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ANALYSIS OF FACTORS THAT INFLUENCE EATING HABITS IN DIFFERENT COUNTRIES

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Abstract

Individual eating habits are influenced by a number of factors, including both internal variables such as physiology and emotion, as well as environmental factors such as food availability and cultural norms. Given the public health impact of dietary habits (choice, quality, amount, frequency) on health outcomes, it is important to understand what factors influence eating habits on a societal level. The aim of this research was to determine factors that influence eating habits and compare these factors between four different countries – Latvia, Lithuania, Portugal and the USA.

An eating motivation questionnaire was used to measure eating habits in 3,348 respondents from different regions and countries. There were ten parts - demographical information, anthropometric data and behavioral and health related elements, sources of information about healthy eating, factors related to food choices according to motivations (health, emotional, economic, availability, social, cultural, environmental, political, marketing and commercials). Data were analyzed using descriptive statistics, and self-reported motivation was compared across countries.

Health was the primary motivator of food selection in this sample (71% of respondents), whereas 34% reported that emotional factors impact their dietary habits and 35% reported that economic factors determine their food selection. A large number of respondents (44%) disagreed or strongly disagree or disagreed with the idea that marketing impacts their dietary habits. Portugal had the highest number of participants (86%), reporting that they agreed or strongly agreed with having health-related motivations for food selection, with Latvia (65%) and Lithuania (76%) showing more moderate levels of endorsement of healthy eating motivations, and the USA having the fewest respondents (52%) endorsing health-related motivations. Respondents from Portugal were more likely than respondents from the other countries to deny having emotional, economic and marketing motivations in food selection.

From results can conclude that consumers are motivated by healthiness factors when making food choices (71% of respondents), but marketing, economic and emotional factors positively impact only 30% of consumers, other respondents completely disagreed or was indifferent to these types of motivations. Baltic countries (Latvia and Lithuania) were similar to each other, but Portugal and USA were completely different. Portugal strongly agreed with healthy motivations and disagreed with all other motivations, whereas USA and also Baltic countries had more equal division of opinions regarding impact of different motivations.

***Key words**: Eating habits, Eating motivations, Consumer behaviour, Food choice.*

1. Introduction

Eating habits, particularly the selection of foods and the amount in which they are consumed, have an important impact on overall health. Although eating can be seen as a physiological requirement that enables bodies to intake sufficient nutrients for growth and proper functioning, there are many non-biological factors that influence what, when, and how people eat. Prior research analysing the factors that impact both healthy and unhealthy food choices have shown a wide variety of influences, including lifestyle, social, cultural and physical environments, past experiences (Laureati *et al.*, [1]), as well as traditions, sensory characteristics, health and convenience (Kimura *et al.*, [2]). Food can be understood as stimulus that has the potential to evoke both positive (e.g. pleasure) and negative (e.g. guilt) affective reactions, which can also impact eating habits (Elder and Mohr, [3]). Stressful situations are classic examples of how situational factors and corresponding emotional states can impact eating habits, resulting in either overconsumption or under consumption of food.

Unhealthy food intake habits contribute to eating disorders, which can lead to obesity, increase risks for cardiovascular diseases or other health issues. Unhealthy eating habits usually develop during adolescence, including the practice of meal skipping, which typically leads to rebound eating that includes a high intake of calories and sodium from solid fats (Rodrigues *et al.*, [4]). Studies of worldwide trends of weight in children and adolescents show that obesity rates are rapidly increasing worldwide, overwhelming many public health systems (Bentham *et al.*, [5]). Creating healthy habits including regular meal consumption in childhood and adolescence is important for creating a sense of tradition and personal experience that supports health-promoting dietary choices throughout the lifespan. Supporting healthy eating habits early in life can influence and even prevent diet-related health problems later in life (Schwartz *et al.*, [6]).

Consumers report growing awareness that food selection can be a cause of health related issues. However, awareness and knowledge of the health impact of dietary choices are not always reflected in personal eating habits, given that other factors such as taste and price are competing priorities (Hoefkens *et al.*, [7]). Despite public awareness of the potential costs of choosing low quality foods, there remain high levels of unhealthy eating behaviours in youth, including selection of high calorie, low nutrient foods (e.g. soft drinks, juices, energy drinks, nutrient-dense snacks and sweets, bakery goods etc.), eating out, and high consumption of ultra-processed foods (Altavilla *et al.*, [8]). Elements of the social environment, such as TV shows and social media, can also influence eating habits in positive or negative ways. For example, TV viewing results in higher consumption of snacks, but viewing of cooking shows can also positively impact knowledge of food topics (Backer and Hudders, [9]). Although numerous studies have suggested that there is a need for more public education about the impact of a low-quality diet on health outcomes, it is also evident that such awareness is not sufficient to impact food choices.

Given the rapidly increasing rates of obesity and other health issues related to the quality and quantity of dietary choices, it is important to understand the other factors that influence food choices and eating patterns (Slater and Mudryj, [10]). Another key factor in food selection is convenience. Processed food helps to reduce cooking time, but it also creates dependence on these products and decreases basic food preparation skills. Conversely, food preparation skills ensure control over mealtime planning, selection, cooking and consumption, which, in turn, can help protect against obesity and nutrition related diseases (Slater and Mudryj, [10]). However, cooking skills alone are not sufficient to promote healthy eating habits unless consumers have access to information about the nutrient quality of various products and an awareness of the association between food quality and health (Altavilla *et al.*, [8]). Hence, both knowledge about nutrition and food skills play significant role in daily eating habits and choices. Accurate estimation of a proper portion size is also an essential skill for healthy dietary patterns. Individuals are commonly inaccurate in assessing the actual energy amount of food due to incorrect definitions of portion size (Mengotti *et al.*,, [11]). Ordinally, people with better knowledge about nutrients and with more restrained eating habits can estimate total energy content of meal more accurately if it contains healthy foods, but both dieters and non-dieters tend to overestimate high energy foods and underestimate low energy foods (Mengotti *et al.*, [11]).

As stated above, there are many types of factors which influence consumers eating habits and food choices – physiological, psychological, environmental, and financial. All these factors can be divided into more detailed components, including emotions, health perceptions, convenience, marketing and influencer impacts, as well as political concerns (e.g., local product). This study utilized a questionnaire measuring a range of influences on eating habits and food choices (Guine *et al.*, [12]). Identifying the correlations between self-reported motivations in food selection and eating habits will allow for improved recommendations for ways to improve healthy food choices, ultimately reducing the negative health effects of poor diet.

Nationality may also impact the cultural and social aspects of food selection, so the present study compared several countries to identify similarities and differences in eating motivations and behaviors (Guine *et al.*, [13]). The aim of this research was to determine self-reported motivations that influence eating habits and compare these factors between four different countries - Latvia, Lithuania, Portugal and USA.

2. Materials and Methods

The primary tool utilized was the Eating Motivations Scale (Guine *et al.*, [12]) which was used to collect information about participants from four countries (from: Latvia, Lithuania, Portugal, and the USA). The questionnaire was divided into different sections in order to collect information about respondents' lifestyle, knowledge about healthy eating, sources of information about healthy eating, and eating motivations. Information about lifestyle included gender, country, information about physical exercise and dietary regimes.

The questionnaire also assessed four categories of eating motivations: health (10 items), emotions (9 items), economics and convenience (7 items) and marketing (7 items). All 33 items are listed in Table 1.

The study was conducted with 3,348 respondents across 4 countries - Portugal (1,314 respondents), Latvia (636 respondents), Lithuania (507 respondents), and the USA (891 respondents). Participation in the study was voluntary and the questionnaire was distributed over the internet and in paper form. The respondents were selected through convenience sampling, although attempting to reach different parts of society, in terms of age, gender, education, living environment, civil state, and professional activities.

Table 1. Questionnaire's design

Item	Question	Item	Question
S1	**Health motivations**	**S2**	**Emotional motivations**
S1.1.	I am very concerned about hygiene and safety of the food I eat	S2.1.	Food helps me cope with stress
S1.2.	It is important for me that my diet is low in fat	S2.2.	I usually eat food that helps me control my weight
S1.3.	Usually, I follow a healthy and balanced diet	S2.3.	I often consume foods that keep me awake and alert (such as coffee, coke, energy drinks
S1.4.	It is important for me that my daily diet contains a lot of vitamins and minerals	S2.4.	I often consume foods that help me relax (such as some teas, red wine)
S1.5.	There are some foods that I consume regularly, even if they may raise my cholesterol	S2.5.	Food makes me feel good
S1.6.	I try to eat foods that do not contain additives	S2.6.	When I feel lonely, I console myself by eating
S1.7.	I avoid eating processed foods, because of their lower nutritional quality	S2.7.	I eat more when I have nothing to do
S1.8.	It is important for me to eat food that keeps me healthy	S2.8.	For me, food serves as an emotional consolation
S1.9.	There are some foods that I consume regularly, even if they may raise my blood glycaemia	S2.9.	I have more cravings for sweets when I am depressed
S1.10.	I avoid foods with genetically modified organisms		
S4	**Economic motivations**	**S4**	**Marketing motivations**
S3.1.	I usually choose food that has a good quality/price ratio	S4.1.	When I buy food I usually do not care about the marketing campaigns happening in the shop
S3.2.	The main reason for choosing a food is its low price	S4.2.	I eat what I eat, because I recognize it from advertisements or have seen it on TV
S3.3.	I choose the food I consume, because it is convenient to purchase	S4.3.	I usually buy food that spontaneously appeals to me (e.g., situated at eye level, appealing colours, pleasant packaging)
S3.4.	I buy fresh vegetables to cook myself more often than frozen	S4.4.	When I go shopping, I prefer to read food labels instead of believing in advertising campaigns
S3.5.	I usually buy food that is easy to prepare	S4.5.	Food advertising campaigns increase my desire to eat certain foods
S3.6.	I usually buy food that is on sale	S4.6.	Brands are important to me when making food choices
S3.7.	I prefer to buy food that is ready to eat or pre-cooked	S4.7.	I try to schedule my shopping for when there are promotions or discounts

Legend: Statements are presented in ordinal Likert scale, where respondents needed to evaluate each question from 1 to 5 (1 - strongly disagree; 2 - disagree; 3 - neither agree nor disagree; 4 - agree and 5 - strongly agree, and additional option "no opinion").

The software IBM SPSS Statistics (build 1.0.0.1508, 64-bit edition) was used for all data analysis. The mean and median were calculated for each subscale of the questionnaire. Exploratory factor analysis was used to reduce data. Factor analysis was used for grouping factors by principal axis factoring method. Kaiser-Meyer-Olkin (KMO) and Bartlett's test were used to determine factor fit, against the benchmarks of factor loading above 0.3, no cross loadings and factor intercorrelations below 0.7. The internal consistency of the extracted factors was measured using Cronbach's alpha coefficient, with coefficients closer to 1.0 demonstrating greater internal consistency. Extracted factors were used in regression analyses to determine relationships between variables. A p-value of 0.05 was preselected to determine significance of analyses. Taking into account the adjusted subscales, there were also determined clusters dependent on motivations variables with K-means method.

3. Results and Discussion

The study enrolled a total of 3,348, with an average age of 34.4 years (range 17 - 85). The majority (83.2%) of the sample were in the economically active population group age between 17 and 50 years, with 13.4% age 51 to 65 years, and 3.4% over 65 years of age. Most (69.9%) respondents were females and (30.1% male; Table 2). Proportions of male and female respondents were similar between Portugal and the USA, (more than 60% female, approximately 30% male), and between Latvia and Lithuania (around 80% female and 20% male).

Most respondents (83.3%) lived in urban areas, while 16.7% lived in rural environments (Table 2), distributed fairly similarly across all four countries. Regarding highest education level achieved, the Portuguese and USA respondents are almost equally divided by secondary school and university, while respondents in Latvia had mostly (77%) attended university, and Lithuania was unique in having 12% of the sample reporting only a primary school education. Most respondents (74.6%) reported a general food regime, with 11.5% of respondents reporting a diet based on caloric restriction / weight control regime, and 4.8% following a flexitarian diet. Levels of vegetarianism were similar in all four countries - around 3.4%,

Table 2. Profile of respondents

Variable	Percentage, %				
	Total	Portugal	Latvia	Lithuania	USA
Gender					
Female	69.9	67.0	81.4	75.3	62.8
Male	30.1	33.0	18.6	24.7	37.2
Living environment					
Rural	16.7	17.6	17.3	12.8	17.0
Urban	83.3	82.4	82.7	87.2	83.0
Education					
Primary school	3.0	0.2	0.6	12.2	3.6
Secondary school	38.3	43.2	22.3	32.9	45.4
University	58.7	56.6	77.0	54.8	51
Specific voluntary dietary regime					
Raw foodism	0.4	0.0	0.9	0.8	0.4
Fruitarianism	0.3	0.2	0.2	0.4	0.6
Vegetarianism	3.4	3.4	3.3	3.4	3.4
Veganism	1.1	0.5	1.7	0.2	2.2
Flexitarianism	4.8	1.1	4.2	4.3	11.0
Caloric restriction / weight control	11.5	7.2	14.6	12.2	15.0
Religious restrictions	3.9	1.6	1.7	1.4	10.2
General food regime	74.6	86.0	73.3	77.3	57.1
Physical exercise					
Never	8.5	6.9	8.0	22.1	3.4
Sporadically (less than 1 time a week)	20.8	15.7	23.6	34.4	18.7
Occasionally (1 time a week)	19.5	13.7	34.0	17.8	18.8
Moderately (2 - 3 times a week)	38.1	55.3	27.2	20.1	30.8
Intensively (more than 3 times a week)	13.1	8.4	7.3	5.7	28.3

although veganism was more popular in Latvia, endorsed by 1.7% of respondents.

The most common (38.1%) self-reported level of physical exercise was moderate engagement, defined as 2 - 3 times per week. Sporadic and occasional levels of physical activity were each reported by around 20% of respondents. 63.7% of Portuguese respondents reported exercising moderately or intensively, with similar levels (59.1%) among respondents from the USA residents. Most Latvian respondents reported engaging in exercise once a week or less, and nearly a quarter (22.1%) of Lithuanian participants reported never engaging in physical activities.

Factor analysis utilizing the principle axis factoring method was used to reduce the data and group it by different motivation subscales. Iterations were continued until a clear pattern of factors was reached - factor loadings above 0.3, no cross loading between factors, cumulative loading explaining more than 55% of data, KMO and Bartlett's test significance value was 0.884. The extracted factors are detailed in Table 3.

Table 3. Factor analysis - pattern matrix

Factor	1	2	3	4
Cronbach's Alpha	0.831	0.876	0.716	0.761
Health Motivations: S1.1.*		0.617		
Health Motivations: S1.3.		0.729		
Health Motivations: S1.4.		0.843		
Health Motivations: S1.8.		0.827		
Emotional Motivations: S2.1.	0.733			
Emotional Motivations: S2.6.	0.849			
Emotional Motivations: S2.7.	0.673			
Emotional Motivations: S2.8.	0.863			
Emotional Motivations: S2.9.	0.732			
Economic Motivations: S3.2.				0.985
Economic Motivations: S3.3.				0.511
Economic Motivations: S3.6.				0.498
Marketing Motivations: S4.2.			0.730	
Marketing Motivations: S4.3.			0.641	
Marketing Motivations: S4.5.			0.783	
Marketing Motivations: S4.6.			0.507	

Legend: * - see full equation Table 1.

Using principal axis factoring with ProMax rotations with Kaiser normalizations, rotation was converged in 5 iterations, with four proposed factors ("healthy motivations", "emotional motivations", "economic motivations" and "marketing motivations", see Table 3). In the initial iterations there were heavy cross loadings between variables and different factors, which led to the elimination of several items in each subscale. In testing the fit of the proposed factors, each factor was determined that the factor loadings were above 0.5, with an average loading for each factor around 0.7. Discriminant validity was determined by examining the correlations between factors, which are significant but moderate (less than 0.7), with the strongest correlations between factors three and four (marketing and economics), and between factors one and three (emotional and economic). The four extracted factors represents 55.345% of the variance, which meets widely accepted benchmarks for factor analysis. The internal reliability of the proposed factors was tested by calculation of Cronbach's alpha Cronbach's alpha for healthy motivations and emotional motivations subscales is above 0.8, which indicates strong internal consistency, while the economic and marketing motivations subscales had Cronbach's alphas above 0.7, which suggests acceptable internal consistency.

The mean scores were calculated for the extracted factor and correlations were tested with other variables including age, gender, country, profession and self-reported level of physical exercise. Almost all variables were significantly correlated, but all correlations were weak or very weak.

3.1 Health motivations

A health motivation subscale was extracted as Factor 2 (Table 3), retaining four of the original ten items (S1.1, S1.3, S1.4, and S1.8). The other six items were dropped due to cross loading with other factors and poor fit with the remaining items. Five of the original subscale items formed two new factors, one defined by concerns about health issues (cholesterol and glycaemia) and other focused on concerns about poor food quality (additives, genetically modified organisms and processed foods). These items were removed from further analysis.

Looking at the health motivations factor scores in regression analysis, results show that only 13% (Table 4) of the variance is accounted for by the other three motivation factors and only the marketing factor has a significant, albeit weak, negative association with health motivations.

Table 4. Regression analysis of healthy motivations statements

Factor	Adjusted R Square	Unstandardized coefficients	Sig.	VIF
Healthy motivations (Factor 2)	0.130			
Emotional motivations		-0.012	0.580	1.704
Marketing motivations		-0.327	0.000	2.356
Economic motivations		-0.043	0.061	2.017

Multicollinearity values variance inflation factor (VIF) are all below 3, which means that there isn't multicollinearity problem and results are adequate (Table 4). The health motivation factor itself also has an insignificant or very weak impact on prediction of other the factors.

A more detailed look at the items in the health motivation factor demonstrates a different degree of endorsement of the individual items (Figure 1). More than 30% of respondents strongly agree that it is important for them to eat food that keeps them healthy.

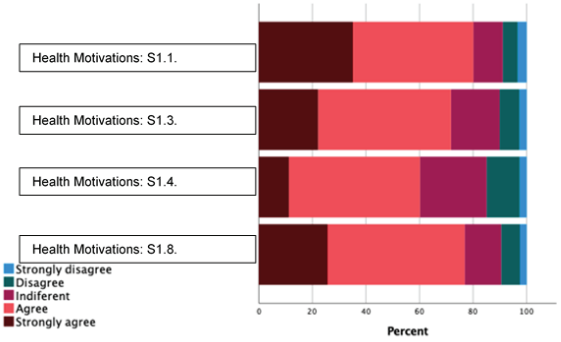

Figure 1. Extracted healthy motivations scales - total results

However, only around 10% of respondents strongly agree that they usually follow a healthy and balanced diet. As shown in Figure 1, statements regarding seeking healthy food and concerns about the hygiene and safety of food have the highest proportion of respondents reporting strong agreement, whereas the item measuring following a healthy and balanced diet had the greatest proportion of respondents in (more than 10% disagree and strongly disagree answers). Believing in the importance of a healthy diet may not be sufficient for actually implementing, because overall eating habits are impacted by many factors and healthiness is just one of them. In understanding these results, it is important to consider findings from prior research that individuals believe that unhealthy eating can be compensated for by engaging healthy behaviours, and contrarily healthy eating can be rewarded with unhealthy behaviour (Petersen *et al.*, [14]). Although physical exercise is a part of healthy habits and healthy behaviour, there weren't any significant strong or moderate correlations between athletic habits and health motivations in dietary selection.

A more detailed look at each country shows that more than 85% Portugal's respondents agree or strongly agree with having health-related motivations, Latvian and Lithuanian generally agrees with the health-related motivation items (respectively more than 65% and more than 75%), but only 53% of respondents from the USA endorsed these motivations (Figure 2). In Figure 2 x axis presents country and y axis respondents rating distribution.

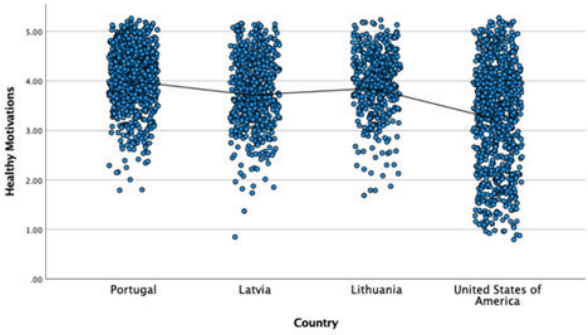

Figure 2. Healthy motivations divided by countries

The country with the highest proportion of respondents disagreeing with the health motivation scale was the USA (more than 27%). The statement with the highest proportion of disagreement responses across countries was S.1.3 (I usually follow a balanced and healthy diet), with 6% of Portuguese, 14% of Latvian, 11% of Lithuanian and 32% of American respondents reporting disagreement. The most endorsed statement was S.1.8., regarding the importance of following a healthy diet, endorsed by 94% of respondents in Portugal, 79% of respondents in Latvia, 79% of respondents in Lithuania, and 61% of respondents in the USA. Figure 2 visually confirms that USA has the lowest level of endorsement of health motivations. But overall results show that 71% of all respondents agree with health-related motivations, perhaps due to the worldwide efforts to reduce obesity through public campaigns to improve eating habits (Sim and Cheon, [15]). Despite the high levels of endorsement of the importance of healthy eating, it remains important to continue educating consumers and changing beliefs about the tastiness of healthy food products to promote a healthy diet (Briers *et al.*, [16]). Knowledge is significant factor which can help to increase healthy eating habits and healthy food choices (Ljubicic *et al.*, [17]) together with other factors that impact consumer daily diets and routines, such as economic constraints, sociocultural factors, and psychological factors.

3.2 Emotional motivations

An emotional motivation subscale was extracted as Factor 1, retaining five of the original nine subscale items (S2.1.; S2.6.; S2.7.; S2.8.; S2.9). The remaining four items were dropped due to cross loading on other factors and insufficient loading on Factor 1.

Looking at the emotional motivations factors scores in regression analysis, results show that 41.3% (Table

5) of the variance is accounted for by the other three motivation factors, and it shows moderately strong positive associations with both the economic and marketing factors.

Multicollinearity values VIF are all below 3, which indicates that there isn't multicollinearity problem and results are adequate (Table 5).

A more detailed look at the items retained in the emotions factor demonstrates a different degree of endorsement across items (Figure 3).

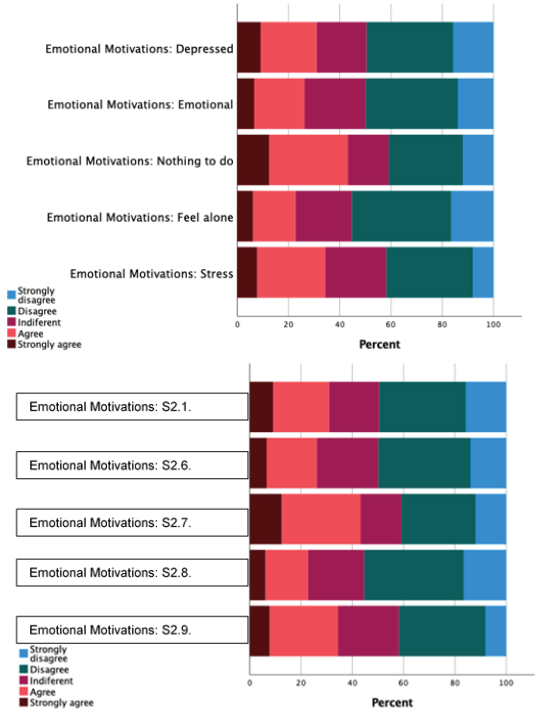

Figure 3. Extracted emotional motivations scales - total results

Results show that more than 10% of participants strongly agreed and more than 30% agreed that they eat more when they have nothing to do. The item with the highest rates (more than 50%) of disagreement and strong disagreement was S.2.6 ("When I feel lonely, I console myself by eating"). The items querying about emotional eating and eating when depressed garnered disagreement from 43 - 44% of total respondents. All in all, only 34% of respondents agreed that emotional motivations impact their eating habits, 43% disagreed, and 27% neither agreed nor disagreed.

In comparing responses acrosscountries, Portugal stands out for lower levels of endorsement of emotional motivations for food selection, with 68% of respondents denying emotional motivations and only 19% agreeing. (Figure 4).

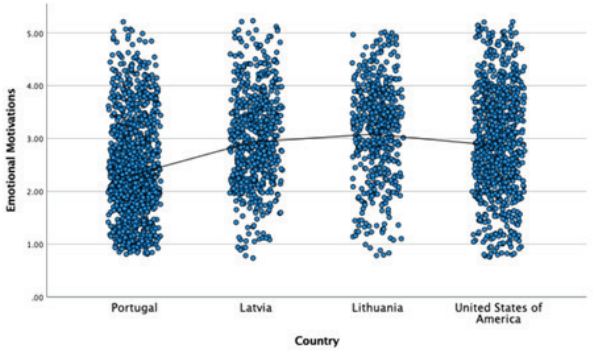

Figure 4. Emotional motivations divided by countries

Despite the well-known fact that food is emotionally laden stimulus, leading to both positive and negative emotions (Elder and Mohr, [3]), respondents from the other three surveyed countries also endorsed relatively low levels of agreement with statements regarding emotional motivations for food selection. Approximately one third (32%) of Latvian respondents endorsed emotional motivations, while 35% of Latvian respondents denied emotional motivations and the remaining 33% neither endorsing nor denying these statements. Among Latvian participants, the most frequently endorsed item was S2.9 (cravings for sweets when depressed) and the least endorsed item was S2.6 (eating for consolation when lonely). Lithuanian respondents were the most likely to endorse emotional motivations, with 46% agreeing 29% disagreeing. Participants from the USA had more evenly distributed answers (Figure 4), with 37% endorsing and 42% denying emotional motivations for food selection. USA respondents disagreed the most with item S2.8 (food serves as emotional consolation), while the highest percentage of USA respondents agreed that "food helps me cope with stress" (S2.1.).

Although only 34% of all respondents agreed that their dietary choices are impacted by emotional motivations, prior research has suggested that emotional eating is one of the most common motivators of dysregulated eating, including both overeating and undereating

Table 5. Regression analysis of emotional motivations statements

Factor	Adjusted R Square	Unstandardized coefficients	Sig.	VIF
Emotional motivations (Factor 1)	0.413			
Healthy motivations		-0.008	0.580	1.150
Marketing motivations		0.502	0.000	2.074
Economic motivations		0.200	.000	1.952

in response to stress or other heightened emotions (Nandrino *et al.*, [18]). The impact of emotions may be particularly heightened when individuals are actively and repeatedly trying to lose weight, when stress about dieting itself can lead to increases in uncontrolled and emotional eating (Halali *et al.*, [19]). It is not clear whether the current results differ because of the nature of the sample, including relatively high levels of food knowledge and health-related motivations, or whether respondents fail to detect and/or accurately self-report the impact that stress and other emotional factors have on their eating patterns.

3.3 Economic and availability motivations

An economic motivation subscale was extracted as Factor 4, retaining three of the original seven items (S3.2, S3.3, and S3.6). The remaining four items were dropped because of high levels of cross loading with other factors, (e.g., statements S3.1, and S3.4 heavily loaded on the health motivations factor) and insufficient loading on the economic motivations factor.

Looking at the economic motivations factors scores in regression analysis, results show that 50.4% (Table 6) of the variance is accounted for by the other three motivation factors. Both the emotional and marketing factors are significantly positively associated with the economic motivation factor. The marketing motivations factor has a moderate association with the emotional motivations factor.

Multicollinearity values VIF are all bellow 3, suggesting that that there isn't multicollinearity problem and results are adequate (Table 6).

A more detailed look at the items retained in the economics factor demonstrates a different degree of endorsement across items (Figure 5).

A little more than a third (35%) of all respondents agreed that economic factors impact their dietary choices, 35% disagreed and the rest neither agreed nor disagreed. Results show that more than almost 40% of respondents strongly agreed or agreed that they select foods that are easy to find. The greatest level of disagreement was in response to the item "the main reason for choosing a food is its low price" (S3.2.), with more than 50% of participants disagreeing or strongly disagreeing.

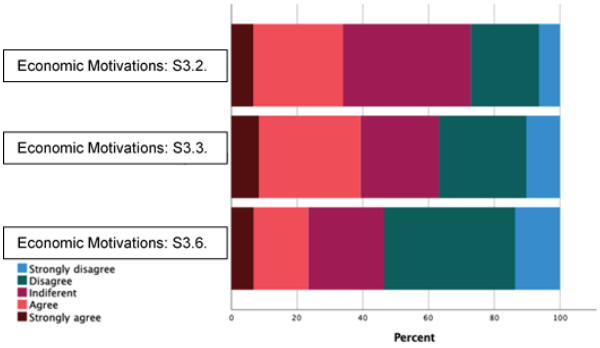

Figure 5. Extracted economic motivations scales – total results

A more detailed depiction of the distribution of scores for the items on the economic motivations scale across the four surveyed countries is shown in Figure 6.

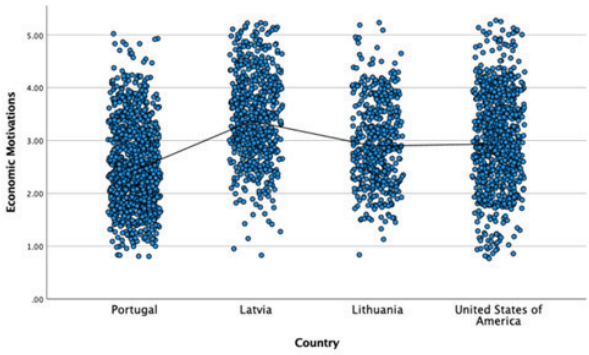

Figure 6. Economic motivation by countries

Most Portuguese respondents strongly disagreed or disagreed (55%) with the items querying economic motivations for food selection. Only 16% of Portuguese respondents endorsed economic motivations. The item with the highest rates of disagreement among Portuguese respondents is S3.2 (choosing foods primarily due to low price), while the most endorsed item was S3.6 (buying food that is on sale). In contrast to Portuguese respondents, Latvian (47%), and Lithuanian (37%) respondents endorsed higher levels of economic and availability motivations. Participants from the USA were evenly divided across agreeing, disagreeing and indifferent responses. The statement receiving the highest level of endorsement in the samples from the USA, Lithuania, and Latvia was S3.3 (choosing foods based on convenience). The item with the greatest rate of disagreement was that low price positively impacts food choice (S3.2).

Table 6. Regression analysis of economic motivations statements

Factor	Adjusted R Square	Unstandardized coefficients	Sig.	VIF
Economic motivations (Factor 4)	0.504			
Emotional motivations		0.166	0.000	1.647
Healthy motivations		-0.025	0.061	1.149
Marketing motivations		0.598	0.000	1.786

These findings suggest that the samples reached in the current study have sufficient income to allow for latitude in food selection, and may select food products based on other factors including convenience and/or perceived health value. Factors that impact food choices rank in different priorities depending on several internal as well as external factors. Taste and sensory characteristics usually are first, followed by healthiness of product and price as other competing priorities in food product choice (Barrett *et al.*, [22]; Hoefkens *et al.*, [7]). The importance of price also depends on its interaction with social acceptance of a product and other related marketing activities ((Norgaard *et al.*, [21])*.)*. These results suggest that respondents won't buy a food product based solely on a low price, but that price will be take into account along with perceived nutritional value of the food, whether or not the price reflects a sale, and the outcomes of marketing activities on social acceptance of a product. Prior research has found that the factors influencing food purchases can change across time and different circumstances, and that individuals may be more concerned about price for some food categories (e.g. meals and products to prepare for them) than other categories (e.g. snacks) (Phan and Chambers, [20]).

3.4 Marketing motivations

A marketing motivation subscale was extracted as Factor 3, retaining four of the original seven items (S4.2, S4.3, S4.5, S4.6). The remaining three items were dropped due to cross loading on other factors (e.g., statement S4.4. heavily loaded on the health motivations factors) and insufficient loading on this factor.

Looking at the marketing motivations factor scores in regression analysis, results show that 59.6% (Table 7) of the variance is accounted for by the other three motivation factors, with all three factors showing a significant association with the marketing factor. Economic motivations have a moderately strong association with the marketing scale. Healthy motivations have negative weak association, but emotional motivations have also weak, but positive association with marketing factors.

Multicollinearity values VIF are all bellow 3, suggesting that that there isn't multicollinearity problem and results are adequate (Table 7).

A more detailed look at the items retained in the marketing factor demonstrates a different degree of endorsement across items (Figure 7).

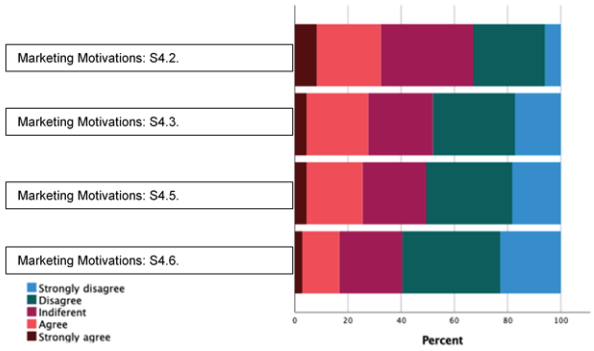

Figure 7. Extracted marketing motivations scales - total results

More than 30% of respondents agreed or strongly agreed that brands are important when making food choices. The statement with highest rates (60%) of disagreement or strong disagreement was item 4.2 (eating foods because they are recognized from ads or TV).

Figure 8 shows more detailed data on the division of responses to the marketing motivations factor between countries. Portugal had the highest rate of respondents disagreeing or strongly disagreeing (64%) to the items on the marketing motivations factor, with only 16% of respondents agreeing to these items. The item most likely to be denied by Portuguese respondents was S4.2. In Latvia, only 29% of respondents disagreed or strongly disagreed with marketing motivations, with 34% agreeing that marketing impacts their food choices. The most commonly endorsed item in Latvia was S4.6 (brands are important in making food choices). Only 20% of Lithuanian respondents endorsed marketing impacts on food selection, with the most endorsed item being "Food advertising campaigns increase my desire to eat certain foods". Nearly half (46%) of Lithuanian respondents denied an impact of marketing. The statement with highest rates of disagreement across all countries (In Portugal 75%, in Latvia 41%, in Lithuania 62%, and in USA 48%).

Table 7. Regression analysis of marketing motivations statements

Factor	Adjusted R Square	Unstandardized coefficients	Sig.	VIF
Marketing motivations (Factor 3)	0.596			
Emotional motivations		0.323	0.000	1.428
Healthy motivations		-0.147	0.000	1.095
Economic motivations		0.465	0.000	1.457

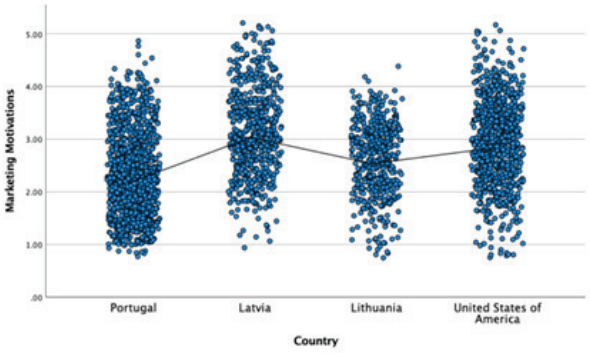

Figure 8. Marketing motivation scales by countries

More than a third (39%) of respondents from the USA disagreed with that marketing has an impact on their food choices, while 36% agreed. The least and most endorsed items were S.4.2 and S4.6, respectively. In total 27% of all respondents across all countries agree with marketing influence and 44% of all respondents disagree with marketing motivations.

It is important to note that the items measuring the impact of marketing didn't include some digital marketing strategies, such as influencers and social media marketing. These strategies can have an effect on eating behaviour, by shifting consumer perceptions of what other individuals are eating (Hawkins *et al.*, [23]). It is possible that the impact of marketing could be higher than 27% if these other forms of marketing were explicitly measured. On the other hand, other studies also confirm that marketing is not a primary determinant of consumption (Esmerino *et al.*, [24]), although marketing may exert an indirect effect by promoting other factors that more directly impact food choices (e.g. messaging around the nutritional value of a product). Although the impact of marketing factors were largely denied in this study, it is possible that marketing can be used effectively to promote the consumption of healthy foods (Bucher *et al.*, [25]). Marketing can also be used to implement diet priming, which is a non-imposing, nudging intervention to activate dieting goals and reduce unhealthy food consumption (Othomo, [26]). Nudging can also be defined as slight changes than can influence consumer behaviour in a nonprescriptive manner, which can be used to increase the likelihood of making healthy choices (Sim and Cheon, [15]).

4. Conclusions

- These results suggest that consumers are largely motivated by health factors when making food choices (71% of respondents), whereas only 30% of individuals self-report that marketing, economic and emotional factors impact their food choices.
- Portuguese respondents strongly endorsed health-related motivations and largely denied other motivations, whereas respondents from the USA also Baltic countries had more equal division of opinions regarding the impact of different motivational factors.
- A greater understanding of the motivations impacting dietary choices can be used to promote and increase healthy lifestyle behaviour. Future research should aim to understand the ways in which these motivational factors interact to impact dietary choices.

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