Consumer Nutritional, Behavioral Perceptions of Snacking in a Sample of the Greek Population: A Cross-Sectional Survey

Kyriakos G. Makris and Antonios E. Koutelidakis *

Posted Date: 29 May 2026

doi: 10.20944/preprints202605.2097.v1

Keywords: snacking habits; snacking consumption frequency; nutritional preferences; consumer attitude; healthy food; nutrition labelling; nutrition claims; packaged snacks; functional snacks; Mediterranean diet

 doi:10.20944/preprints202605.2097.v1

Article

Consumer Nutritional, Behavioral Perceptions of Snacking in a Sample of the Greek Population: A Cross-Sectional Survey

Kyriakos G. Makris and Antonios E. Koutelidakis *

Unit of Human Nutrition, Laboratory of Nutrition and Public Health, Department of Food Science and Nutrition, University of the Aegean, Leoforos Dimokratias 66, 81400 Myrina, Lemnos, Greece

* Correspondence: akoutel@aegean.gr; Tel.: +302254083123

Abstract

(1) Background: Snacking has become a routine part of how people eat today, with real potential to shape overall diet quality, food choices, and daily nutrient intake. This cross-sectional study aimed to explore snack purchasing and nutritional habits among Greek adults, investigate how consumers perceive the nutritional value of snacks, and understand their attitudes toward nutrition labelling, nutrition claims, and new snack products on the market. (2) Methods: A structured questionnaire was sent out electronically to 1,039 Greek adults. Participants provided information on their sociodemographic background, health and lifestyle habits, snack consumption and purchasing behavior, perceptions of snack products, nutrition labelling, and interest in innovative and functional snacks. The data were analyzed using descriptive statistics and Chi-square tests of independence. (3) Results: The most common packaged snack for the average person in the study was a cereal bar, while the least popular non-packaged snack was a bakery cheese pie. Consumers viewed the appearance of the product's packaging as a secondary consideration at the point of purchase, and the most prominent label elements that attracted consumer attention were nutrition, calories, and fat. The claims that consumers found most appealing were "no preservatives" and "sugar-free/no added sugars." A clear preference was shown for snack products that relied mainly on naturally occurring nutrients rather than fortified ingredients, as well as a greater willingness to try new savoury snack options that used familiar/demonstrable Greek ingredients, such as certain olives, nuts, and fruit. Statistically significant relationships have been identified between certain snacking behaviours, attitudes, and labelling preferences, with respect to age, gender, education level, employment status, BMI, health status, physical activity, and place of residence. (4) Conclusions: Sociodemographic, education level and lifestyle all have an influence on how Greek adult consumers view and use snacks. Interest in nutrition information varies widely between different types of consumers. These findings may be useful in guiding the future development of snacks that meet the nutritional requirements of the Mediterranean diet, as well as in creating more targeted nutrition information and consumer education programs.

Keywords: snacking habits; snacking consumption frequency; nutritional preferences; consumer attitude; healthy food; nutrition labelling; nutrition claims; packaged snacks; functional snacks; Mediterranean diet

1. Introduction

People's eating habits have changed dramatically over the past several decades. Snacking has gradually shifted from marginal to mainstream in our daily dietary patterns. Factors such as busy lifestyles, longer working hours, living in cities, and limited cooking opportunities at home have driven many people to seek snacks as a viable way to meet their energy and nutrient needs throughout the day [1,3,4]. While there are certainly snacks that contain important nutrients, the

 doi:10.20944/preprints202605.2097.v1

majority of what is readily available in most grocery stores or convenience stores are usually high in calories, sugar, saturated fat, and sodium and can significantly detract from one's overall dietary quality over time. This is why we no longer refer to snacking as simply an "in-between meal" behavior; for most people, it has now become an integral part of their food intake pattern used to reach their energy/nutrient requirements each day [1,3]. The snack food industry has seen a dramatic increase in size with bakery products, cereal-based items, savory foods, dairy products, and a multitude of functional snacks [1,3]. The number of snack foods that people eat each day determines the nutritional quality of the entire diet [5]. Consumers are currently looking for snack foods that appear to be healthier and more natural than traditional snack foods [2,3,6]. Many snack foods contain significant amounts of protein or fibre, are fortified with vitamins and minerals, or are reformulated to have reduced sugars, fats or salt levels; they have all been heavily promoted as good substitutes for traditional snack foods [2,3].

Advances in food technology have created an entirely new class of functional snacks made from functional ingredients, new raw material sources, and simplified formulations [2,23]. However, the market success of these products ultimately depends on more than what goes into the product. The consumer's preference plays a significant role in determining market success, as well as whether they have a valid understanding of the information on the product's packaging [2,6,20]. The consumer's understanding of food products is primarily through nutrition statements and health or nutrition claims on food labels — in theory, nutrition statements and health claims should help the consumer compare products based on how the product performs against each claim. Research has shown that consumers frequently do not read the label information carefully, understand it correctly, or use it consistently in their purchasing decisions. Different backgrounds, education levels and demographics will result in different reactions from consumers with respect to the label information and claims [7,8].

Snacking behaviors are shaped by a wide range of personal factors. Demographic variables, including age, sex, education, smokers or non-smokers, level of physical activity, and body weight, all can impact both frequency of snacking, types of snacks selected, overall perceptions of the nutritional quality of snack foods and the degree to which shoppers check product labels prior to their purchase [9,10,15,22]. To assist the food industry in its efforts to create a clearer understanding of consumer attitudes and behaviors toward snack foods, it has been helpful to gather more data about the factors that influence snacking behaviors and purchase decisions [2,7]. All of this said, the amount of information and data on the snacking behaviors of Greek adults, as well as their perceptions of the nutritional quality of snack foods and the extent to which they read labels prior to making a purchase, is limited. Many of the studies conducted in Greece on snacking behaviors have focused on general patterns of snacking only but not fully addressed the entire picture of snacking behaviors, including purchasing behaviors, consumption behaviors, perceptions of nutritional quality, labelling and receptivity to innovation for all snack food products [9,10].

Considering that gap, this research project was carried out in order to investigate more clearly how snack products are purchased and consumed by adult Greeks, their attitudes toward the nutrition quality of those products; and their attitudes toward the nutrition labelling and claims they see on pre-packaged snacks. Additionally, the study examined how these behaviors and attitudes correlate with a variety of demographic and lifestyle attributes.

2. Materials and Methods

2.1. Questionnaire Design and Structure

The survey was developed between August 2021 and October 2022 following a detailed analysis of the current literature. The development of the questionnaire took inspiration from previously published questionnaires and surveys that had assessed dietary habits, snacking habits, the utility and understanding of food labels, nutrition knowledge, and consumer attitudes towards functional, innovative, and healthier snacks [9,11,14,19,20]. The development of the questionnaire was guided by previous research that examined the specifications and timing of snacking behaviour and product

 doi:10.20944/preprints202605.2097.v1

choice [9,12], r that examined eating habits and lifestyle in adults [13], and other methodological resources for conducting web-based surveys [14]. The development of the survey was informed by research on the consumer's perception of the nature of healthy, functional, and innovative snacks, and the role of claims and naturalness in their evaluation [8,17–20]. The final version of the survey was modified to include the specific objectives of this study and the dietary and consumer characteristics of Greek adults.

The questionnaire was organized into three parts:

Part A- The demographic and personal health information collected from respondents included age, gender, occupation, residence, health status and how many physical activities they perform each week. The questionnaire also collected data on the respondent's weight, height, BMI, smoking habits and if they have any allergies or intolerances.

Part B- The intent of this part of the research was to gain insight into the actual eating and purchasing behaviors of participants towards snacks; specifically, to identify for participants what the term 'snack' means, the motivations for snacking, when snacking occurs and under what conditions snacks are consumed, the sensory characteristics associated with snacks, and the extent to which snacks replace main meals, and which snack types the participants feel are most popular. Additionally, purchasing behavior was also included in this part of the survey and looked at the relative importance placed by participants on various factors in making their snack purchasing decisions, such as packaging, convenience, availability, and nutritional attributes of the snack products.

Part C- This section covered the perception and opinion of snacks to reveal how the participant thinks/feels about snacks in general. This covered their overall attitude toward menu labels, nutritional/health claims, and innovative or functional snack products. Participants were asked to identify the most attention-grabbing pieces of label information, to indicate the most meaningful nutritional characteristics and claim(s) found on a package, and to state the level of trust they assign to such labelling and how they evaluate snacks that are enhanced by functional ingredients or developed using traditional Greek raw materials.

Closed-ended response types in either single-answer or multiple-answer questions were predominantly utilized for the questionnaire, simplifying both data coding and statistical analysis. Each question's order, content, and wording were carefully selected and designed to ensure questions were clear, relevant, and consistent with the objectives of the study, in accordance with nutrition and consumer surveys that have existed previously [11,13]. The letters of the final version of the questionnaire were reviewed through a pre-testing process to ensure that it would be easy for the target population to utilize [11,14].

2.2. Sample Collection and Processing

A convenience sample was used in this study, consisting of available participants from Athens and other areas of Greece who volunteered through social media or email. There were 1,039 complete questionnaires, with participant ages ranging from 18 to 65+. This research follows the Helsinki Declaration ethical guidelines and was approved by the Ethics Committee of the Aegean, protocol number 7505 (20 October 2019). All participants were fully informed prior to their involvement, and they signed an informed consent form indicating their agreement to participate. An online survey was conducted through Instagram, Facebook and emails to gather data. This method was selected in part due to logistics; it enabled the survey to reach adult consumers across Greece relatively quickly and made it easy and straightforward for consumers to voluntarily participate, a common characteristic shared by web-based surveys of this type [14]. Respondents completed the online questionnaire anonymously; neither respondent's name nor any identifying personal information was requested or recorded. This was done to protect respondents' confidentiality and facilitate truthful responses. As mentioned, participation was optional, and those who took part were adults who could comprehend the contents of the questionnaire. Participants were provided with information about the study (the study's purpose), that they could opt to take part in the study, how

 doi:10.20944/preprints202605.2097.v1

the data collected would be used and were made aware they could withdraw from the study at any time until the time of submission. The information collected was used only for research purposes, and only responses that were completed were included in the analysis of the data. After data collection concluded, responses were then prepared for entry into a data-based program for statistical analysis.

2.3. Analysis of the First Hypothesis (H1)

The first hypothesis (H1) held that sociodemographic characteristics (including age, gender, education, occupation, place of residence, health status, and physical activity) had no bearing on snack consumption and purchasing habits, such as how often people buy and eat snacks, what types of snacks they tend to go for, their preferred taste profile, and what drives their purchasing decisions. The alternative hypothesis (H1) proposed the opposite: that these same characteristics do meaningfully shape snack-related behavior in all of the above respects. To test this, sociodemographic variables were examined alongside a range of behavioral variables capturing snack consumption and purchasing patterns. These covered things like how frequently participants snacked, what time of day they usually did so, how often snacks substituted for a proper meal, how regularly they purchased snacks, and what factors guided their product choices.

2.4. Analysis of the Second Hypothesis (H2)

The second hypothesis (H2) assumed that sociodemographic factors had no influence on how participants perceived and thought about snacks including their point of view on what the average consumer prefers and how nutritious they consider snacks to be. This hypothesis was explored by looking at how participants' backgrounds related to the way they conceptualize snacks, the role they feel snacks play in daily eating, how they judge snack products nutritionally, and what they think about specific snack categories. The aim here was to find out whether who someone is affects not just what they do, but how they think about snack products and what they imagine others prefer.

2.5. Analysis of the Third Hypothesis (H3)

The third hypothesis (H3) assumed that sociodemographic characteristics had no effect on attitudes toward snack packaging, labelling, and nutrition claims. The focus here was on the possible links between participants' backgrounds and how they engage with packaging and label information. Specifically, the analysis looked at how much packaging appearance influences purchasing decisions, which parts of the nutrition declaration people pay attention to, and which nutrition or front-of-pack claims tend to catch their eye. The broader question this hypothesis sought to answer was whether demographic and lifestyle differences show up in how much importance people place on a product's external presentation and nutritional information.

2.6. Analysis of the Fourth Hypothesis (H4)

The fourth hypothesis (H4) assumed that sociodemographic characteristics had no effect on how open participants were to innovative and functional snack products. This hypothesis was examined by exploring how participants' backgrounds related to their openness to innovation and functionality in snacks. The analysis paid particular attention to preferences for enriched snack products, desired taste characteristics in a novel snack, and which traditional Greek ingredients people would like to see incorporated. The underlying goal was to build a clearer picture of which consumer groups are most-and least-receptive to new directions in snack product development.

2.7. Statistical Analysis

Data processing and analysis were done with the IBM SPSS Statistics 26 (Statistical Package for the Social Sciences). The Chi-Square Test was performed to determine the degree of association between variables. Descriptive statistics were utilized at first to summarize the characteristics of the

 doi:10.20944/preprints202605.2097.v1

sample and show how responses were distributed. Most variables were categorical, so frequencies and percentages were used to show most of them. Inferential analyses were performed next to test for the associations between sociodemographic characteristics and all other variables related to snack consumption habits, perceptions, attitudes, packaging preferences, and acceptance of innovative snack products. A Chi-Square Test for independence was used to determine if there was a significant association between two categorical variables, using a significance level of $p<0.05$. Categorical variables were interpreted statistically, and among the patterns noticed among responses, to gain a more complete understanding of the results obtained from the analyses.

3. Results

3.1. Participants' Sociodemographic Characteristics

The sample consisted of 1,039 adults, with women outnumbering men by a considerable margin (64.1% vs 35.9%). This kind of gender imbalance is not unusual in voluntary, online survey research, where women tend to participate at higher rates. In terms of age, the sample skewed toward the middle adult years. The 35–44 bracket was the most heavily represented group, making up nearly a third of all respondents (34.9%), with the 25–34 group not far behind at 23.2%. Younger adults aged 18–24 made up 15.7%, while those in the 45–54 range came in at 18.9%. The educational profile of the sample was notably high. The single largest group had a university degree (43.3%), and a further 37.8% held a postgraduate degree. High school graduates accounted for 10.6%, while those whose education ended at primary school were a very small minority (0.9%). This is worth bearing in mind when interpreting the findings, as the sample is considerably more educated than the Greek general population. On the occupational front, private sector employees dominated at 42.0%, followed by civil servants (20.9%), students (14.3%), and freelancers (13.2%). Smaller groups included unemployed participants (6.6%), pensioners (2.5%), and police or military officers (0.5%). As for where people lived, the overwhelming majority (81.5%) were based in urban areas, which again reflects the recruitment approach via social media and email. Semi-urban residents made up 12.0% of the sample, and those living in provincial cities accounted for the remaining 6.5%. (Table 1).

Table 1. Participants' demographic characteristics.

Characteristics	Categories	Percentage
Gender (1)	Male	35.9%
	Female	64.1%
Age (2)	18-24 years	15,7%
	25-34 years	23,2%
	35-44 years	34,9%
	45-54 years	18,9%
	55-64 years	6,2%
Education level (6)	Primary school	0,9%
	High school	10,6%
	University	43,3%
	Post-graduate studies	37,8%
	PhD studies	7,4%
Profession (7)	Private employees	42,0%
	Civil servants	20,9%
	Students	14,3%
	Freelancers	13,2%
	Unemployed	6,6%

 doi:10.20944/preprints202605.2097.v1

	Pensioners	2,5%
	Police/military officers	0,5%
Place of residence (5)	Urban city	81,5%
	Semi- Urban city	12,0%
	Provincial city	6,5%

3.2. Participants' Health Status and Lifestyle Characteristics

The distribution of participants according to body mass index indicated that normal body weight was the most prevalent category (54.8%), followed by overweight (29.6%). Considerably lower proportions were classified as obese class I (8.1%) and underweight (4.2%). Concerning self-perceived health status, most respondents rated their health as good (44.9%) or very good (35.6%), whereas smaller percentages characterized their health as moderate (16.9%), poor (2.1%), or very poor (0.5%). Regarding lifestyle characteristics, moderate-intensity physical activity was reported most frequently (49.2%), followed by low-intensity physical activity (39.2%). In addition, most participants were non-smokers (69.2%). With respect to food allergies or intolerances, most respondents reported no such condition (83.5%), while 16.5% indicated the presence of food allergy or intolerance. While Table 2 presents the overall prevalence of food allergies and intolerances, Figure 1 illustrates the distribution of the specific substances reported by affected participants. Among these, milk was the most frequently reported substance (59.8%), followed by gluten (43.0%) and fish (13.1%).

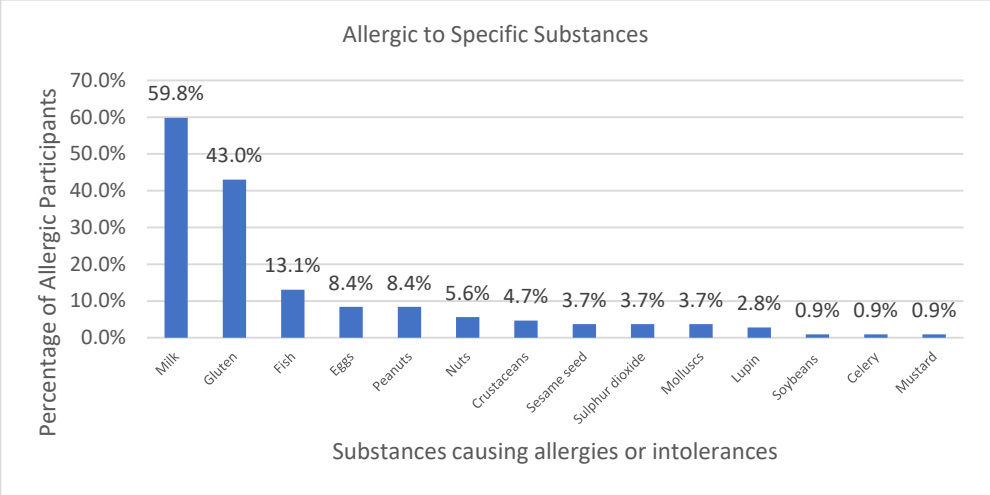

Figure 1. Distribution of Reported Allergies or Intolerances among Participants with Allergies.

Among those affected, milk was the most reported allergen/intolerance-related substance (59.8%), followed by gluten (43.0%) and fish (13.1%). Finally, among participants who did not report good or very good health, the most frequently reported health-related condition was obesity (40.7%), followed by appetite disorders (19.7%), hypertension (16.8%), diabetes mellitus (13.8%), and cardiovascular disease (9.0%) (Table 2).

Table 2. Participants' health status and lifestyle characteristics.

Characteristics	Categories	Percentage
Body Mass Index (3+4) (BMI range – kg/m²)	Underweight (<18.5)	4,2%
	Normal Body Weight (18.5 – 25)	54,8%
	Overweight (25 – 30)	29,6%
	Obese Class I (30 – 35)	8,1%
	Obese Class II (35 – 40)	2,5%

 doi:10.20944/preprints202605.2097.v1

	Obese Class III (> 40)	0,8%
Self-rated health status (8)	Good/Very good health	80.5%
	Moderate health	16.9%
	Poor/Very poor health	2.6%
Reported health status (if poor health) (**9**)	Obesity	40.7%
	Appetite disorders	19,7%
	Hypertension	16.8%
	Diabetes mellitus	13.8%
	Cardiovascular disease	9.0%
Physical activity (10)	Low intensity	39.2%
	Moderate intensity	49.2%
	High intensity	11.6%
Smoking status(11)	Smokers	30.8%
	Non- Smokers	69.2%
Food allergies/intolerances	Yes	16.5%
	No	83.5%

3.3. Participants' Snack-Related Purchasing and Consumption Habits

Participants reported that snacking was mainly driven by the convenience of storage and portability (38.8%) and limited time availability (34.2%), while 22.1% considered snacks part of a healthy dietary pattern. Snack consumption occurred most frequently during mid-morning (38.7%) and afternoon (29.1%). A clear preference for savory packaged snacks was observed (64.1%), compared with sweet snacks (35.9%). Half of the participants reported that they did not replace meals with snacks (50.5%), whereas 27.6% did so occasionally and 21.9% reported meal replacement. Among those replacing meals with snacks, the most common frequency was 1-2 times per week (55.9%). Regarding purchasing behavior, most participants reported buying snacks whenever desired (68.0%) rather than following weekly planning (32.0%). Snacks were generally considered easy or relatively easy to access (46.8% and 44.1%, respectively). Storage and preparation requirements affected purchasing decisions considerably, with 42.8% reporting a strong effect and 28.8% having a moderate effect. Taste was identified as the primary factor influencing snack choice (60.2%), followed by nutritional value (39.8%). In addition, 61.3% of respondents believed that packaged snacks currently available on the market could meet their needs throughout the day. When combined choice criteria were examined, the most common response was taste, price, and nutritional value together (38.8%), followed by taste and nutritional value (37.1%) and taste and price (21.5%). Finally, regarding dietary habits and preferences, the Mediterranean dietary pattern was the most frequently reported (37.9%), followed by preference for conventional products (32.1%) and organic products (13.1%), while all other dietary preferences were reported by relatively small percentages. (Table 3)

Table 3. Snack consumption habits, purchasing behaviour, and dietary preferences.

Participants' data	Categories	Percentage
Reasons for snacking (15)	Convenience of storage and portability	38.8%
	Forced choice because of limited time	34.2%
	As part of a healthy dietary pattern	22.1%
	Specific health-related reasons	1.1%
	In the morning	8.4%

 doi:10.20944/preprints202605.2097.v1

	Mid-morning	38.7%
Usual snack consumption time (16)	Midday / lunchtime period	3.1%
	Afternoon	29.1%
	Evening	6.7%
	Any Day Time	14.0%
Primary taste associated with packaged snacks (17)	Savoury	64.1%
	Sweet	35.9%
Meal replacement with snacks (18)	No	50.5%
	Occasionally	27.6%
	Yes*	21.9%
	Daily	10.4%
Meal replacement frequency (If Yes) (19)	1-2 (times/week)	55.9%
	3-4 (times/week)	28.8%
	5-6 (times/week)	4.9%
Snack purchasing pattern (planned vs impulse) (21)	Whenever desired	68.0%
	Following weekly planning	32.0%
	Easily	46.8%
Perceived ease of accessing snacks when desired (22)	Relatively easily	44.1%
	Relatively difficult	7.2%
	Difficult	1.9%
Impact of snack type (storage/preparation requirements) on the purchase decision (23)	A lot	42.8%
	Moderately	28.8%
	A little	16.9%
	Not at all	11.5%
Primary factor influencing snack choice (33)	Taste	60.2%
	Nutritional value	39.8%
Availability of packaged snacks meeting all-day needs (38)	Yes	61.3%
	No	38.7%
Combined factors in regularly consumed snacks (45)	Taste, price, nutritional value	38.8%
	Taste & nutritional value	37.1%
	Taste & price	21.5%
	Price & nutritional value	2.7%
Dietary habits/preferences (46)	I prefer conventional products	32.1%
	I prefer organic products	13.1%
	I prefer gluten-free products	3.6%
	I pay attention to/avoid allergens	0.9%
	I am vegan/vegetarian	1.9%
	I follow a health-related diet	3.9%
	I follow a specific diet due to obesity	3.9%
	I follow Mediterranean diet pattern	37.9%

 doi:10.20944/preprints202605.2097.v1

Figure 2 presents the perceived time-of-day snack consumption pattern across different snack categories, showing that cereal, baked cheese pie and cereal bars were more frequently associated with morning consumption, whereas chips, nuts and fresh fruits were more commonly linked to afternoon and evening occasions.

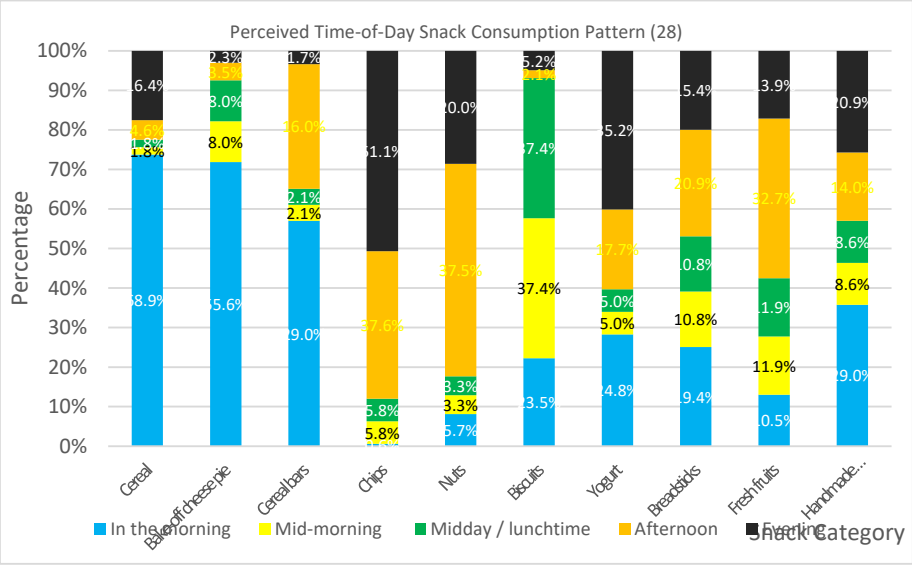

Figure 2. Perceived time-of-day consumption pattern by snack category.

3.4. Participants' Data on Perceptions and Attitudes Toward Snacks, Perceived Average Consumer Preferences, and Snack Nutritional Value

When participants were asked about the first thought that came to mind when hearing the word/term "snack", the largest proportion associated it with a prepackaged snack (40.7%), followed by a homemade snack (28.1%). Smaller percentages associated snacks with non-prepacked snacks (17.3%), nuts (11.7%), while only very limited proportions referred to fruits (1.1%) or other options (1.1%). Regarding the context in which snacks are most consumed, the majority of participants associated snack consumption with working hours (42.5%). This was followed by leisure activities, such as travelling or excursions (20.6%), and entertainment occasions, such as going to the cinema (20.0%). Lower percentages reported snack consumption before or after exercise (10.5%) or immediately after waking up (6.1%), while only 0.3% selected all the above. Perceptions of the most popular packaged snack category for the average consumer, cereal bars ranked first (22.9%), followed closely by cookies/biscuits (18.1%), breadsticks/Greek kritsini (17.9%), and chips (16.6%). Less frequently mentioned categories were nuts (8.8%), dairy products such as yogurt (6.8%), rice cakes (4.9%), and breakfast cereals (4.0%). As for non-packaged snacks, the most popular category for the average consumer was bakery cheese pie (35.4%), followed by handmade toast (30.2%), fruits/vegetables (20.6%), and bakery rusks (Greek paksimadi) (13.8%).

Regarding the perceived appropriate portion size for a snack, the highest percentage of participants stated that portion size does not matter (37.3%). Among those who selected a specific amount, 100 g was the most frequently preferred portion size (29.8%), followed by 40 g (23.5%), 150 g (6.4%), and 20 g (3.0%). Participants' perceptions of the nutritional value of different snack categories varied considerably. Nuts (31.0%) and dairy products such as yogurt (30.4%) were most frequently perceived as very nutritious snack options. In contrast, chips were predominantly considered not at all nutritious (42.3%), followed by biscuits (19.4%) and bake-off cheese pie (21.8%). Cereal bars, handmade toast/sandwich, rice cakes and breakfast cereals received more mixed evaluations, with participants tending to classify them mainly as quite or a little nutritious. These findings are presented in Figure 3.

 doi:10.20944/preprints202605.2097.v1

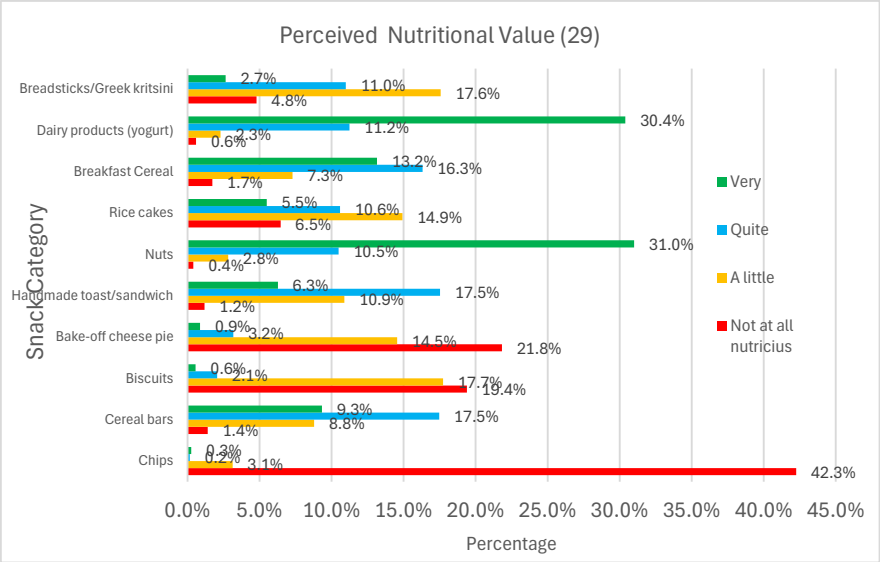

Figure 3. Perceived nutritional value of snack categories.

Participants also expressed mixed perceptions regarding the nutritional value of specific snack categories. Almost half considered a vegan snack to be healthier or more nutritious than a conventional one (49.2%), whereas 26.8% disagreed, and 24.1% stated that they did not know. In contrast, the majority believed that a gluten-free snack is not healthier than a conventional snack (58.4%), while 20.9% considered it healthier, and 20.7% were uncertain. Similarly, most participants reported that an organic snack is not safer than a conventional one (61.4%), whereas 27.4% believed that it is safer and 11.2% selected "I do not know". Finally, most respondents believed that the currently available packaged snacks can meet consumers' needs throughout the day (61.3%), while 38.7% disagreed. Regarding taste perception, the largest number of participants believed that a snack with high nutritional value has the same taste as one with lower nutritional value (44.8%). However, 28.7% believed that it had a worse taste, whereas 26.6% considered it to have a better taste (Table 4)

Table 4. Participants' snack-related perceptions and attitudes.

Participants' data	Categories	Percentage
First thought about "snacks" (14)	Prepacked snack	40.7%
	Homemade snack	28.1%
	Non-prepacked snack	17.3%
	Nuts	11.7%
	Fruits	1.1%
Activities associated with snack consumption (20)	During working hours	42.5%
	Leisure (e.g., travel, excursion)	20.6%
	Entertainment (e.g., cinema)	20.0%
	Before/after exercise or sports	10.5%
	After waking up (start of the day)	6.1%
Most Popular Packaged Snack category for average Consumer (25)	Cereal bars	22.9%
	Cookies/Biscuits	18.1%
	Breadsticks/Greek kritsini	17.9%
	Chips	16.6%
	Nuts	8.8%
	Dairy products (yogurt)	6.8%

 doi:10.20944/preprints202605.2097.v1

	Rice cakes	4.9%
	Breakfast Cereals	4.0%
Most Popular non- Packaged Snack category for average Consumer (26)	Bakery cheese pie	35.4%;
	Handmade toast	30.2%
	Fruits/vegetables	20.6%
	Bakery rusks (Greek paksimadi)	13.8%
Appropriate portion size for a snack (27)	20gr	3.0%
	40gr	23.5%
	100gr	29.8%
	150gr	6.4%
	Doesn't matter	37.3%
Vegan snack healthier/more nutritious than a conventional (30)	Yes	49,2%
	No	26.8%
	I do not know	24.1%
Gluten-free snack healthier than a conventional (31)	No	58.4%
	Yes	20.9%
	I do not know	20.7%
Organic snack safer than a Conventional (32)	No	61.4%
	Yes	27.4%
	I do not know	11.2%
Availability of packaged snacks meeting all-day needs (38)	Yes	61.3%
	No	38.7%
Taste estimation of high- vs low-nutrition value snack (40)	The same taste	44.8%
	Worse taste	28.7%
	Better taste	26.6%

3.5. Participants' Attitudes Toward Snack Packaging, Labelling, and Nutrition Claims

Participants did not consider the appearance of packaging to be the most important factor when it comes to making a purchase decision, with 55% of respondents reporting that this did not play a major role in their decision. A further 36.86% indicated that the packaging could influence their choice, and only 8.22% said it was a deciding factor. In terms of nutrition declaration, the two most selected items reported by participants were energy (36.63%) and fat (21.89%), followed by sugars (12.49%), with the remaining nutrients selected less frequently. The preferred categories of nutritional claims were fat / saturated fat content (18.2%) and the energy value (17.83%), with sugar content (13.93%) and protein content (13.27%) being selected next most frequently. When looking at the specific claims made on the packaging, the most selected claim was "No Preservatives" (31.30%), followed by "Sugar-Free / No Added Sugar" (19.46%), "Free from Palm Oil" (16.83%) and "Organic" (16.46%). Each of the other claims, "Contains mono/polyunsaturated fat" (7.69%), "Gluten Free" (5.74%), and "Suitable for Vegan" (2.65%) were selected much less frequently by participants. The most significant factor when purchasing packaged snacks is nutritional value (44.9%), with price (22.4%) as the next most significant factor. Origin of the product (10.7%), quantity (10.2%), brand name (9.3%), and packaging material (2.4%) are considered substantially less important (Table 5).

 doi:10.20944/preprints202605.2097.v1

Table 5. Participants' attitudes toward snack packaging, labelling, and nutrition claims.

Participants' data	Categories	Percentage
Packaging appearance as the main criterion for snack purchase (24)	No	55.0%
	It might influence me	36.8%
	Yes	8.2%
Primary prefered element on nutrition declaration (35)	Energy	36.6%
	Fat	21.9%
	None of the above	16.4%
	Sugars	12.5%
	Protein	6.1%
	Vitamins and minerals	3.1%
	Salt	2.8%
	Fibre	0.7%
Primary "nutrition claim" categories (36)	Fat / saturated fat content	18.2%
	Energy value	17.9%
	Sugar content	13.9%
	Protein content	13.3%
	Vitamin and trace element content	9.7%
	Low calories ("light")	9.4%
	Dietary fibre content	9.1%
	Salt content	8.7%
Preferred on-pack snack claims. (37)	« No Preservatives»	31.3%
	«Sugar-free / No added sugar»	19.5%
	« Palm oil–free »	16.8%
	« Organic »	16.5%
	«With mono/poly-unsaturated fats»	7.7%
	« Gluten-free »	5.7%
	« Suitable for vegan »	2.6%
Primary prefered purchase factor on packaged snack (43)	Nutritional value	44.9%
	Price	22.4%
	Product origin	10.7%
	Quantity	10.2%
	Brandname	9.3%
	Packaging material	2.4%

3.6. Participants' Preferences Toward Innovative and Functional Snack Products

Regarding the preference between fortified snacks and snacks containing naturally occurring nutrients at lower levels, most participants preferred the latter option (77.3%), whereas only 22.7% favored fortified snacks with higher nutrient levels. In terms of taste preference for an innovative snack, savory taste clearly predominated, being selected by 66.4% of participants, while sweet taste was preferred by 33.6%. Concerning the Greek traditional ingredients that participants considered most desirable for incorporation into innovative snacks, olive oil ranked first (18.7%), followed very closely by nuts (18.5%) and fruits (18.0%). Lower but still notable percentages were recorded for

 doi:10.20944/preprints202605.2097.v1

vegetables (10.1%), cheese (9.8%), and dairy products (9.7%). Herbal infusions/essential oils were selected, whereas aromatic plants accounted for 5.3%. Plant by-products were the least preferred ingredient category, representing only 3.5% of responses. Overall, these findings indicate that participants were more receptive to innovative snacks based on naturally nutrient-rich ingredients rather than fortified formulations, with a clear preference for savory products and for the inclusion of familiar traditional Greek ingredients, particularly olive oil, nuts, and fruits. (Table 6)

Table 6. Participants' preferences toward innovative and functional snack products.

Participants' data	Categories	Percentage
Enriched vs naturally nutrient-rich snack preference (34)	Naturally occurring nutrients (lower levels)	77.3%
	Fortified snacks (higher nutrient levels)	22.7%
Preferred taste for an innovative snack (39)	Savoury	66.4%
	Sweet	33.6%
Preferred Greek traditional ingredients (for innovative snacks) (42)	Olive oil	18.7%
	Nuts	18.5%
	Fruits	18.0%
	Vegetables	10.1%
	Cheese	9.8%
	Dairy	9.7%
	Herbal Infusions/Essential Oils	6.4%
	Aromatic plants	5.3%
	Plants by-products	3.5%

3.7. Results of the First Hypothesis (H1)

The pooled results are summarized in Table 7

Table 7. Sociodemographic and lifestyle factors associated with snack consumption and purchasing behavior.

Survey variable	Sociodemographic variables	Statistical significance
Reasons for snacking 15	Gender	Significant for limited time ($p<0.05$)
	Age	Significant for limited time and storage/portability ($p<0.05$ for both)
	Employment status	Significant for limited time and storage/portability ($p<0.01$ for both)
	Residence area	Significant for storage/portability ($p<0.05$)
Timing of snack consumption 16	Gender	Significant for morning, mid-morning, lunchtime, afternoon, and evening ($p<0.05$ to $p<0.001$)
	Age	Significant for morning, mid-morning, afternoon, and any time of the day ($p<0.05$ to $p<0.001$)
	Level of education	Significant for morning, mid-morning, evening, and any time of the day ($p<0.05$ to $p<0.01$)
	Employment status	Significant for mid-morning, afternoon, and any time of the day ($p<0.01$ to $p<0.001$)

 doi:10.20944/preprints202605.2097.v1

	Health status	Significant for mid-morning and lunchtime ($p<0.05$ to $p<0.01$)
	BMI classification	Significant for morning only ($p<0.001$)
Taste mainly associated with packaged snacks 17	Gender Age	Significant for savoury/sweet distinction ($p<0.001$)
	Level of education	Significant for savoury/sweet distinction ($p<0.05$)
Meal replacement with snacks 18	Employment status	Significant for "yes" and "no" responses ($p<0.05$)
	Health status Physical activity	Significant for "yes" and "no" responses ($p<0.001$)
Planned vs impulse snack purchase 21	Gender	Significant for weekly planning vs whenever desired ($p<0.001$)
Degree to which snack type influences choice 23	Gender Physical activity	Significant for nature/type of snack ($p<0.05$)
Most important factor affecting snack selection 33	Age Employment status BMI	Significant for taste and nutritional value ($p<0.001$)
	Education	Significant for taste and nutritional value ($p<0.01$)
	Health status	
Combined attributes of regularly consumed snacks 45	Employment status Age	Significant for taste & price, taste & nutritional value, and taste & price & nutritional value ($p<0.001$)
	Education	Significant for taste & price and taste & nutritional value ($p=0.001$)
	Health status	Significant for taste & nutritional value and taste & price ($p<0.05$)
Dietary habits and preferences 46	Gender	Significant for conventional products and Mediterranean dietary habits ($p<0.01$)
	BMI	Significant for obesity-related diet, diabetes-related diet, health-related diet, and Mediterranean dietary habits ($p<0.001$)
	Health status	Significant for Mediterranean dietary habits and diabetes/health-related dietary restrictions ($p<0.001$)

3.7.1. Sociodemographic Determinants of Snack Consumption Motivations, Patterns, and Selection Behavior

The results of the first hypothesis confirmed that there are strong associations between sociodemographic and health-related characteristics of participants, and motivations for snack consumption, patterns of snack consumption and selections of snacks. In particular, the reasons for consuming a snack, the timing of the consumption of snacks, and the flavor profile (savory vs sweet) of snacks were all greatly influenced by gender, age, educational status, employment status and BMI. There was a significant difference in the use of snacks as meal substitutes based on employment status, health status and physical activity level; selection criteria for snacks (specifically taste and nutrition value) were significantly different based on age, gender, BMI, education and health status. For instance, the different dietary habits and preferences across population subgroups were

 doi:10.20944/preprints202605.2097.v1

influenced by gender, BMI and health status. In short, there are meaningful differences in motivations to consume snacks, when snacks are consumed and selection criteria for snacks between population subgroups.

3.7.2. How Demographic Characteristics Affected Snack Purchasing Behavior and Accessibility

Demographics had an impact on snack purchasing behavior. Purchasing behavior, whether planned or impulse, was associated with gender. The extent to which snack type affected choice depended on gender, age, education level and amount of physical activity. The results indicate that both purchasing behavior and perceived access differ across demographic/lifestyle subgroups.

3.8. Results of the Second Hypothesis (H2)

The pooled results are summarized in Table 8.

Table 8. Demographic characteristics affecting questions about perceptions and attitudes toward snacks, perceived average consumer preferences, and snack's nutritional value.

Survey variable	Sociodemographic variables	Statistical significance
First thought associated with "snack" (14)	Age	Significant for homemade/handmade snack ($p<0.05$) and prepacked product ($p<0.001$)
	Gender	Significant for non-prepacked product ($p<0.01$) and nuts ($p<0.05$)
	Physical activity	Significant for homemade/handmade snack ($p<0.05$)
	BMI Health status	Significant for non-prepacked product ($p<0.001$)
	Employment status	Significant for prepacked product ($p<0.05$)
Activities most commonly associated with snack consumption (20)	Gender	Significant for recreation/excursion ($p<0.01$)
	Age	Significant for after morning wake-up, during working hours, before/after exercise, recreation, and rest/entertainment ($p<0.001$ for all)
	BMI	Significant for before/after exercise ($p<0.001$)
	Education	Significant for after morning wake-up ($p<0.05$), during working hours ($p<0.01$), recreation ($p<0.001$), and rest/entertainment ($p<0.01$)
	Employment status	Significant for after morning wake-up ($p<0.01$), during working hours ($p<0.001$), before/after exercise ($p<0.01$), recreation ($p<0.001$), and rest/entertainment ($p<0.001$)
	Health status	Significant for during working hours ($p<0.05$) and before/after exercise ($p=0.05$)
	Physical activity	Significant for before/after exercise ($p<0.001$)
Most popular packaged snack for	Gender	Significant for cereal bars ($p<0.001$), rice cakes ($p<0.05$), and fine bakery products/biscuits ($p<0.01$)

 doi:10.20944/preprints202605.2097.v1

average consumer (25)	Age	Significant for chips (p<0.001), cereal bars (p<0.05), rice cakes (p<0.05), fine bakery products/biscuits (p<0.001), nuts (p<0.01), and dairy products/yogurt (p<0.001)
	BMI	Significant for cereal bars (p<0.05)
	Physical activity	Significant for chips (p<0.05)
	Health status	Significant for nuts (p<0.01)
	Education	Significant for chips and cereals (p<0.05 for both)
	Employment status	Significant for chips (p<0.001), fine bakery products/biscuits (p<0.001), and dairy products/yogurt (p<0.05)
Most popular non-packaged snack for average consumer (26)	Gender	Significant for fresh fruits and vegetables (p<0.01)
	BMI	Significant for puff pastry products (p<0.05)
	Physical activity	Significant for handmade snack (p<0.05)
	Residence area	Significant for puff pastry products and fresh fruits/vegetables (p<0.05 for both)
	Employment status	Significant for handmade snack (p<0.05)
Appropriate portion size of a snack (27)	Gender	Significant (p<0.01)
	Age/Employment st.	Significant (p<0.05)
Perceived nutritional value of snack categories (29)	Gender	Significant for chips, cereal bars, biscuits, and puff pastries (p<0.001), nuts (p<0.01), and dairy products/yogurt (p<0.05)
	Age	Significant for puff pastries, handmade snack, nuts, and dairy products/yogurt (p<0.001), and rice cakes and bread products (p<0.05)
	BMI	Significant for puff pastries (p<0.05)
	Physical activity	Significant for handmade snack (p<0.01)
	Health status	Significant for cereal bars (p<0.01), and rice cakes and dairy products/yogurt (p<0.05)
	Residence area	Significant for handmade snack (p<0.05)
	Education	Significant for cereal bars (p<0.01), and handmade snack and nuts (p<0.001)
	Employment status	Significant for cereal bars, handmade snack, and bread products (p<0.05), puff pastries and dairy products/yogurt (p<0.001), and nuts (p<0.01)
Vegan snacks healthier / more nutritious than conventional (30)	Education	Significant (p<0.001)
	Employment status	
Gluten-free snacks healthier/more nutritious than conventional (31)	Education	Significant for yes, no, and “I do not know” responses (p=0.001)
	Employment status	
	Education	

 doi:10.20944/preprints202605.2097.v1

Organic snacks safer than conventional (32)	Employment status	Significant ($p<0.05$)
Adequacy of packaged snacks to meet all-day needs (38)	BMI	Significant across all BMI categories, from underweight to obesity class III ($p<0.05$)
Taste of high- vs low-nutritional-value snacks (40)	Area of residence	Significant across urban, semi-urban, and rural areas ($p<0.05$)

3.8.1. Sociodemographic Influences on Snack Perceptions, Perceived Popularity, and Nutritional Evaluation

The second hypothesis was supported. The mental representation of the term "snack," the activities associated with its consumption, and perceptions of the most popular packaged and non-packaged snacks all varied significantly according to gender, age, employment status, BMI, and physical activity. Perceived appropriate portion size was associated with gender, age, and employment status. The perceived nutritional value of snack categories was the most broadly differentiated domain, significantly associated with nearly all sociodemographic variables examined. Beliefs about the healthiness of vegan, gluten-free, and organic snacks differed mainly by educational level and employment status. Overall, snack perceptions are shaped by a broad combination of demographic, occupational, lifestyle, and health-related characteristics.

3.9. Results of the Third Hypothesis (H3)

The pooled results are summarized in Table 9.

Table 9. Demographic characteristics affecting questions about attitudes toward snack packaging, labelling, and nutrition-claim use.

Survey variable	Sociodemographic variables	Statistical significance
Packaging appearance influences purchase (24)	Age	Significant across age groups ($p<0.001$)
	Employment status	Significant across employment categories ($p<0.001$)
Main item examined in nutrition declaration (35)	Gender	Significant for calories/energy, fat/saturated fat, sugars, and protein ($p<0.001$)
	Age	Significant for calories/energy, fat/saturated fat, and sugars ($p<0.05$)
	Physical activity	Significant for calories/energy, fat/saturated fat, sugars, and protein ($p<0.05$)
	Education	Significant for calories/energy, fat/saturated fat, sugars, protein, and vitamins/micronutrients ($p<0.001$)

 doi:10.20944/preprints202605.2097.v1

	Residence area	Significant for calories/energy and fat/saturated fat (p<0.05)
	Employment status	Significant for calories/energy, fat/saturated fat, sugars, and protein (p<0.01)
Preferred nutrition-claim categories (36)	Gender	Significant for protein content (p<0.001) and fat/saturated fat (p<0.01)
	Age BMI Physical activity level	Significant for protein content and vitamins/minerals (p<0.05 for both)
		Significant for salt content (p<0.05) and protein content (p<0.001)
	Level of education	Significant for sugar content (p<0.01), fat/saturated fat (p<0.05), vitamins/minerals (p<0.01), and reduced calories/"light" (p<0.05)
	Employment status	Significant for sugar content and protein content (p<0.05 for both)
Preferred front-of-pack snack claims (37)	Gender	Significant for "without palm oil" (p<0.001)
	Age	Significant for "without preservatives" (p<0.05)
	Health status	Significant for "without palm oil" and "with monounsaturated/polyunsaturated fats" (p<0.05 for both)
	Physical activity	Significant for "without preservatives" and "suitable for vegan" (p<0.05 for both)
	Educational level	Significant for "without preservatives" (p<0.01) and "with monounsaturated/polyunsaturated fats" (p<0.05)
Main criterion influencing packaged snack selection (43)	Gender	Significant for price, nutritional value, product origin, and packaging material (p<0.001)
	Age	Significant for price, nutritional value, and product origin (p<0.001)
	Health status	Significant for price and nutritional value (p=0.005)
	Physical activity level	Significant for price, brand name, and nutritional value (p<0.001)
	Educational level	Significant for price and nutritional value (p<0.001)
	Employment status	Significant for price, quantity, product origin, and nutritional value (p<0.001)

3.9.1. Sociodemographic Differences in Snack Packaging and Labelling Perceptions

The third hypothesis was partially confirmed. There were very distinct variances between the different groups regarding the effect that appearance has on purchasing products based on age and employment. The specific nutrition items that were evaluated, primarily energy, fat, sugars, and protein, varied greatly based on the same demographic factors: gender, age, activity level, education level, and employment status. Gender, age, health status, level of activity, and education were also related to consumers' preferences toward specific claims and front-of-pack labelling, such as "No

 doi:10.20944/preprints202605.2097.v1

Preservatives" and "No Palm Oil." Similarly, consumers' primary criterion for selecting snacks was also significantly impacted by the same factors. However, participants primarily selected products using price, healthiness of the product, and where the product came from, as the three major attributes that impacted where consumers spent their money.

3.10. Results of the Fourth Hypothesis (H4)

The pooled results are summarized in Table 10.

Table 10. Demographic characteristics affecting questions about health-lifestyle factors and attitudes toward and acceptance of innovative/functional snacks.

Survey variable	Sociodemographic variables	Statistical significance
Preference for fortified snack products or naturally occurring nutrients in lower amounts (34)	Age Employment status	Significant for both fortified snacks and naturally occurring nutrients from raw materials ($p<0.001$)
Taste associated with a novel/innovative snack 39	Area of residence	Significant for savoury taste preference ($p<0.05$)
	Educational level	Significant for savoury taste preference ($p<0.01$)
Preferred traditional raw materials in snack ingredients 42	Gender	Significant for vegetables ($p<0.05$)
	Age	Significant for nuts ($p<0.01$) and ingredients derived from plant by-products ($p<0.05$)
	BMI	Significant for fruits ($p<0.01$) and cheese products ($p<0.05$)
	Physical activity	Significant for vegetables ($p<0.01$) and cheese products ($p<0.05$)
	Residence area	Significant for olive oil ($p<0.05$)
	Education	Significant for vegetables ($p<0.05$)
	Employment status	Significant for fruits and nuts ($p<0.05$ for both)

3.10.1. How Demographic Characteristics Affected Preference for Fortified Snacks or Naturally Occurring Nutrients in Lower Amounts

Consumption of fortified and naturally occurring sources of nutrients is significantly affected by age/employment. The other variables influencing the choice of snacks include location of residence, educational level and savory flavor preference. Furthermore the traditional method of sourcing/raw materials for new snack food is affected by the time of the year/ weather (for example: vegetables) based on gender/physical activity/education, ages/employment status (e.g., nuts), weight (BMI)/employment (fruits), physical activity (cheese) and age (e.g., olive oil) as well as by-products of plants will be influenced by the above variables. These various findings suggest that consumers' expectations for newly created snacks will vary based on each consumer's individual demographic/lifestyle characteristics.

 doi:10.20944/preprints202605.2097.v1

4. Discussion

The purpose of this research was to better understand how Greek men and women snack (i.e., their shopping habits, reasons for purchasing food products). It also attempted to learn the extent to which nutritional information has any influence on snacking nutritional behavior. The research findings indicate that no one factor drives a person's entire snacking behavior. Factors such as one's demographic background, education level, lifestyle choices, and physical well-being will all impact an individual's snacking decisions; some factors will interact with one another as opposed to working independently of one another. This confirms the assertion in the existing literature that food choices are subjective and complicated processes dependent upon both the consumer's identity and the products available [6–8,18,20].

The emergence of new understanding about what people perceive to be snacks and how they snack has recently revealed apparent differences between various demographic or socio-economic groupings of people. For most of those surveyed in this study, snacking is associated with convenience and portability, and occurs after work or leisure hours; the primary times of day when snacks are consumed by both demographic groups are between mid-morning and mid-afternoon, which is consistent with previous research showing that (across cultures) snacks have become, for adults at least, an integral part of their daily routine rather than an indulgence to consume between their three main eating occasions. The findings from the international research indicated that afternoon snacking was prevalent amongst adults in Greece [1,3,9,12]. In contrast, while these behaviors may not appear nutritionally insignificant at first glance, the different eating behaviors of the various demographic groups in the sample have been found to be directly related to actual differences in how many nutrients each group consumes and their overall diet quality [3,9,22].

One of the key variables for this data set was the age of the participant. The younger, 18-34-year-old participants were more likely to prefer the convenience of pre-packaged, convenience or more extravagant options when purchasing food than were the older participants, 35 years of age or older, who appeared to be more selective of food choices and more likely to consider health attributes associated with food choices. This finding is consistent with previous research that has also indicated younger adults tend to prefer convenience-oriented food choices, whereas older adults tend to put more thought into what they eat [10,13,15,16]. Evidence from the Greeks and the Mediterranean culture corroborates this trend; therefore, the results of this current study are most likely reflective of trends related to age and not just trends related to snacking. [10,15,16].

There were also gender differences shown in the present study. For example, women were more likely to read nutritional content on packaged foods than men and had a greater tendency to choose healthy snacks based on nutrition. Past research found similar patterns—such as women and individuals with higher education being more likely to read labels and look for food-related health information, as well as independent survey studies showing healthier eating habits and more active food decision making among women versus men. Therefore, the current data is consistent with previous studies [1,2].

An individual's level of education affects how they behave as consumers. For example, individuals with a higher level of education tend to consult nutrition labels more frequently than individuals with a lower level of education. In a general sense, these findings confirm that individuals' levels of education affect the extent to which nutrition literacy develops. Education plays an important role in providing the knowledge necessary to understand and use nutrition-related information when making food choices; however, this research has demonstrated further evidence that education serves as not only a variable representing an individual's social background, but also as one that influences the degree of practicality of the individual's knowledge-based food choices [3,4].

Nutritional claims and declarations require special consideration when dealing with packaged snacks. Labels may influence some groups of consumers more than others - females and those who have higher education used labels more than older and less educated groups, who relied on labels less often when choosing what to purchase. This finding is consistent with other studies done in

 doi:10.20944/preprints202605.2097.v1

various countries, which show that nutritional claims can have many different effects when used by consumers and that these differences depend on the presentation of the information, credibility of the information, and clarity of the information available [7,8,20]. All these factors are responsible for explaining why simply putting a label on a package is not a guarantee of making healthier choices for consumers.

Consumers prefer food products that are wholesome or natural in some way, rather than heavily fortified products or those with bold health claims. Consumers demonstrated a greater interest in snacks with naturally occurring nutrients, even if those nutrients were at lower levels than in fortified varieties of similar foods. This is consistent with research on the consumption of functional and innovative foods, where consumer acceptance depends heavily on perceptions of naturalness, familiarity and compatibility with existing eating patterns and habits [2,8,19,20,23]. The tension between health credentials and naturalness is very strong in the snack food category because the consumer's expectations include that snack foods should be healthy enough, convenient and enjoyable all at the same time [2,6].

Another aspect of this narrative is consumers' preference for savory snacks and traditional Greek ingredients. When placed alongside the other findings, it seems clear that not only are consumers simply looking for healthier foods in an abstract way, but they also desire foods that remind them of what they already enjoy and have culturally identified with. From a practical standpoint, this suggests that when developing new snack products, those that will likely resonate with consumers will be based on familiar, traditional and recognizable ingredients rather than on products that seem technical or unknown. The findings of this research support and complement work investigating how Mediterranean diet perceptions and socially embedded food behaviors can influence an individual's acceptance of new product types. Additionally, healthier snacks are typically given more favorable reception when they reflect what consumers have previously come to expect or value [16,19,23]. Therefore, one of the best ways for Greek firms to innovate in developing snacks may be to combine more nutritious credentials with taste profiles and ingredients that are already trusted by consumers.

Lifestyle characteristics were also important factors. Specifically, participants who did not have a healthy lifestyle (e.g., smokers with higher BMIs) had less desirable snacking habits than those who were physically active and had an overall better engagement with healthy food selections and nutritional information. Additionally, research (both domestically and internationally) has consistently demonstrated that dietary behaviors cluster together with other lifestyle behaviors [9,10,21]; therefore, in line with this literature, it seems as if snacking is part of a general behavioral profile rather than simply an isolated behavior.

From the standpoint of Greek Public Health, these findings contribute some valuable new evidence related to adult snacking and their relationship to nutrition awareness, as well as their use of nutrition labels in Greece as part of a limited but constantly expanding database of research on the subject. Prior studies in Greece have indicated that individuals differ with respect to both the pattern of how they snack and the quality of the food they consume based on various sociodemographic and lifestyle-related factors; therefore, this research builds upon what was previously known by focusing exclusively on snacking-related attitudes and behaviors. The community at large appears to be undergoing a transition to consuming more Western-style convenience foods compared to traditional, healthier foods and seeing a trend away from strictly consuming traditional foods. This inconsistency between community members' convenience and desire to eat more traditional, healthy and nutritionally based foods will provide interesting opportunities for public health efforts and for food manufacturers as they seek to innovate within the snack category [20–23].

Manufacturers of healthy and innovative snack foods are generally well aware of the key lessons they can learn from the research conducted to date: snack foods that are successful are those that have appealing sensory qualities (i.e., taste and texture), communicate clearly and simply, and look close enough to similar products to give consumers a feeling of familiarity rather than criticality. Just changing a product will likely not produce enough of a positive change to be successful. If people do not understand or do not trust claims made about a product's nutritional value, then this will limit

 doi:10.20944/preprints202605.2097.v1

the impact it has (both commercial and on people's behavior). Also, if a product is perceived by consumers as requiring them to sacrifice taste, naturalness, or convenience, then it is unlikely that the product will be accepted. Research supports these findings regarding both acceptance of healthy snacks and acceptance of innovation in foods [17–20,23].

For public health and nutrition policy, the results support utilizing targeted strategies instead of broad initiatives. Younger generations, as well as people with lower levels of education, generally do not use nutrition information meaningfully; however, these populations would benefit from additional support to develop their ability to read nutrition labels and interpret them in practice. While nutrition labels demonstrate great promise to be population-wide tools, they will only be effective if consumers can understand how to read them [7,8]. As a result, improving snack quality at the population level requires not only higher quality products, but also having clearer front-of-pack messaging and providing additional educational programming about nutrition [8].

There are some limitations in the present study that should be acknowledged. Because this study utilized a cross-sectional design, we cannot make causal inferences based on the relationships identified in this study; rather, the study simply reveals relationships and suggests possibilities for future studies without documenting temporal order or direction of effect. Additionally, the use of a convenience sampling methodology will restrict the extent to which results can be generalized to the larger Greek adult population. Self-reported data may also be subject to recall (memory) bias, reporting bias, or social desirability bias, particularly for body weight, healthy lifestyle and nutrition- and attitude-related behaviors. Finally, because these data reflect preferences and perceptions instead of actual behaviors or dietary consumption, researchers should be mindful when considering the implications of these results from a practical standpoint.

It would be helpful for future studies if larger, more representative sample sizes were utilized, as well as utilizing questionnaires in conjunction with actual purchase data and/or dietary assessment or experimental choice tasks. Longitudinal research designs would also be meaningful to establish whether demographic/lifestyle factors actually predict an individual's change, or if demographic/lifestyle factors are only associated with the change. In addition, more research is needed on how Greek consumers interpret and evaluate nutrition and health claims, particularly as they relate to fortified versus naturally occurring snack concepts, and on the relative importance of trust, familiarity, and perceived naturalness in relation to the acceptance of new products [8,20]. Evidence of this type would greatly aid the development of snacks that are nutritionally enhanced, but also that have an inherent degree of understandability, credibility, and cultural relevance in Greece.

5. Conclusions

In conclusion, this research indicates that how Greek adults think about, choose, and eat snacks is connected in important ways to who they are (e.g., their age, gender, education, lifestyle, and state of health). The majority of the findings are consistent with both the Greek and international studies of consumer behavior, which show that women, older adults, and consumers with higher education levels are more likely than their male, younger, and less educated peers to actively engage with nutrition information when making food choices for themselves or their families [7,10,13]. In addition to factors such as nutrient composition, consumer acceptance of healthier and/or more innovative snacks seems to depend on their level of trust in the product, familiarity with the product, naturalness of the product, and clarity of the label on the product [8,20]. Industry strategies such as Research and Development will benefit from incorporating these findings into their planning.

Author Contributions: Conceptualization, Kyriakos G. Makris; Data curation, Kyriakos G. Makris and Antonios E. Koutelidakis; Formal analysis, Kyriakos G. Makris; Investigation, Kyriakos G. Makris; Methodology, Kyriakos G. Makris; Resources, Kyriakos G. Makris; Software, Kyriakos G. Makris; Supervision, Antonios E. Koutelidakis; Validation, Kyriakos G. Makris and Antonios E. Koutelidakis; Visualization, Antonios E. Koutelidakis; Writing

 doi:10.20944/preprints202605.2097.v1

– original draft, Kyriakos G. Makris; Writing – review & editing, Antonios E. Koutelidakis. All authors have read and agreed to the published version of the manuscript.

Funding: This research did not receive funding,.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the University of the Aegean (protocol code 7505 and date of approval 20 October 2019).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data is available after demand from the corresponding author.

Acknowledgments: We would like to thank all the volunteers who participated in the study.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Hess, J.M.; Jonnalagadda, S.S.; Slavin, J.L. What Is a Snack, Why Do We Snack, and How Can We Choose Better Snacks? A Review of the Definitions of Snacking, Motivations to Snack, Contributions to Dietary Intake, and Recommendations for Improvement. Adv. Nutr. 2016, 7, 466–475.
2. Boukid, F.; Klerks, M.; Pellegrini, N.; Fogliano, V.; Sanchez-Siles, L.; Roman, S.; Vittadini, E. Current and Emerging Trends in Cereal Snack Bars: Implications for New Product Development. Int. J. Food Sci. Nutr. 2022, 73, 610–629.
3. Marangoni, F.; Martini, D.; Scaglioni, S.; Sculati, M.; Donini, L.M.; Leonardi, F.; Agostoni, C.; Castelnuovo, G.; Ferrara, N.; Ghiselli, A.; et al. Snacking in Nutrition and Health. Int. J. Food Sci. Nutr. 2019, 70, 909–923.
4. Njike, V.Y.; Smith, T.M.; Shuval, O.; Shuval, K.; Edshteyn, I.; Kalantari, V.; Yaroch, A.L. Snack Food, Satiety, and Weight. Adv. Nutr. 2016, 7, 866–878.
5. Potter, M.; Vlassopoulos, A.; Lehmann, U. Snacking Recommendations Worldwide: A Scoping Review. Adv. Nutr. 2018, 9, 86–98.
6. Schlinkert, C.; Gillebaart, M.; Benjamins, J.; Poelman, M.; de Ridder, D. The Snack That Has It All: People's Associations with Ideal Snacks. Appetite 2020, 147, 104649.
7. Sharf, M.; Sela, R.; Zentner, G.; Shoob, H.; Shai, I.; Stein-Zamir, C. Figuring Out Food Labels: Young Adults' Understanding of Nutritional Information Presented on Food Labels Is Inadequate. Public Health Nutr. 2012, 15, 407–414.
8. Iles, I.A.; Nan, X.; Verrill, L. Nutrient Content Claims: How They Impact Perceived Healthfulness of Fortified Snack Foods and the Moderating Effects of Nutrition Facts Labels. Health Commun. 2018, 33, 130–138.
9. Fotiadou, E.; Babajimopoulos, M. Snack Patterns of Greek Adults 20–50 Years of Age. J. Foodserv. 2006, 17, 197–204.
10. Georgoulis, M.; Georgousopoulou, E.N.; Chrysohoou, C.; Pitsavos, C.; Panagiotakos, D.B. Longitudinal Trends, Determinants, and Cardiometabolic Impact of Adherence to the Mediterranean Diet among Greek Adults. Foods 2022, 11, 2389.
11. Jezewska-Zychowicz, M.; Gawecki, J.; Wadolowska, L.; Czarnocińska, J.; Gałański, G.; Kollajtis-Dolowy, A.; Roszkowski, W.; Wawrzyniak, A.; Przybyłowicz, K.; Krusińska, B.; et al. Dietary Habits and Nutrition Beliefs Questionnaire and the Manual for Developing Nutritional Data; Committee of Human Nutrition, Polish Academy of Sciences: Olsztyn, Poland, 2018.
12. Cross, A.T.; Babicz, D.; Cushman, L.F. Snacking Patterns among 1,800 Adults and Children. J. Am. Diet. Assoc. 1994, 94, 1398–1403.
13. Lupi, S.; Bagordo, F.; Stefanati, A.; Grassi, T.; Piccinni, L.; Bergamini, M.; De Donno, A. Assessment of Lifestyle and Eating Habits among Undergraduate Students in Northern Italy. Ann. Ist Super. Sanita 2015, 51, 154–161.

 doi:10.20944/preprints202605.2097.v1

14. Raju, N.V.; Harinarayana, N.S. Online Survey Tools: A Case Study of Google Forms. In Proceedings of the National Conference on Scientific, Computational and Information Research Trends in Engineering, GSSS-IETW, Mysore, India, 2016.
15. Yannakoulia, M.; Karayiannis, D.; Terzidou, M.; Kokkevi, A.; Sidossis, L.S. Nutrition-Related Habits of Greek Adolescents. Eur. J. Clin. Nutr. 2004, 58, 580–586.
16. Angastinioti, E.; Zakrajsek, A.G.; Hutchins-Wiese, H. An Exploratory Study Examining Mediterranean Diet Perceptions, Eating Practices, and Food Choice of Emerging Adults from Cyprus and the United States. World Nutr. 2020, 11, 22–43.
17. Mohamad, R.; Noh, N.F.M.; Mohamad, S.S. Consumer Preferences and Purchasing Intention towards a New Healthy Snack Product. Econ. Technol. Manag. Rev. 2014, 9b, 123–132.
18. Wang, E.S.-T. Impact of Multiple Perceived Value on Consumers' Brand Preference and Purchase Intention: A Case of Snack Foods. J. Food Prod. Mark, 2010, 16, 386–397.
19. Nørgaard, M.K.; Sørensen, B.T.; Brunsø, K. A Concept Test of Novel Healthy Snacks among Adolescents: Antecedents of Preferences and Buying Intentions. Food Qual. Prefer. 2014, 33, 20–28.
20. Michel, F.; Sanchez-Siles, L.M.; Siegrist, M. Predicting How Consumers Perceive the Naturalness of Snacks: The Usefulness of a Simple Index. Food Qual. Prefer. 2021, 94, 104295.
21. Aljefree, N.M.; Shatwan, I.M.; Almoraie, N.M. Impact of the Intake of Snacks and Lifestyle Behaviours on Obesity among University Students Living in Jeddah, Saudi Arabia. Healthcare 2022, 10, 400.
22. Mitsopoulou, A.-V.; Magriplis, E.; Dimakopoulos, I.; Karageorgou, D.; Bakogianni, I.; Micha, R.; Michas, G.; Chourdakis, M.; Ntouroupi, T.; Tsaniklidou, S.-M.; et al. Association of Meal and Snack Patterns with Micronutrient Intakes among Greek Children and Adolescents: Data from the Hellenic National Nutrition and Health Survey. J. Hum. Nutr. Diet. 2019, 32, 13–22.
23. Ciurzynska, A.; Cieśluk, P.; Barwińska, M.; Marczak, W.; Ordyniak, A.; Lenart, A.; Janowicz, M. Eating Habits and Sustainable Food Production in the Development of Innovative 'Healthy' Snacks. Sustainability 2019, 11, 2800.