

Relations between Psychographic and Descriptive Features Conditioning Nutritional Behaviours

Izabela Cichocka^{1*}, Tadeusz Grabiński²

¹Economics Department, Information Technology and Management, Rzeszow, Poland

²Finance Department, Cracow University of Economics, Cracow, Poland

*Corresponding author: icichocka@wsiz.rzeszow.pl

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Abstract The aim of this paper is to draw up a description of the Polish consumer via psychographic variables determining his nutritional habits and to define the relationship between descriptive and psychographic determinants for consumer behaviours. Such psychographic features were chosen: personality (measured by susceptibility to marketing influences and nutritional knowledge); beliefs (as concern for one's health and the attitude towards the general health of one's diet); ability to identify risks (understood as a feeling of food risk and nutrition risk) and innovativeness (described with food neophobia).

Keywords: PCA, ANOVA, consumer segmentation, nutritional behaviour

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1. Introduction

Nutritional behaviours, seen a part of a nutritional pattern, are understood as activities and patterns of behaviour aimed at satisfying nutritional needs, while referring to - among others - the sphere of choice of food products, the organization of purchasing of such products, methods of storing, the planning of meals, consumption frequency, but also widely understood quality of meals [1]. These behaviours are based on three assumptions stating that a consumer does not follow the rules of economic rationality and does not act in an random or accidental fashion, but his behaviour stems from his/her inborn and acquired needs (physiological, economic and socio-psychological ones) [2]. These information may help better understand consumers' responses and explain variability in test results [3].

Behaviours are always of a cognitive-emotional-volitional character. This complicated nature tends to exist on a conscious level (conscious acts of behaviour), but also on a subconscious level (subliminal) [4].

A number of authors have tried to classify the factors that appear to influence consumer habits including nutritional behaviours. According to P. Kotler et al. [5] a theoretical model of factors describing a consumer's behaviour on the market includes the following groups of factors: marketing-mix, stimuli from outside of marketing (e.g. economic or cultural), consumer's 'black box' which stands for a consumer's characteristic features (e.g. personal or psychological ones), as well as the decision-making process along with a decision to purchase a product (behavioural elements). Among the features that

characterise consumers the following may be found: descriptive i.e. socio-economic and demographic, and psycho-graphic (personality, lifestyle, level of activity, interests, attitudes, opinions). Psychographic considerations are at the bottom of a psycho-centric treatment of consumer's needs and motivations which have been defined by psychologists in intervening categories, that is as motivational variables. In this type of reasoning customers' needs are identified with elements of a motivational system [6,7].

The chief notion within the area of psycho-graphic (psychological) considerations is 'lifestyle' which includes the following crucial elements: personality, beliefs, ability to identify risks, innovativeness [8].

Research into behaviours in the food market should include the whole spectrum of considerations, both demographic or socio-economical but also psychological.

The aim of this paper is to draw up a description of the Polish consumer via psychographic variables determining his nutritional habits and to define the relationship between descriptive and psychographic determinants for consumer behaviours.

Such psychographic features were chosen which according to the literature of this field- have the strongest connection with universally understood nutritional behaviours. The following measuring devices have been chosen which describe:

- personality – susceptibility to marketing influences and nutritional knowledge
- beliefs – concern for one's health and the attitude towards the general health of one's diet,
- ability to identify risks – a feeling of food risk and nutrition risk,
- innovativeness – food neophobia.

2. Material and Methods

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The primary method used in the research was a direct interview. The respondents were asked to utter their opinion on a number of statements that characterized psychographic features.

Susceptibility to marketing influences was estimated by defining a respondent's attitude towards the aforementioned statements regarding the most common promotional activities as well as the customer's attitude to a given brand name or a shop.

The statements that helped to determine the level of nutritional knowledge were prepared on the basis of Polish Academy of Science (PAN) guidelines [9].

The concern for one's health and the standard of a diet one follows, draws a clear picture of a respondent's attitude towards his own health on which his nutritional habits have the greatest influence. These qualities were established by adapting and modifying the statements used in researches carried out by H.N.J. Schifferstein *et al.* [10] and K. Roininen *et al.* [11] using *Health and Taste Attitude Scales*.

A feeling of food risk (chemical and microbiological contaminations, genetic modifications, BSE) and of nutrition risk (deficiency of significant elements or an excessive amount of harmful ingredients, improper method of preparing meals) were prepared on the basis of data available in the literature on risk which the majority of consumers mention in their opinions.

Food neophobia is understood as unwillingness to consume new and unknown products. The statements aimed to characterise neophobia were prepared on the basis of Food Neophobia Scale conceived by P. Pliner and K. Hobden [12].

Each of these features was graded according to a 4 or 5-point Likert scale.

The statistical analysis of all the results was carried out under applicable procedures using *Statistica 8.0* program.

The questionnaire was conducted in 13 Polish cities. It was filled by 717 respondents.

3. Results

The aim of the first stage of the analysis was to establish relationships between psycho-graphical determinant-measuring devices. For this purpose Principal Component Analysis was used. First, the correlation matrix was established between psycho-graphical measuring devices to determine the strength of the relations. Each of the seven variables was highly correlated with at least one of the remaining variables. Moreover, Bartlett test was carried out. The calculated statistics ($\chi^2 = 101,9$, p -value = 0,0) entitled to make a statement that the set of correlation factors between all pairs of variables may be recognized as statistically significant. The results gave reasons for the use of PCA. Kaiser's criteria were applied in the aforementioned analysis to determine the number of components, while the rotation was performed using the method of normalised varimax.

The calculations undertaken allowed for the isolating of three orthogonal principal components. The eigenvalues were as follow: 3,791; 1,752 and 0,887. Although the third eigenvalue did not reach the value of 1,0, the fraction of the explained variance criterion entitles us to accept the three principal components; jointly they explain as much as 91,9% of the general result variance. Every next principal component explains less than 5% of the variability.

Table 1. Eigenvalues and % of the Explained Variability

Item	The eigenvalues	% of the explained variation	Cumulated % of the explained variation
1	3,791	54,2	54,2
2	1,752	25,0	79,2
3	0,887	12,7	91,9
4	0,313	4,5	96,4
5	0,152	2,2	98,6
6	0,094	1,3	99,9
7	0,006	0,1	100,0

[Source: own study]

The calculated values of factor loadings (at least 0,8) allow to ascribe each feature to a particular principal component explicitly (Table 2).

Table 2. Values of Factor Loadings

Feature	Principal component		
	1 [Knowledge]	2 [Neophobia]	3 [Concern]
Susceptibility to marketing influences	0,106	-0,940	-0,077
Nutritional knowledge	0,769	0,567	0,141
Concern for one's health	0,128	0,204	0,943
The attitude towards the general health of one's diet,	0,891	-0,099	0,352
A feeling of food product risk	0,891	-0,026	-0,212
A feeling of nutrition risk	0,874	0,292	0,341
Food neophobia	0,270	0,893	0,210

[Source: own study]

The first principal component was created by four psychographic features: the level of nutritional knowledge, conviction about having a correct "healthy diet" and the level of the feeling of food product risk and improper diet. It has to be assumed that the feature which substantially distinguish this principal component is the level of nutritional knowledge, evaluated as the compatibility of nutritional views with dietary rules given by a scientific community. Knowledge of these principles, therefore, goes hand in hand with a sense of understanding that there are various nutritional risk and conviction about one's own diet and its level of being healthy.

The second principal component is positively correlated with the level of food neophobia and negatively – with susceptibility to marketing influences of the consumers' environment. Therefore, in such composition it is a bipolar component. Placing both of these psychographic features

indicates their opposing role in shaping nutritional behaviours. A person who suffers neophobia is a person who is not subjected to various promotional activities but who does not take a decision to buy these consumption goods, under the influence of advertising slogans, tasting etc.

Orthogonality of food neophobia regards psychographic features accumulated in the first and third principal component indicates that the reluctance of the food novelties is not a result of a concern for one's health, or concern associated with the presence of harmful substances and contaminants in food products, or the lack of knowledge about proper diet. It is rather a result of dietary habits, usually established by the family home during the preschool and school educational period.

The third principal component is created by only one feature - a sense of concern for one's own health. Lack of co-existence of this feature with the feature cumulated in

the first principal component indicates that the respondents have no awareness of the impact of faulty diet or the impact of contaminants found in food on human health.

In delimitation stage of factor analysis for each segment of respondents, separated on the basis of socio-economic and demographic features, the factor loadings were determined. The intention of this stage was the verification of hypotheses dealing with the possibility of ascribing particular areas set by the three principal components to specific segments of consumers in terms of descriptive features. The factor loadings were juxtaposed in Table 3. In accordance with the principles of interpretation, it was assumed that the factor loadings equal or higher than +1,0 and equal or lower than -1,0 (marked in bold in Table 3) authorize to determine a connection between particular segment and a latent variable.

Table 3. The Coordinates of the Segments in the Space Created by Three Principal Components (Factor loadings)

Segmentation criteria	Segment	Principal component		
		1 [Knowledge]	2 [Neophobia]	3 [Concern]
Sex	Women	1,114	-0,663	1,118
	Men	-1,622	0,456	-1,915
Age	18-25	-1,641	-1,211	1,192
	26-40	0,547	-0,777	-0,896
	41-55	1,007	1,118	-1,081
	56-65	1,562	1,202	1,606
Education	Elementary or vocational education	-1,642	2,353	1,192
	High school education	0,267	-0,398	-0,391
	A university degree	0,262	-0,740	-0,048
Place of residence	Rural areas	0,583	-0,568	-0,173
	City up to 20 thousand inhabitants	0,411	0,735	-1,417
	City between 20-100 thousand inhabitants	-0,006	0,040	0,355
	City more than 100 thousand inhabitants	-0,447	-0,974	0,440

[Source: own study]

The segments of the examined population that can be called the "aware consumers" or "rationalists" are: women aged over 40. In the negative side of the first principal component, there can be found a few other segments of this group, that is: men, people aged 18-25 as well as people having an elementary or vocational education. These are groups of consumers among whom there are many people who can be named "food dilettantes", whose food consumption has all the characteristics of being completely "unaware".

Locating the segments of respondents along the second principal component allows to distinguish neophobes and dietary neophiles. To the group of neophobes one should also include: people having an elementary or vocational education and people over 40. As dietary neophiles there can be considered: young people- aged up to 25 and inhabitants of large urban centres.

Groups of respondents who declare much concern for their health are: women, people who belong to two age categories: up to 25 years of age and more than 55 years of age as well as people who received vocational education. It is indicated by high positive factor loadings of the third principal component. High negative factor loadings of this component have the following segments: men, people aged 41-55 and the inhabitants of small cities.

In the next stage of analysis one-way ANOVA was carried out a test which aimed at identification of diversity of psychographic features depending on descriptive features. The hypothesis about the equality of average values in general populations was verified by means of F-Snedecor test. The *post-hoc* analysis was made by means of LSD test. The results of the analysis of variations was juxtaposed in Table 4.

Table 4. A Diversity of Psychographic Features Depending on Descriptive Features – the Results of ANOVA

Descriptive feature	Segment	Psychographic feature						
		Susceptibility to marketing influences	Nutritional knowledge	Concern for one's health	The attitude towards the general health of one's diet	A feeling of food product risk	A feeling of nutrition risk	Food neophobia
Sex	Women	15,76	32,65 b	39,59 b	19,19 b	19,43 b	17,78 b	27,11 b
	Men	15,43	30,98 a	37,63 a	18,46 a	18,75 a	16,13 a	25,70 a
		1,834	26,378*	24,468*	15,559*	6,357*	35,629*	8,106*
Age		Value of an arithmetic mean						
	18-25 years old	16,08	30,44 a	38,99	18,28 a	18,13 a	16,06 a	24,75 a
	26-40 years old	15,54	31,78 ab	38,25	19,15 b	19,67 b	16,97 ab	25,35 a
	41-55 years old	15,37	32,98 b	38,42	19,08 b	19,50 b	17,54 b	28,28 b
	56-65 years old	15,10	33,20 b	40,03	19,10 b	19,38 b	18,54 c	29,09 b
		2,486	15,553*	2,323	5,798*	8,335*	10,261*	17,214*
Education		Value of an arithmetic mean						
	Elementary or vocational education	14,73 a	31,66	39,78	18,13 a	18,84	16,90	29,54 b
	High school education	15,97 b	32,20	38,56	18,88 ab	19,12	17,15	26,18 a
	A university degree	15,38 ab	31,49	38,49	19,13 b	19,25	16,88	25,64 a
		6,455*	2,037	2,292	5,646*	0,459	0,440	13,199*
Place of residence		Value of an arithmetic mean						
	Rural areas	15,83	31,74	38,54	18,89	19,40	17,11	27,53 b
	City up to 20 thousand inhabitants	15,36	32,53	38,24	18,74	19,07	16,96	27,37 b
	City between 20-100 thousand inhabitants	15,47	31,89	39,23	18,93	19,15	17,15	26,57 b
	City more than 100 thousand inhabitants	15,78	31,58	38,53	18,84	18,94	16,88	24,89 a
		0,797	1,362	1,200	0,182	0,464	0,215	6,003*

Symbol * means statistically significant value of the F test with the level of $\alpha=0,05$

The same letter next to the arithmetic mean means qualification to a homogeneous group on the basis of post-hoc analysis.

[Source: own study]

The level of nutritional knowledge, subjective concern for one's own diet as well as various nutritional risk was proved to be higher in women than in men, therefore which is why the term “rational diet” can be attributed to women, whereas among men one should look for “food dilettantes”.

The rationality of diet increases with age. This is especially true with regard to nutritional knowledge and a feeling of risk of an improper diet. In a group of young people who are up to 25 years of age the sense of a healthy diet is lower as well as the feeling of risk of food products. Therefore in the group of “food dilettantes” one can find also people between 18 and 25 years of age, whereas in a group of “dietary rationalists” – people over 40. The fact that people with elementary or vocational education belong to “food dilettantes” can be explained by their lowest level of attitude towards the general health of their diet as well as the lowest (despite the fact that the differences were statistically insignificant) level of awareness of risk of food products.

Two segments of the examined group, which belong to neophobes; that is people over 40 and those who received elementary or vocational education are characterized by significantly higher level of food neophobia. The segment of neophiles includes: young people who are up to 25

years of age as well as residents of cities with more than 100.000 inhabitants. They received during the research the lowest level of an average food neophobia, which is statistically different from average of other respondents.

Women, who are up to 25 years of age as well as people over 55 and the respondents with an elementary or vocational education are characterised by high average values which give a picture of their concern for their health. And although in the case of age groups and segments which differ in educational level the differences between means in ANOVA are insignificant, it should be assumed that these differences decided about including these particular segments to the population of people who “have a concern for their health”. Similar conclusions can be drawn after examination of the results of ANOVA for segments which in PCA belonged to the group of people who have little concern for their health, that is men between 41 and 55 and inhabitants of small cities (in this case the average values of the concern for one's health ratio were the lowest).

Configuration of segments of the examined population, constructed on the basis of factor loadings, graphically presented in figures 1-6, allows to make a psychological characteristics of individual segments of consumers.

Nutritional behaviours of inhabitants of large urban agglomerations is determined by the low level of their inhabitants' food neophobia. Decisions which concern food made by inhabitants of small urban areas result among other things from the indifference of this segment of consumers to health problems.

More complex is the nature of behaviours of a few segments distinguished on the basis of the age criterion or the level of education. Young consumers – between 18 and 25 – are characterized by a low “dietary dilettantism” (low level of the feeling of having a healthy diet and risk connected with food products), food neophilia as well as a belief of a concern for one's own health. Nutritional behaviours of mature people (41- 55) are in opposition to those just described, because the behaviours are determined by a good nutritional knowledge, high level of food neophobia and the lack of concern for one's health. Similarly- consumer behaviours who are over 55 are determined by their rationality and food neophobia as well as a high level of concern for one's health. Food neophobia and a concern for one's health, but also a low level of nutritional knowledge shape nutritional behaviours of people with at least vocational education.

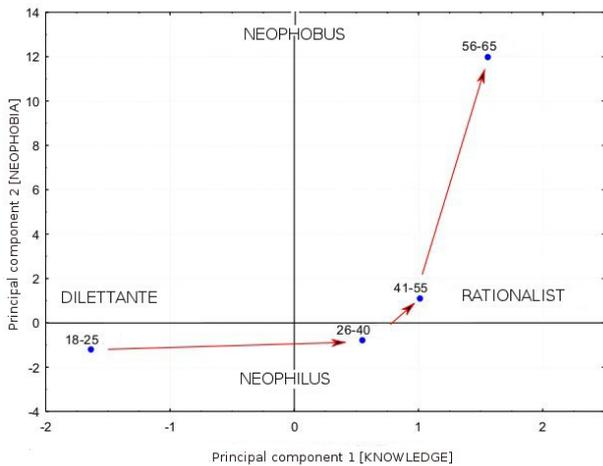


Figure 1. Configuration of Segments (Age) in the Space Determined by the First and the Second Principal Component [Source: own study].

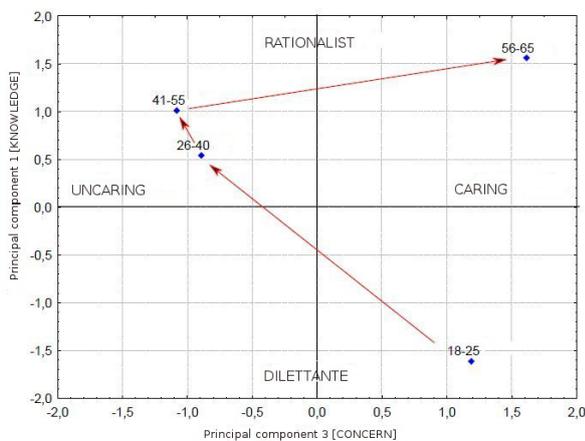


Figure 2. Configuration of Segments (Age) in the Space Determined by the First and the Third Principal Component [Source: own study]

From the configuration of segments created according to the age criterion results that the youngest consumers are food dilettantes. With age their level of nutritional knowledge increases (people between 26-40 and 41-55

can be called rationalists), but have little concern for their health (people between 26-40 and 41-55 are the segments of consumers who were named uncaring). When they grew older, and are over 55, this gained knowledge about the healthy diet goes then hand in hand with a concern for their health as well as food neophobia which is a commonly known reluctance of older people to any new products also in the field of nutrition (what can be caused by an anxiety about the influence of new and unknown products on an organism- e.g problems with digestion, inability to eat some types of food).

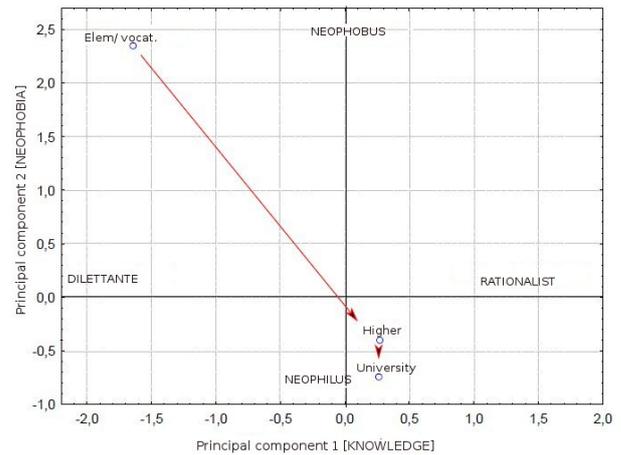


Figure 3. Configuration of Segments (Education) in the Space Determined by the First and the Second Principal Component [Source: own study]

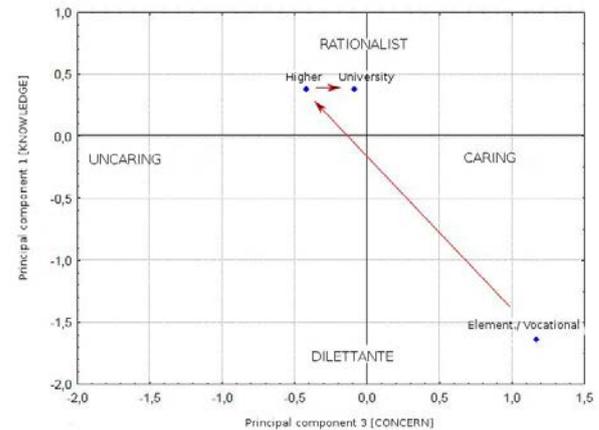


Figure 4. Configuration of Segments (Education) in the Space Determined by the First and the Third Principal Component [Source: own study]

The arrangement of segments created with regard to the level of education proves that with an increase of level of education the level of nutritional knowledge and food neophobia, also increases but the biggest changes have been observed between the vocational and high school level of education. Respondents who are characterised by the lowest level of education are dilettantes in the field of nutritional knowledge and there are distrustful to new food products (express neophobic opinions). Moreover, they have a feeling of concern for their health. Getting higher education results in the change of attitude to new products on the market of foodstuffs – from neophobic into neophilic.

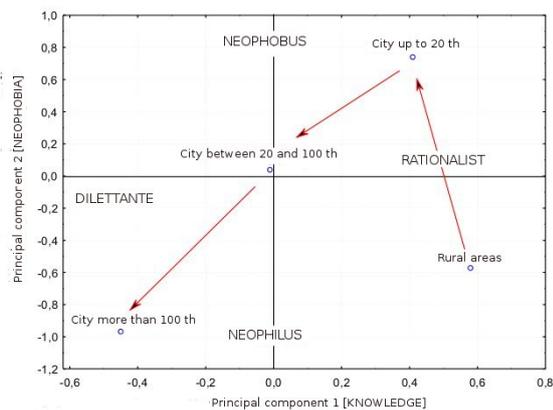


Figure 5. Configuration of Segments (Place of Residence) in Space Determined by the First and the Second Principal Component [Source: own study]

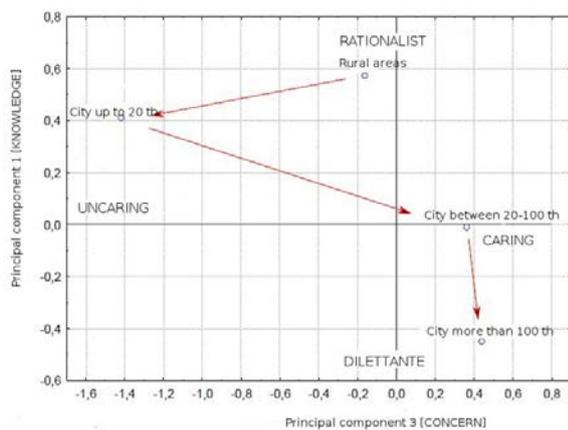


Figure 6. Configuration of Segments (Place of Residence) in Space Determined by the First and the Third Principal Component [Source: own study]

The configuration of segments of respondents created according to place of residence criterion indicates that people who live in rural areas and in large urban agglomerations are food neophiles, but the first group have nutritional knowledge whereas the second does not and because of this they have been called food dilettantes. Besides, the inhabitants of big cities are characterised by a concern for their own health what may result from an enthusiastic approach to novelties in nutrition combined with a low level of knowledge about the rules of proper nutrition (advertisement of new products plays here a role of no small importance because usually it contains information about a positive influence of a given product on one's health). Specific group are also the inhabitants of small cities who can be characterised by nutritional knowledge, neophobia as well as a little concern for their health.

4. Discussion

Sensitiveness to all to all information about harmfulness of food contamination and pollution to one's health differ from various reports which can be found in the literature of this field which indicate the divergence of these factors influencing dietary behaviour. According to these reports, a consumer concentrates his feeling of danger to his health usually focusing on chemicals added to food products (artificial preservatives, food colouring,

stabilizers) used in food processing, whereas in the view of the scientific community even more hazardous are chemical pollution of food materials as well as microbiological contamination. Consumers' belief that their own eating style is healthy from the point of view of their health results, according to some publications, from the lack of knowledge of scientific views on the subject, and from susceptibility to other „philosophies of nutrition” or beliefs deeply rooted in the past (e.g family food preferences). This may also result from the phenomenon of optimistic bias [13,14] which in relation to dietary behaviour comes down to a subjective belief in the correctness of diet which one has and a belief that all risk and incorrectness in dietary behaviours concern other people (not us). The discrepancy between the results of this part of research and reports found can indicate an escalation of effectiveness of actions which promote the principles of healthy eating in recent years, done through Polish mass means of communication.

The reasons for the opposing role of food neophobia and susceptibility to marketing influences in shaping nutritional behaviours can be found in the changes that have taken place in the Polish food market in the last 15-20 years. In the first half of 90s of the twentieth century the consumer market strengthened in Poland so much that food manufacturers could see a strong need to promote their products. Because of the widespread difficulties with supply of food products and their very narrow assortment that existed in the past decades, the promotion of many products has been seen as the promotion of market novelties. In such a form it is readily accepted only by the segment of consumers-neophiles in the field of nutritional behaviours. A good example may be the effects of an active promotion of yoghurts which has been taking place for the last ten years. Despite the fact that the yoghurts on Polish market could have been purchased without difficulty during rationing economy, Polish consumer accepted the promotion as a new food offer. This is demonstrated by the results of studies carried out in the first half of 90s among the inhabitants of the south-east Poland; the segment of young consumers was mainly interested in the consumption of yoghurts. Older people (over 50 years of age) preferred the traditional kefir [15], which shows directly about the dominance of habits in consumer behaviour, and indirectly – about food neophobia.

Lack of co-existence of this feature with the feature cumulated in the first principal component indicates that the respondents have no awareness of the impact of faulty diet or the impact of contaminants found in food on human health. Similar conclusions have been made by the authors and their results of studies carried out in the Podkarpackie region [16]. It has been found in them, that the belief of the respondents about the relationship between the diet and health is limited only to the most common health problems resulting from excess body weight. A small percentage of respondents saw the impact of diet on the emergence of diseases such as diabetes, gastrointestinal diseases and cardiovascular diseases. It was also found in these studies, that the subjective sense of self-knowledge of the principles of good nutrition, and the belief in the correctness of own diet does not go hand in hand with knowledge of the relationship of nutrition with getting down with particular metabolic diseases. The

results of these studies suggest, moreover, that these psychological conditions of receipt of information on food security, decide on the degree of subjective sense of risk. They are: “a sense of mastery” that is sufficiently conviction of one's own correct behaviour, and risk analysis of the “disaster syndrome” [17].

The level of nutritional knowledge, subjective concern for one's own diet as well as various nutritional risk was proved to be higher in women than in men. Gender differences have been observed in various research. In all these cases, women have been shown as more sensitive than men to chemical and non-chemical exposure hazards [18]. Similar findings have been highlighted by Wadolowska *et al.* [19], where women displayed pro-health behaviours in food choice more often.

The rationality of diet increases with age. In a group of young people who are up to 25 years of age the sense of a healthy diet is lower as well as the feeling of risk of food products. These results correspond to findings by Onay *et al.* [20] where young Turkish consumers were found to pay less attention to hazards than older consumers. Also, Chambers *et al.* [21] have reported that young participants of their research were less likely to make food choices based on health considerations. This group of consumers may play an important role in improving consumer behaviour. The reason for that is limited food preparation experience and relatively little impact of demographic factors on the development of safe behaviours [22].

Therefore in the group of “food dilettantes” one can find also people between 18 and 25 years of age, whereas in a group of “dietary rationalists” – people over 40. The fact that people with elementary or vocational education belong to “food dilettantes” can be explained by their lowest level of attitude towards the general health of their diet as well as the lowest (despite the fact that the differences were statistically insignificant) level of awareness of risk of food products. These results correspond with other pieces of research such as for example Samuel *et al.* [23], who have reported that older people are more likely to avoid consumption of risky food. Also, Cabrera *et al.* [24] have made a conclusion regarding to age and education level – older people with lower education level have had lower diet quality scores.

Neophobes are people over 40 and those who received elementary or vocational education. The segment of neophiles includes: young people who are up to 25 years of age as well as residents of cities which have more than 100.000 inhabitants. Such a rule has also been observed by Meiselman *et al.* [25]. In their research, they state that for US consumers, neophobia appears to increase with age and decrease with increasing education level and income. Similar conclusions have been made by Cullen and Kingston [26] – according to them, urban consumers are more responsive toward new food products. Also, Schickenberg *et al.* [27] have pointed out that poorly educated consumers had significantly higher neophobia scores than highly educated ones.

5. Conclusions

On the basis of the analysis of results of the research which has been carried out the following final conclusions may be drawn:

1. Among psychographic factors which determine nutritional behaviours of a Polish consumer there can be distinguished three groups: nutritional knowledge (which cooperates with psychographic features is connected with the awareness of connections between the quality of a diet and the state of health of particular person) food neophobia (which is an opposition to the susceptibility to marketing influences) and the belief in taking care about one's own health.
2. The level of nutritional knowledge depends first of all on the age and sex of consumers. Big knowledge about the rules of good nutrition which can be called rational and aware behaviours on the market of foodstuffs may be ascribed to women and people who are over 40. Whereas, on the contrary men and young people -up to 25- are „dietary dilettantes.”
3. The intensity of food neophobia increases with a consumer's age, but is reduced with the increase in the level of education and an income level of consumer's household. It is also higher in a group of women and in a group of people who live in rural areas and small urban centres.
4. Women and two age groups: young people (up to 25) and older people (over 55) in opposition to men and remaining age groups are characterised by a high subjective belief in taking care about their health and the health of their family.

Statement of Competing Interests

The authors have no competing interests.

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