2.74	1.09
Advertising over labels	2.25	1.04

Although the motivational level for commercial and marketing aspects is not pronounced, it is still interesting to understand which consumers are most motivated by them. In this study, the main research problem lies in the following question: Overall, what makes consumers more prone to commercial and marketing motivations?

Applying cluster analysis, it was possible to identify two groups that were distinguished precisely by the level of commercial and marketing motivations:

- Notably motivated consumers – which covers 57.8% of the sample and is characterized as a group of consumers with higher levels of commercial and marketing motivations, since in the 5 motivational variables the means for this group are above the global mean.

- Low motivated consumers – which includes 42.2% of respondents, those with lower levels of motivation as they present mean levels of motivation below the mean values for the entire sample.

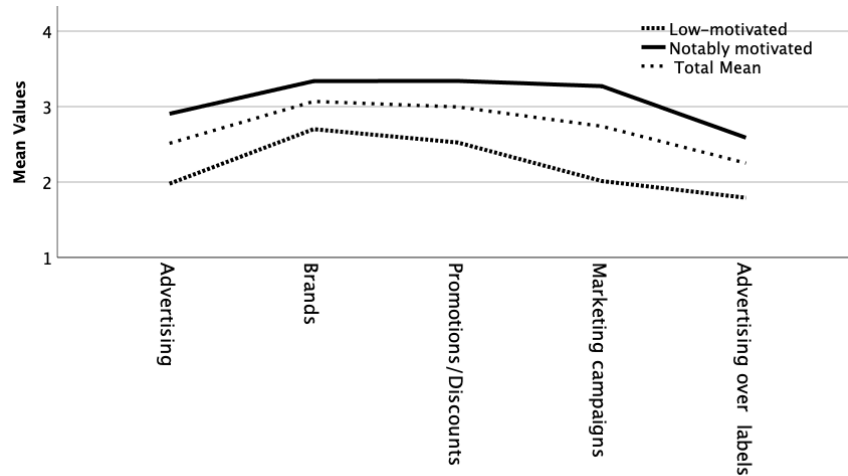


Figure 1. Average values of the five motivational variables for the entire sample and for the two groups

Clustering algorithms always provide a clustering solution regardless of whether or not a cluster structure exists in the dataset. If natural clusters exist in the data, they will emerge repeatedly over different computations. So, in cluster analysis, it is fundamental to assess the stability of a cluster solution in order to establish its validity (Hair et al., 2010). The two-group solution found in this study revealed good stability in the performed analysis, which supports its validity. In fact, when applying k-means to 50 bootstrap samples (Dolnicar & Leisch, 2009), the various clustering solutions found for the two-group solution were very similar, as indicated by the rand index, contrasting with solutions with another number of groups (Figure 2). Additionally, applying the K-means after hierarchical methodology, the three solutions obtained were fully co-incident, which further supports the stability of the two-cluster solution.

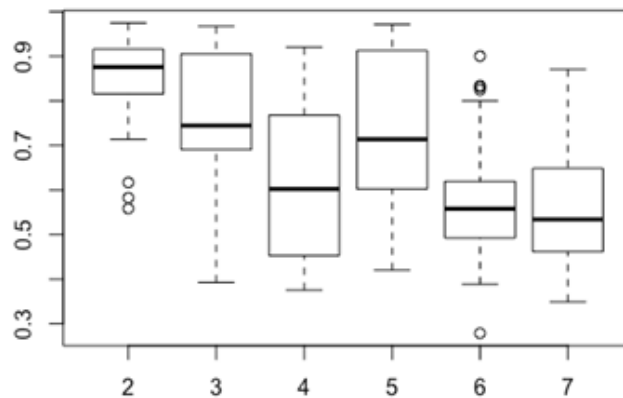


Figure 2. Similarity of cluster solutions for k number of clusters (k=2,3,...7)

3.3. Cluster Profiles

To better understand the profile of consumers most prone to commercial and marketing motivations, the two groups were compared regarding demographic, anthropometric, behavioral and health related variables. Let us classify by group 1 the notably motivated consumers and group 2 the group of low motivated consumers.

When comparing the demographic characteristics of these two groups using univariate statistical analysis, significant differences are found (Table 5). Individuals belonging to the group of the most motivated tend to be younger than those in the group with less motivation (mean age group 1 = 32.7 years vs. mean age group 2 = 36.7 years, $p < 0.005$). The notably motivated group has a higher percentage of women (72.2% vs. 70.2%), a higher percentage of single individuals (51.9% vs. 37.9%), a lower proportion of individuals with university education (58.3% vs. 66.1%), more consumers living in rural or suburban areas (37.2% vs. 27.6%), and more consumers who do not have an active professional activity, that is, unemployed, non-working students or retired (43.1% vs. 31.1%).

Table 5. Cluster profiles: demographic characteristics

Variables/groups		Low motivated Consumers (%)	Notably motivated Consumers (%)	Total (%)	p-value Chi-square
Gender	Male	29.8	27.8	28.6	0.016
	Female	70.2	72.2	71.4	
Education Level	Primary School	1.1	2.9	2.1	<0.005
	Secondary School	32.8	38.8	36.3	
	University	66.1	58.3	61.6	
Living Environment	Rural	13.1	18.6	16.3	<0.005
	Suburban	14.5	18.6	16.8	
	Urban	72.4	62.9	66.9	
Civil State	Single	37.9	51.9	46.0	<0.005
	Married/Living together	54.0	42.7	47.5	
	Divorced/Separated	5.7	3.9	4.7	
	Widowed	2.3	1.5	1.9	
Professionally Active	Yes (employed or working student)	68.9	56.9	62.0	<0.005
	No (unemployed, non-working student or retired)	31.1	43.1	38.0	

Higher percentages of notably-motivated consumers are found in Egypt, Lithuania, Netherlands, Croatia and United States of America, with over 60% of respondents belonging to this segment. In contrast, Portugal, Poland Romania and Italy have less than 50% of notably motivated respondents (Figure 3).

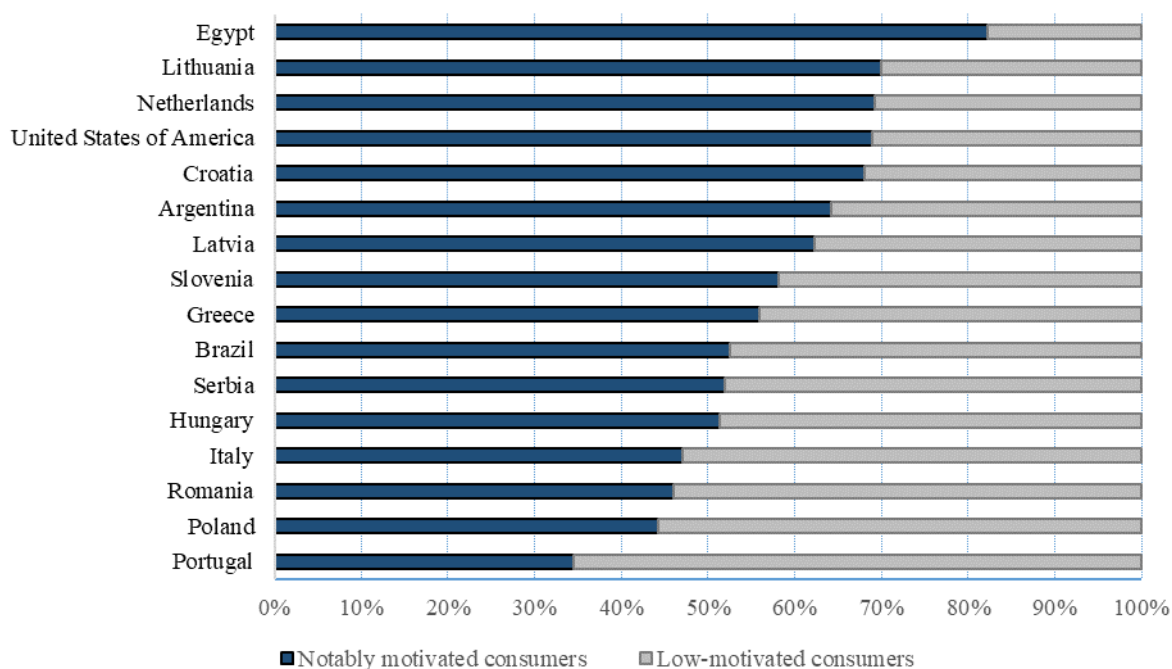


Figure 3. Cluster Profiles by Country

The group with greater motivation for commercial and marketing aspects has a higher percentage of consumers who do not exercise regularly (62.7% vs. 50.4, $p < 0.005$). Accordingly, this is the group with the highest percentage of overweight or obese individuals (37.6% vs. 31.2%, $p < 0.005$). There are no statistically significant differences between the two groups in the proportion of consumers with lactose ($p = 0.057$), casein ($p = 0.87$) or nuts ($p = 0.70$) intolerance, or with associated diseases such as diabetes ($p = 0.768$), intestinal disorders ($p = 0.346$) and cardiovascular diseases ($p = 0.359$). However, in the group of the most motivated there is a lower percentage of consumers with high cholesterol (4.0% vs. 7.0%, $p < 0.005$), hypertension (5.5% vs. 9.2%, $p < 0.005$) and gluten or shellfish intolerance (1.3% vs. 2.1%, $p = 0.001$ and 1.6% vs. 3.2%, $p < 0.005$ respectively), but a higher percentage of consumers with gastric disorders (4.6% vs. 3.4%, $p < 0.002$).

Multivariate Logistic regression was used to estimate the odds of a consumer being in the notably motivated group, identifying the variables independently associated with higher levels of commercial and marketing motivations. The chances of belonging to the notably motivated group are higher for females (OR gender = 1.15, $p = 0.001$) and decrease with age (OR age = 0.99, $p < 0.005$). As academic background increases, the odds of belonging to the notably motivated group decreases (OR secondary school = 0.38, OR university = 0.35, compared to primary school education level, $p < 0.005$). It is in the rural environment that the most motivated are found: as we get closer to the urban environment, chance of belonging to the notably motivated group decreases (OR Suburban = 1.23, OR Rural = 1.32, comparing with the inhabitants of the urban environment, $p < 0.005$). The chance of belonging to the motivated group increases with the grow in BMI (OR = 1.06, $p < 0.005$), is higher for people who are not professionally active (OR = 1.23, $p < 0.005$) and do not exercise much (OR occasionally = 0.85, $p = 0.002$, OR moderate/intensively = 0.61, $p < 0.005$, compared to the group that never/sporadically engages in physical exercise). Consumers with shellfish intolerance, gluten intolerance, arterial hypertension, high cholesterol are less likely to belong to the high motivation group and, in contrast, those with gastric disorders are more likely to belong to this group (Table 6).

Table 6. Logistic regression model: independent predictors of notably motivated consumers

	B	OR	Sig.	95% C.I.	
Age	-0.014	0.986	0.000	0.982	0.990
BMI	0.055	1.056	0.000	1.046	1.067
Gender=Female	0.143	1.154	0.001	1.058	1.259
Education Level					
Secondary School (compared to primary school)	-0.968	0.380	0.000	0.276	0.523
University (compared to primary school)	-1.062	0.346	0.000	0.252	0.475
Living environment					
Suburban (compared to Urban)	0.206	1.229	0.000	1.100	1.373
Rural (compared to Urban)	0.276	1.317	0.000	1.185	1.465
Civil State					
Married/living together (compared to single)	-0.286	0.752	0.000	0.680	0.831
Divorced/separated (compared to single)	-0.284		0.005	0.617	0.919
Widow (compared to single)	-0.308	0.753	0.055	0.536	1.007
Present professional activity = Not active	0.204	1.226	0.000	1.119	1.344
Physical Exercise					
Occasionally (compared to Never/Sporadically)	-0.166	0.847	0.002	0.763	0.940
Moderately /Intensively (compared to Never/Sporadically)	-0.496	0.609	0.000	0.557	0.665
High cholesterol = Present	-0.237	0.789	0.011	0.658	0.946
Arterial hypertension = Present	-0.269	0.764	0.001	0.648	0.901
Gastric disorders = Present	0.265	1.303	0.009	1.068	1.590
Gluten Intolerance= Present	-0.514	0.598	0.001	0.440	0.812
Shellfish Intolerance = Present	-0.563	0.569	0.000	0.436	0.743

4. Discussion

The results of the present work highlighted important dissimilarities between consumers from different countries in what concerns their shaping of food choices according to factors related to commercials and marketing. While consumers in Egypt, Lithuania, The Netherlands, United States or Croatia majorly in the group of notably motivated consumers, in contrast, Portuguese consumers are mostly in the category of low motivated consumers. The sociocultural environment and political regulations or public health strategies vary considerably among countries, and therefore it is expected that the behaviours of consumers are partly influenced by those factors (Dai et al., 2021; Rempe et al., 2019). Besides, a historical context attributes to food a diversity of functions, promoting social transformation and organization, geopolitical collaboration or competition, as well as industrial and economic development. Hence it acts as a reflection of the sociocultural interactions within a group, and countries, most of the times, represent different groups, to this purpose, given a common socio-cultural-political environment. Within most cultures, collective food consumption behaviours can be contextualized and better understood taking into account that each society constructs their own culturally-specific profiles (Hughes et al., 2017; Nunes et al., 2020; Standage, 2009; Stovall et al., 2021). Studies about the food marketing and advertising campaigns and their effects worldwide have shown differences. For example, Vanderlee et al. (2021) from the International Food Policy Study, reported differences between food marketing via television and digital media in five countries (Canada, United States, United Kingdom, Australia, and Mexico). These differences can naturally have some influence in the food choices of the citizens from different countries.

This study also found evidence that sociodemographic factors like age, education, marital status, living environment or professional activity influence the food choices. In particular, it was observed that consumers who are more prone to commercial and marketing motivations tend to be younger, less educated, are more likely to live in rural or suburban areas and less likely to be professionally active. Women and singles are also more likely

to be part of the notably motivated consumers. Sociodemographic characteristics, have been associated with different food consumption patterns (Guiné, et al., 2020). According to the work by Dana et al. (2021) price was one of the dominant factors for food choice together with convenience, and segmentation was driven by demographic characteristics, particularly by age, gender and residential location. In another work by Marsola et al. (2022) identified some factors that determine food choice among Brazilian adults, which include, among others, price, easiness of preparation and buying convenience. Westenhoefer (2005) suggest age and gender as major factors influencing food choice, but also describe lifestyle and socio-economic situation as important drivers of food choice. In fact, the economic availability may have a decisive influence in buying intentions, and therefore the search for promotional campaigns or sales at lower prices are in people's minds when going shopping. In a study conducted in different countries, variables age, marital status, country, living environment, level of education and professional area were identified as significantly influencing the eating motivations, including those related with commercials and marketing of food items (Guiné et al., 2020).

Finally, it was also observed that lifestyle factors and health characteristics, such as physical exercise, body weight or health problems (allergies, hypertension, high cholesterol) are related to the consumer's behaviour in what concerns the commercial and marketing motivations. Less exercise and overweight are also factors associated with greater propensity for commercial and marketing motivations. Furthermore, health problems such as shellfish or gluten intolerance, hypertension and high cholesterol confer less propensity to be in the segment of the most motivated. But, in contrast, gastric disorders are associated with higher probability of being commercial/marketing motivated. Bacarêa et al. (2021) reported that age and presence of cardiovascular disorders were factors strongly influencing food choices. Also Wongprawmas et al. (2021) described the role of environmental aspects and health condition in the food choice and buying intention. People with excessive weight, who practise physical exercise or have certain health conditions are expected to play more attention to their diets, and therefore might be more motivated to escape the influences of commercials or marketing campaigns, especially those announcing non-healthy foods, like sugar dense, high fat (particularly saturated fat), high salt or excessively caloric but with a poor nutritional value (Banovic et al., 2021; Fox et al., 2021; Mesler et al., 2021).

Conclusions

This study produced some light into the characteristics of consumers that are related with their prone to be more or less influenced by food advertising and marketing strategies, in different sociocultural contexts.

Regarding the differences among countries, it was found that consumers in Egypt, Lithuania, The Netherlands, United States or Croatia are more prone to be in the group of notably motivated consumers in what concerns the economic and marketing motivations for food choice while in Portugal the highest percentage of consumers fall into the category of low motivated consumers.

The results further evidenced that consumers who are more prone to be influenced by commercial and marketing motivations tend to be younger, less educated, more likely to live in rural or suburban areas and less likely to be professionally active. Furthermore, women and singles are also among the groups more likely to be part of the notably motivated consumers. Additionally, the results showed that less exercise and overweight are also factors associated with greater propensity for commercial and marketing motivations.

Apart from the sociodemographic characteristics of the participants, also their health-related conditions were found to be associated with their food consumption motivations. For example, health problems such as shellfish or gluten intolerance, hypertension and high cholesterol confer less propensity to be in the segment of the most motivated consumers, which means that these are least influenced by commercial and marketing factors when making food purchases. In contrast, gastric disorders are associated with higher probability of being commercial/marketing motivated.

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