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THE IMPACT OF SOCIO-DEMOGRAPHIC FACTORS ON CONSUMER ATTITUDES AND BEHAVIORS TOWARDS FOOD CONSUMPTION – THE CASE OF POLAND

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Purpose: The aim of the article was to define the attitudes and behavior of Polish consumers towards food depending on gender, age, place of residence, income and level of education of the respondents.
Design/methodology/approach: The study used a quantitative approach based on data from an online survey conducted in 2023 with 631 Polish respondents. The survey included 17 variables measured on a five-point scale describing consumers' attitudes and behaviors towards food. Descriptive statistics and exploratory factor analysis were used to identify the key components that define consumer attitudes and behaviors towards food.
Findings: The results of the study indicate that Polish consumers generally have a positive attitude towards experimenting with food; however, this openness to innovation is rather moderate. Respondents are not indifferent to the quality and origin of food and have a positive attitude towards minimally processed food. The analysis of the results based on metric criteria revealed the presence of many statistically significant differences. Polish women consume food more consciously than men and make more conscious food choices. They are more interested in the quality and origin of food. The younger generation of Poles is more open to new foods. At the same time, older consumers generally pay more attention to a healthy diet than the other generation of consumers. Poles with a higher annual income and Poles with a higher level of education are more willing to buy unprocessed food.
Research limitations/implications: The research was conducted with Polish consumers only. Due to cultural differences, future research could be conducted with a cross-cultural sample.
Originality/value: The study fills a research gap in the field of research on the determinants of Polish consumers' behavior towards food and may provide a starting point for further in-depth studies.
Keywords: consumer behaviour, consumer attitudes, food products.
Category of the paper: research paper.

1. Introduction

Eating habits have changed significantly in recent years. Greater variety and availability of food, higher incomes of the population, the changing and increasingly higher expectations and needs of customers - all this has led to changes in the personal food system of consumers (Sajdakowska et al., 2018). Health and environmental concerns related to the production and consumption of food have become crucial for modern society (Żelazna, Bojanowska, Buraczyńska, 2021). Consumers are increasingly mindful of what they eat and notice the impact of daily food choices on their health and the environment. Modern consumers are paying more and more attention to the ecological, healthy and safe aspects of food.

Decisions related to food choices are sometimes difficult to explain because they are frequent, multifaceted, situational, dynamic and complex (Sobal, Bisogni, 2009; Bublitz et al., 2010). In addition, consumer opinions about food and the technologies used in food production play an important role in explaining consumer decisions about food (Ares, Gámbaro, 2007; Bruhn, 2007; Vassallo et al., 2009). The decisive factors in the purchasing process for many novel foods differ depending on the type of innovation and its market acceptance (Barrena, Sánchez, 2012). On the other hand, consumers generally show a certain degree of resistance when it comes to accepting innovations in new foods that are introduced to the market (Balrcellos et al., 2009; Bäckström, Pirttilä-Backman, Tuorila, 2004).

In the contemporary food market, there are several prevailing trends and development directions for food products. The food sector is increasingly turning to sustainability issues (Vermeir et al., 2020). Environmentally Sustainable Food Consumption can be defined as the use of food "that satisfies basic needs and provides a better quality of life while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants during the life cycle so as not to compromise the needs of future generations" (Oslo Roundtable…, 1994). Reducing meat consumption and replacing it with plant-based foods and alternative proteins is a new and growing trend (Hoak et al., 2004; Lea, Crawford, Worsley, 2006; Megido et al., 2016). The organic market and locally produced food are growing because customers want to buy high-quality and safe food for themselves and their families (Bentsen, Pedersen, 2021; Jones, Comfort, Hillier, 2004). New consumption practices are gaining attention in light of increasing concerns about food sustainability, safety, nutrition and animal welfare.

The aim of the article was to defining consumer attitudes and behaviors towards food among Polish consumers depending on the respondents' gender, age, place of residence, income and level of education. Understanding which demographic factors influence polish consumer attitudes adopted when choosing food products could be of utmost importance in the coming years and is very important for the market success of this food. This research adds to the growing literature on consumer acceptance of innovative food products and demonstrates the new finding that demographic factors play an important role in the perception and acceptance of this foods.

2. Literature review

Studies have shown that socio-demographic factors such as age, gender and education level influence the purchasing decisions of food consumers (McCluskey, Grimsurd, Ouchi, Wahl, 2003; Ward, Tran, 2007). Consumer acceptance is one of the most important challenges for innovative food producers and is crucial for the success of new foods. Therefore, it is necessary to understand the determinants that influence consumer attitudes in the food market. The studies reveal differences between various demographic groups. We first focus on some key determinants of consumer acceptance of insects as food. According to previous studies, these were the most studied socio-demographic variables: gender, age, income and education level of respondents.

Gender

Keifer et al. (2005) found that there are significant gender differences in dietary behavior, food consumption, and the psychological factors that influence this behavior. Women are generally more knowledgeable and conscious about their diet (Jun et al., 2016). Women are also more likely to consume fruit and vegetables, dairy products and whole grains. Lone et al. (2009) have empirically shown that women eat more consciously than men. According to research, women are more likely to buy health-promoting foods (Pearson, Henryks, Jones, 2011) and more organic foods than men (Irianto, 2015; Lockie et al., 2002; Radman, 2005). Consuming a balanced diet plays a crucial role in increasing women's motivation. Women are the clear promoters of healthy eating at home and in the family, and they prioritize healthy eating for their children (Yazar, Burucuoğlu, 2019). Therefore, female consumers have a more negative attitude towards genetically modified foods than male consumers when it comes to whether genetically modified foods are healthy or not (Chen, 2011). Men are more likely to consume red meat, alcohol, fast food and foods high in sugar (Keifer et al., 2005).

Age

Research has shown that age is a significant factor that increases the likelihood that consumers are willing to try food products. Age determines consumer attitudes towards food. Younger consumers are more innovative than older consumers (Kowalczuk, 2011). Results of studies among Polish respondents show that young consumers are open to innovation (Barska, 2014) and that they accept novelties on the food market more easily compared to other consumer groups (Żakowska-Biemans, 2016; Kowalczuk, 2010; Gutkowska, Ozimek, 2005).

Younger consumers are generally more aware of organic food than their older counterparts (Kumar, Ali, 2011). In turn, Leclercq et al. (2009) and Wongprawmas et al. (2021) point out that older consumers tend to consume more fresh food - fruit and vegetables - and are generally more aware of a healthy diet than the younger generation of consumers. Colón-Ramos et al. (2013) reported that unhealthy foods such as fast food are favored by younger consumers.

Income

Some results indicate that there is an influence on the acceptance of innovative foods. Consumers who have a high disposable income and pay more attention to a healthy and balanced diet are more likely to choose innovative food products. As Pearson, Henryks and Jones (2011) found, people with a higher annual income are more likely to buy a health-promoting food product. Studies have shown that high-income consumers have a greater awareness of organic food (Briz, Ward, 2009; Gil, Soler, 2006).

In addition, the results of the studies reviewed suggest that high price is a barrier to food acceptance and a limitation in acquiring the knowledge and skills needed to change dietary and health behaviors (Sajdakowska et al., 2018).

Level of education

There is a possible correlation between the level of education and the depth of nutritional knowledge and awareness (Gil, Gracia, Sanchez, 2000; Popek, Halagarda, 2017). According to the studies examined (Pearson, Henryks, Jones, 2011), the level of education has a positive influence on the acceptance of a food product. According to studies (Evans et al., 2010; Vidigal et al., 2015), people with a higher level of education appear to be more open to new products and new technologies in the food market. High education was found to be a strong factor increasing the likelihood of trying new, innovative, healthy food products (Cattaneo et al., 2018). People with higher education had a more positive attitude towards buying organic food (Magnusson et al., 2001). The link between education and willingness to eat may be explained by the greater environmental awareness that highly educated people tend to have compared to less educated people.

3. Research Design

The research was conducted in April 2023 on a population of adult Poles. Quota sampling was employed as the method for sample selection, and the structure of the sample (Table 1) corresponded to the structure of the adult population of Poland as outlined in the most recent national census. The sample size consisted of 631 respondents. The study was carried out using the nationwide research panel Ariadna. The dataset was created with IBM SPSS 27.

Table 1.
Structure of the research sample

Respondent characteristics		N	%↕
Sex	Female	329	52.1
	Male	302	47.9
	Total	**631**	**100.0**
Age	up to 29 years old	117	18.5
	30-49 years old	246	39.0
	50+	268	42.5
	Total	**631**	**100.0**
Place of residence	Village	234	37.1
	Small towns (up to 99,000 inhabitants)	208	33.0
	Large cities (over 100,000 inhabitants)	189	30.0
	Total	**631**	**100.0**
Material status	Below average	121	19.2
	Average	223	35.3
	Above average	287	45.5
	Total	**631**	**100.0**
Education	Primary, middle school, or vocational education	77	12.2
	Secondary, post-secondary, or technical education	272	43.1
	Higher education	282	44.7
	Total	**631**	**100.0**

Source: own research.

The research procedure involved the analysis of 17 variables (table 2), including both original variables and those adapted from other studies (Videbæk, Grunert, 2020; Orsi, Voege, Stranieri, 2019; de Koning et al., 2020; Bäckström, Pirttilä-Backman, Tuorila, 2004). The variables were measured using a five-grade ordinal scale. In all calculations, it has been assumed that there are equal intervals between categories on an ordinal scale. Polish consumers generally believe that minimally processed food products are better than highly processed ones ($\overline{x}$ = 3.84). They also enjoy experimenting with food, such as trying new products ($\overline{x}$ = 3.74) or new recipes ($\overline{x}$ = 3.72). Interestingly, relatively low scores related to concerns about what they eat ($\overline{x}$ = 2.33) and the statement that they do not care how the food they consume is produced ($\overline{x}$ = 2.33) suggest that Poles tend to be conscious consumers who pay attention to both the food products themselves and the methods of their production. It is also worth noting that environmental issues were not relatively important for respondents in the context of purchasing and consuming food ($\overline{x}$ ranging from 3.12 to 3.59). Importantly, even at the declarative level, they do not show a clear willingness to purchase more environmentally friendly products if they were to cost more than non-ecological food products ($\overline{x}$ = 3.29).

Table 2.
The mean values of variables describing consumer attitudes and behaviors toward food

Variable	$\bar{x}$	σ
1. I look for ways to prepare unusual meals.	3.28	.967
2. Recipes and articles on food from other culinary traditions encourage me to experiment in the kitchen.	3.45	.976
3. I like to try new foods that I have never tasted before.	3.74	.951
4. I like to try out new recipes.	3.72	.913
5. When I buy food, I consider how its purchase and consumption will impact the environment.	3.12	.960
6. It is important to me that the food was produced in an environmentally friendly way.	3.59	.935
7. It is important to me that the food has been packaged in an environmentally friendly way.	3.56	.941
8. If given a choice, I choose the more environmentally friendly product, even at higher costs.	3.29	.988
9. I am very particular about the healthiness of food.	3.61	.905
10. I eat what I like, and I do not worry much about the healthiness of food.	2.95	1.086
11. A healthy and balanced diet plays an important role in my life.	3.54	.996
12. I don't care what I eat, as long as hunger stays away.	2.33	1.038
13. I don't care how my food is produced.	2.33	1.021
14. I don't need much information on new foods.	2.84	.962
15. I trust minimally processed food.	3.49	.863
16. In my opinion, minimally processed food products are better than highly processed ones.	3.84	.884
17. I trust that minimally processed products are of high quality.	3.60	.794

Legend: $\bar{x}$ – mean; σ – standard deviation

Source: own research.

The comparison of the average significance of variables determining consumer attitudes and behaviors towards food, based on selected respondent characteristics (age, place of residence, material status, and education level), was conducted using analysis of variance (ANOVA). The results obtained are presented in table 3.

Table 3.
The mean significance of variables determining consumer attitudes and behaviors towards food based on respondent characteristics

Variable	$\bar{x}$ overall	Age ≤29 | 30-49 | ≥50	ANOVA
1. I look for ways to prepare unusual meals.	3.28	$3.40^{2} \approx 3.35^{2} > 3.17^{1}$	3.315*
2. Recipes and articles on food from other culinary traditions encourage me to experiment in the kitchen.	3.45	$3.56^{2} \approx 3.58^{2} > 3.28^{1}$	6.976***
4. I like to try out new recipes.	3.72	$3.79^{2} \approx 3.81^{2} > 3.61^{1}$	3.600*
6. It is important to me that the food was produced in an environmentally friendly way.	3.59	$3.45^{1} \approx 3.54^{1} < 3.70^{2}$	3.593*
9. I am very particular about the healthiness of food.	3.61	$3.43^{1} < 3.60^{2} \approx 3.69^{2}$	3.468*
10. I eat what I like, and I do not worry much about the healthiness of food.	2.95	$3.12^{2} \approx 2.99^{2} > 2.84^{1}$	2.984*
12. I don't care what I eat, as long as hunger stays away.	2.33	$2.66^{3} > 2.38^{2} > 2.13^{1}$	11.220***
13. I don't care how my food is produced.	2.33	$2.58^{2} \approx 2.43^{2} > 2.12^{1}$	10.865***
16. In my opinion, minimally processed food products are better than highly processed ones.	3.84	$3.63^{1} < 3.84^{2} \approx 3.92^{2}$	4.411*
17. I trust that minimally processed products are of high quality.	3.60	$3.44^{1} < 3.61^{2} \approx 3.66^{2}$	3.417*

Cont. table 3.

Variable	$\bar{x}$ overall	Place of residence V | T<100 | C≥100	ANOVA
No statistically significant differences were identified based on the respondents' place of residence.			
Variable	**$\bar{x}$ overall**	**Material status ↙ | ↔ | ↗**	**ANOVA**
3. I like to try new foods that I have never tasted before.	3.74	$3.59^1 \approx 3.66^1 < 3.86$	4.877**
12. I don't care what I eat, as long as hunger stays away.	2.33	$2.55^2 > 2.27^1 \approx 2.28^1$	3.620*
15. I trust minimally processed food.	3.49	$3.45^1 \approx 3.36^1 < 3.60^2$	4.711**
17. I trust that minimally processed products are of high quality.	3.60	$3.49^1 \approx 3.54^1 < 3.70^2$	4.062*
Variable	**$\bar{x}$ overall**	**Education P | S | H**	**ANOVA**
9. I am very particular about the healthiness of food.	3.61	$3.38^1 < 3.55^2 \approx 3.72^2$	5.409**
10. I eat what I like, and I do not worry much about the healthiness of food.	2.95	$3.29^2 > 2.99^1 \approx 2.82^1$	5.854**
11. A healthy and balanced diet plays an important role in my life.	3.54	$3.30^1 \approx 3.42^1 < 3.73^2$	9.354***
12. I don't care what I eat, as long as hunger stays away.	2.33	$2.70^2 > 2.36^1 \approx 2.19^1$	7.878***
13. I don't care how my food is produced.	2.33	$2.47^1 \approx 2.42^1 \approx 2.20^1$	4.197*
15. I trust minimally processed food.	3.49	$3.18^1 < 3.41^2 < 3.64^3$	10.697***
16. In my opinion, minimally processed food products are better than highly processed ones.	3.84	$3.40^1 < 3.72^2 < 4.07^3$	22.700***
17. I trust that minimally processed products are of high quality.	3.60	$3.22^1 < 3.53^2 < 3.77^3$	16.987***

Legend:
Statistical significance (p-value): ***p≤0.001, **p≤0.01, *p≤0.05
Age: ≤29 – up to 29 years old; 30-49 – from 30 to 49 years old; ≥50 – 50 years old or older
Place of residence: V – village; T<100 – town with less than 100,000 inhabitants; C≥100 – city with 100,000 inhabitants or more
Material status: ↙ – below average; ↔ – average; ↗ – above average
Education: P – primary/vocational; S – secondary/post-secondary; H – higher education
$\bar{x}$ – mean
$^{1, 2, 3}$ – group membership – the higher the value, the higher the mean in the group

Source: own research.

The presentation of results in the table 3, was limited to statistically significant findings. In terms of age, respondents in the 30-49 and 50+ age groups place greater emphasis on the healthiness of the food they consume (see variable 9: "I am very particular about the healthiness of food"). The lower engagement of the youngest age group in health and ecological matters is further confirmed by variables such as 12: "I don't care what I eat, as long as hunger stays away" and 13: "I don't care how my food is produced"—though in the case of the latter variable, a similar attitude is also observed among the middle-aged group. The obtained results indicate lower demands, especially among the youngest respondents, concerning the healthiness and quality of the food they consume. As for the place of residence, the analysis did not reveal statistically significant differences, suggesting that the attitudes and behaviors of respondents towards food are similar regardless of where they live. In terms of material status, the ANOVA showed significant differences in several key variables—respondents with higher material status are more inclined to try new dishes (they experiment with food more often—variable 3) and show greater trust in minimally processed food (variables 15 and 17). When it comes to education, individuals with higher education ("university graduates") pay more attention to the

healthiness of the food they consume (clearly noticeable compared to individuals with basic education) and demonstrate greater trust in minimally processed products. This may reflect a higher awareness within this group regarding the quality of the food they consume. In summary, older consumers, as well as those with higher material status and higher education, are more engaged in health and environmental concerns related to food. In contrast, younger individuals and those with lower education or material status tend to be less concerned with these aspects.

The next step in the research procedure was the analysis of the dataset using the exploratory factor analysis (EFA) method. Factor analysis is commonly used to reduce a dataset containing many original variables and replace it with a smaller set of factors. The newly extracted factors are independent of each other while retaining some of the information contained in the original variables. This allows for the identification of potential hidden relationships within the entire dataset (Walesiak, Bąk, 1997; Czyż, 1971; Malarska, 2005; Watkins, 2018).

The analysis of the correlation matrix between variables revealed the presence of many statistically significant correlations, thus providing a basis for conducting Exploratory Factor Analysis (EFA). As part of data inspection, Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were conducted. The KMO measure ranges from 0 to 1, with higher values indicating greater justification for performing factor analysis on a given data set. The KMO value (table 4) was 0.893, which, according to Kaiser's classification, is "meritorious" (Watkins, 2018). The result of Bartlett's test of sphericity showed that the variable correlation matrix is not an identity matrix ($p < 0.001$), thus the results of both tests justify the use of exploratory factor analysis for analyzing the data set.

Table 4.
Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity results

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy		,893
Bartlett's Test of Sphericity	Approximate Chi-Square:	5078,289
	df	136
	Significance	< ,001

Source: own research.

Subsequently, using the principal component method, factors (components) were extracted. Uncorrelated primary variables were transformed into new components and ranked according to the explained variance (Table 5). Applying the so-called Kaiser criterion, four factors (components) were identified in subsequent stages of data analysis, which had eigenvalues greater than 1 (Braeken, van Assen, 2017).

Table 5.
Total Explained Variance of Factors

Total Explained Variance of Factors									
	Initial eigenvalues			Sum of squared loadings after extraction			Sum of squared loadings after rotation		
Variable	Overall	% of variance	% cumulative	Overall	% of variance	% cumulative	Overall	% of variance	% cumulative
1	6.358	37.402	37.402	6.358	37.402	37.402	3.358	19.751	19.751
2	2.073	12.195	49.597	2.073	12.195	49.597	2.977	17.509	37.261
3	1.565	9.203	58.801	1.565	9.203	58.801	2.887	16.985	54.245
4	1.319	7.761	66.562	1.319	7.761	66.562	2.094	12.317	66.562
5	.785	4.615	71.177						
6	.613	3.607	74.784						
7	.568	3.341	78.125						
8	.510	2.997	81.122						
9	.492	2.897	84.019						
10	.452	2.658	86.677						
11	.398	2.342	89.018						
12	.369	2.170	91.188						
13	.347	2.040	93.228						
14	.317	1.867	95.095						
15	.306	1.799	96.894						
16	.270	1.591	98.485						
17	.258	1.515	100.000						
Factor extraction method – principal components.									

Source: own research.

The calculations of factor loadings were performed using orthogonal Varimax rotation. There is no consensus in the literature regarding the minimum value of such a loading to be considered in further analysis. Some authors classify variables with factor loadings of at least 0.4 for further analysis (Yong and Pearce, 2013), while others use thresholds of at least 0.5 (Czyż, 1971) or 0.65 (Walesiak, 1996). The threshold for considering factor loadings as significant was arbitrarily set at 0.6. The factor loadings of two variables did not meet this criterion, thus the variable "9. I pay a lot of attention to the healthiness of the food I eat" (0.525) and "11. A healthy and balanced diet plays an important role in my life" (0.530) were removed from further analysis. The remaining variables along with their components are included in Table 6. The first component relates to openness regarding food and meal preparation (seeking new ways of preparation, making unconventional meals, trying new dishes and recipes). The second component concerns the ecological aspects of food consumption—considering the environmental impact of purchases, environmentally friendly production, eco-friendly packaging, and declarations about purchasing more ecological alternatives at higher costs. The third component reflects consumers' potential indifference toward the quality and origin of food. The final component pertains to attitudes toward unprocessed products—trust in them, their quality, and their superiority over processed products. Based on the analysis of the results presented in Table 6, it can be concluded that Polish consumers are indeed open to experimentation in the context of food consumption, but to a relatively limited extent ($\overline{x} = 3.55$). Interestingly, ecological issues were rated even lower by respondents ($\overline{x} = 3.39$). Despite observed changes in consumer behaviors and an increasing awareness (at least at the declarative level) regarding environmental issues, the results of our study suggest that Polish consumers exhibit pro-ecological attitudes towards food consumption, but these are relatively limited.

The results of the conducted analysis showed that respondents are not indifferent to what they eat. Rather (though not to a significant extent), they pay attention to the quality and origin of food products ($\bar{x} = 2.61$). Notably, the component concerning attitudes toward unprocessed food received the highest rating (which does not mean it was rated highly overall) ($\bar{x} = 3.64$).

Table 6.
Results of the EFA in the set of variables defining consumer attitudes and behaviors towards food

Component	$\bar{x}$ overall	Factor loading	Variables
1. openness to culinary experiments	3.55	.739	1. I look for ways to prepare unusual meals.
		.826	2. Recipes and articles on food from other culinary traditions encourage me to experiment in the kitchen.
		.805	3. I like to try new foods that I have never tasted before.
		.836	4. I like to try out new recipes.
2. environmental awareness in food choices	3.39	.839	5. When I buy food, I consider how its purchase and consumption will impact the environment.
		.738	6. It is important to me that the food was produced in an environmentally friendly way.
		.748	7. It is important to me that the food has been packaged in an environmentally friendly way.
		.775	8. If given a choice, I choose the more environmentally friendly product, even at higher costs.
3. indifference to the quality and origin of food	2.61	.743	10. I eat what I like, and I do not worry much about the healthiness of food.
		.829	12. I don't care what I eat, as long as hunger stays away.
		.739	13. I don't care how my food is produced.
		.655	14. I don't need much information on new foods.
4. attitudes toward minimally processed food	3.64	.819	15. I trust minimally processed food.
		.747	16. In my opinion, minimally processed food products are better than highly processed ones.
		.768	17. I trust that minimally processed products are of high quality.

Factor extraction method – Principal components.
Rotation method – Varimax with Kaiser normalization.
The rotation converged in 5 iterations.

Source: own research.

It is noteworthy that the analysis of the significance of the components defining the attitudes and behaviors of Polish consumers regarding food consumption, based on gender (Table 7), revealed statistically significant differences between women and men in relation to all factors. Women are more inclined than men to experiment with food consumption and make more environmentally conscious food choices, as well as exhibit more positive attitudes toward minimally processed food. Furthermore, they also show greater interest in the quality and origin of the food they consume.

Table 7.
Mean significance of the components defining consumer attitudes and behaviors towards food based on gender

Variable	$\bar{x}$ overall	Sex F | M	test-t
1. openness to culinary experiments	3.55	3.64 > 3.44	3.144***
2. environmental awareness in food choices	3.39	3.51 > 3.26	4.065***
3. indifference to the quality and origin of food	2.61	2.46 < 2.78	-5.103***
4. attitudes toward minimally processed food	3.64	3.72 > 3.55	3.178***

Legend:
Statistical significance (p-value): ***p≤0.001, **p≤0.01, *p≤0.05
Sex: F – Female; M – Male
$\bar{x}$ - mean

Source: own research.

Analyzing the results through the lens of respondents' age, it can be stated that regarding issues related to experimenting with food preparation and consumption, as well as paying attention to its quality and origin, individuals aged below 29 and those aged 30-49 exhibit similar attitudes (table 8). Interestingly, while younger individuals are more open to culinary innovations than those over 49, the oldest group is less indifferent to the quality and origin of the food they purchase and consume. Individuals in the youngest age group exhibit a significantly less positive attitude toward unprocessed food compared to other age segments. Notably, no statistically significant differences were recorded concerning pro-ecological issues in the context of food consumption.

Table 8.
Mean significance of the components defining consumer attitudes and behaviors towards food based on age

Variable	$\bar{x}$ overall	Age ≤29 | 30-49 | ≥50	ANOVA
1. openness to culinary experiments	3.55	$3.64^{2} \approx 3.64^{2} > 3.42^{1}$	5.697**
2. environmental awareness in food choices	3.39	$3.36^{1} \approx 3.34^{1} \approx 3.45^{1}$	1.483
3. indifference to the quality and origin of food	2.61	$2.78^{2} \approx 2.69^{2} > 2.47^{1}$	7.998***
4. attitudes toward minimally processed food	3.64	$3.52^{1} < 3.63^{2} \approx 3.70^{2}$	2.790*

Legend:
Statistical significance (p-value): ***p≤0.001, **p≤0.01, *p≤0.05
Age: ≤29 – up to 29 years old; 30-49 – from 30 to 49 years old; ≥50 – 50 years old or older
$\bar{x}$ - mean
$^{1, 2, 3}$ – group membership – the higher the value, the higher the mean in the group

Source: own research.

The results of the discussed analysis based on the respondents' place of residence are particularly interesting (Table 9). No statistically significant differences were recorded in this regard in the respondents' declarations.

Table 9.
Mean significance of the components defining consumer attitudes and behaviors towards food based on place of residence

Variable	$\bar{x}$ overall	Place of residence V | T<100 | C≥100	ANOVA
1. openness to culinary experiments	3.55	$3.55^1 \approx 3.59^1 \approx 3.49^1$	0.928
2. environmental awareness in food choices	3.39	$3.40^1 \approx 3.36^1 \approx 3.40^1$	0.159
3. indifference to the quality and origin of food	2.61	$2.64^1 \approx 2.59^1 \approx 2.60^1$	0.298
4. attitudes toward minimally processed food	3.64	$3.64^1 \approx 3.62^1 \approx 3.67^1$	0.257

Legend:
Statistical significance (p-value): ***p≤0.001, **p≤0.01, *p≤0.05
Place of residence: V – village; T<100 – town with less than 100,000 inhabitants; C≥100 – city with 100.000 inhabitants or more
$\bar{x}$ - mean
[1, 2, 3] – group membership – the higher the value, the higher the mean in the group

Source: own research.

Individuals reporting a relatively higher material status are more inclined to experiment with dishes and exhibit relatively more positive attitudes toward minimally processed food than those with medium or lower status (Table 10). Interestingly, no statistically significant differences were noted between groups regarding responses related to ecological awareness and indifference in food consumption.

Table 10.
Mean significance of the components defining consumer attitudes and behaviors towards food based on material status

Variable	$\bar{x}$ overall	Material status ↙ | ↔ | ↗	ANOVA
1. openness to culinary experiments	3.55	$3.48^1 \approx 3.47^1 < 3.64^2$	3.554*
2. environmental awareness in food choices	3.39	$3.36^1 \approx 3.39^1 \approx 3.40^1$	0.130
3. indifference to the quality and origin of food	2.61	$2.70^1 \approx 2.57^1 \approx 2.61^1$	1.140
4. attitudes toward minimally processed food	3.64	$3.58^1 \approx 3.55^1 < 3.74^2$	5.372**

Legend:
Statistical significance (p-value): ***p≤0.001, **p≤0.01, *p≤0.05
Material status: ↙ – below average; ↔ – average; ↗ – above average
$\bar{x}$ - mean
[1, 2, 3] – group membership – the higher the value, the higher the mean in the group

Source: own research.

The analysis of the results based on the respondents' education level revealed that Polish food consumers assess the significance of openness to culinary innovations and ecological issues in the context of their market behaviors (Table 11). Clear differences between groups were noted regarding attitudes toward minimally processed food. The higher the level of education, the more positive these attitudes become. Similar statistically significant differences were observed in relation to paying attention to the quality and origin of food.

Table 11.
Mean significance of the components defining consumer attitudes and behaviors towards food based on the level of education

Variable	$\bar{x}$ overall	Education P | S | H	ANOVA
1. openness to culinary experiments	3.55	$3.45^{1} \approx 3.54^{1} \approx 3.57^{1}$	0.691
2. environmental awareness in food choices	3.39	$3.33^{1} \approx 3.45^{1} \approx 3.45^{1}$	1.289
3. indifference to the quality and origin of food	2.61	$2.86^{2} > 2.66^{1} \approx 2.49^{1}$	7.404***
4. attitudes toward minimally processed food	3.64	$3.27^{1} < 3.55^{2} < 3.83^{3}$	25.258***

Legend:
Statistical significance (p-value): ***p≤0.001, **p≤0.01, *p≤0.05
Education: P – primary/vocational; S – secondary/post-secondary; H – higher education
$\bar{x}$ - mean
[1, 2, 3] – group membership – the higher the value, the higher the mean in the group

Source: own research.

4. Discussion and future research directions

The results of the study suggest that, in general, Polish consumers exhibit a positive attitude toward experimenting with food; however, this openness to innovations is rather moderate. Similar conclusions can be drawn regarding the importance of ecological issues for consumers when purchasing and consuming food. Respondents are not indifferent to the quality and origin of food products and tend to have a positive attitude toward minimally processed food.

The analysis of the results based on metric criteria revealed the presence of many statistically significant differences in the assessment of the specified components. These differences were observed in relation to all components when evaluating based on gender. The analysis through the lens of age showed that certain age groups exhibit similar attitudes toward food products. Older individuals displayed significantly different attitudes regarding openness to innovations and ecological considerations in the context of food choices, quality, and origin compared to the other two age groups, which, in turn, exhibited similar attitudes in these aspects. Wealthier respondents were more open to innovations and exhibited a more positive attitude toward minimally processed food than less affluent individuals. The findings indicated that the higher the education level of consumers, the more positive their attitudes toward minimally processed food. The only metric criterion for which no statistically significant differences were found among Polish consumers regarding their attitudes toward food was place of residence.

Poles, like many other Europeans, are conscious consumers who pay attention to their diet, food and the way it is produced. The results of research among Polish consumers are consistent with the findings of other researchers - price is the biggest obstacle to buying organic products (Sajdakowska et al., 2018; Bryła, 2016). Despite the awareness that organic food is of better quality, subject to stricter controls and produced in a more traditional way, Polish consumers

do not show a clear willingness to buy it. The analysis of Polish consumers' attitudes and behaviors towards food consumption based on geographical variables is consistent with the research results presented in the literature on this topic. In line with other studies (Jun et al., 2016; Lone et al., 2009), Polish women consume food more consciously than men and make more conscious food choices. They are more interested in the quality and origin of food. The younger generation of Poles is more open to new foods. At the same time, older consumers generally pay more attention to a healthy diet than the other generation of consumers, which is consistent with the studies by Leclercq et al. (2009) and Wongprawmas et al. (2021). Poles with a higher annual income and Poles with a higher level of education are more willing to buy unprocessed food.

Although this study provides several empirical contributions, it still has some limitations that can be addressed by future researchers. First, this study is limited to Polish consumers; future research could conduct a cross-cultural sample. Secondly, further research can be conducted qualitatively by conducting focus groups or in-depth interviews with consumers to explore other reasons that may drive customer purchase intentions for healthy, innovative foods.

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