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# Food Literacy Assessment of a Sample of Romanian Higher Education Students

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**Abstract:** Background: Food literacy is an essential aspect of modern education, nourishing students with the knowledge and necessary skills to make informed, healthy, and sustainable food choices. Building upon the validated research conducted in Portugal concerning the nutritional knowledge level of Portuguese students, our objective was to provide a similar survey instrument to Romanian students to assess their level of food literacy. Methods: The data was collected, based on a pilot study, from 120 Romanian students who completed an online questionnaire. The questionnaire covered anthropometrics, physical activity, diet, food literacy knowledge, and behavior. Food literacy was classified into three distinct sections: literacy about healthy eating patterns, literacy about labeling and food choices, and literacy about nutritional value and composition. Results: Students who possessed the most elevated food literacy were also the ones with a high academic performance. Weight issues affected 45% of students, with a significant 12.7% having eating disorders. We found no association between food literacy, BMI, and age. Conclusions: Our pilot study could lay the foundation for similar studies for our country on a larger scale, with the aim of developing further educational curricula and community programs regarding nutrition, striving towards a healthier future.

**Keywords:** food literacy; nutrition knowledge; healthy behaviors; eating patterns; healthy eating; higher education students; food choices



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## 1. Introduction

Food literacy plays a pivotal role in promoting healthier eating habits and overall well-being [1]. Studies show that individuals with higher health and food literacy tend to make more nutritious food choices, leading to improved health outcomes and reduced risk of diet-related illnesses [2–6].

Food literacy was defined by Cullen et al. [7] as “the ability of an individual to understand food in a way that they develop a positive relationship with it, including food skills and practices across the lifespan to navigate, engage, and participate within a complex food system. It is the ability to make decisions to support the achievement of personal health and a sustainable food system considering environmental, social, economic, cultural, and political components”.

Similarly, Vidgen and Gallegos [8] stated that food literacy is “composed of a collection of inter-related knowledge, skills and behaviors required to plan, manage, select, prepare and eat food to meet needs and determine intake”.

Components of Food Literacy [8] include (Figure 1):

#### Plan and manage

- Allocating time and resources for food.
- Organizing food consumption in a manner that ensures consistent access to food sources, regardless of environmental or situational changes.
- Making food choices that are realistic and consider your resources, such as time, money, skills, and food needs (like hunger, taste, and nutrition).

#### Select

- Purchasing food from various sources and comprehend the benefits and disadvantages of each.
- Identifying the components of a food product, its origin, and the best ways to use and store it.
- Evaluating the quality of food.

#### Prepare

- Preparing a delicious meal with any ingredient you have available. This includes the ability to prepare common foods, using cooking equipment efficiently, and adapting recipes.
- Implementing basic rules for keeping food clean and handling it safely.

#### Eat

- Understanding how eating affects personal well-being.
- Self-management of nutrient intake. This involves understanding which foods are beneficial, which foods to restrict, as well as the appropriate amount and frequency of meals.
- Take your time with your dinner and socialize.

**Figure 1.** Components of Food Literacy.

An individual's eating behavior is greatly influenced by their interactions with the food system, encompassing all stages from production to consumption. In particular, the availability and accessibility to ultra-processed foods create social norms that perpetuate poor eating habits that can be challenging to change [9].

Children's healthy growth and development are linked to the nutritional habits they learn during their youth. Between the ages of 6 and 14, children acquire knowledge rapidly and are vulnerable to external influences [10]. Therefore, at this stage, parents have a considerable influence over the environments and experiences of their children [11].

Young adults, on the other hand, as they enter university, start taking responsibility for their eating habits and lifestyle. This population is more likely to develop unhealthy eating patterns and nutritional deficiencies, such as: failure to adhere to the meal schedule, skipping breakfast, and consuming a decreased quantity of fruits, vegetables, and whole grains, the latter being associated with a high intake of fast-food products [12]. It was found that these deficient eating habits are most commonly accompanied by sedentarism, inadequate time management, and increased stress levels [13]. The environment may play a significant role in the development of these behaviors due to the continuously increasing number of fast-food chains, cafes, and restaurants that are providing students with dining options while reducing the consumption of home-cooked meals. These eating patterns, which develop throughout this specific life phase, are subject to persisting into adulthood [14].

In Romania, several studies [6,15–19] were conducted on food literacy among the general population, though on a smaller scale. The main nutritional risk factors observed among modern consumers included low intake of nutritious foods such as whole grains, vegetables, fruits, nuts, and seeds and an excessive intake of fats, sweets, red meat, and sodium. Since the fall of the communist regime, Romanians have also adopted the Western diet pattern [15]. According to Bilbiie et al. [16], the age group that is consuming the most fast-food products is represented by young adults (18 to 24 years old), affordability and accessibility being some of the variables that are generally influencing their decision to eat this type of food.

Nutrition education has been related to positive changes in eating habits and improved health status, particularly in noncommunicable diseases like type 2 diabetes and cardiovascular disease [20–23]. Therefore, food literacy initiatives, such as implementing

nutrition courses held by registered dietitians, as well as culinary classes or workshops, into high school and university curricula and ensuring easy access to a canteen or cafeteria, may effectively reduce the risk of developing unhealthy eating habits and minimize the detrimental environmental impact associated with food consumption.

In Romania, risk factors associated with damaging behavior, such as smoking, alcohol overindulgence, and overeating, contributes to almost 50% of all fatalities. Among Romanian adults, one in five people smokes daily; the smoker rate is gender-influenced, with men smokers accounting for up to 32% of the male population, while women smokers amount to a mere 8% of the female population. Although adult obesity rates in the EU are among the lowest at 10%, childhood obesity and overweight rates have risen to 15% in the past ten years. Alcohol use poses a serious risk to public health, with binge-drinking rates of 35% significantly higher than the 20% norm for the EU. This rate exceeds 50% in men [24].

Given the lack of studies on food literacy among Romanian university students, our main aim was to assess the level of food literacy in this category and to create/deliver a pilot study for future research in order to facilitate the development of tailored intervention programs to improve healthy eating behaviors in university students.

## 2. Materials and Methods

### 2.1. Research Questions

Starting with the hypothesis that nutritional knowledge is affected by numerous factors such as age, gender, level of education, and socioeconomic status [25–27], this study was designed primarily around three research questions, which are as follows:

RQ1: What is the level of food literacy among Romanian students?

RQ2: Is there a link between academic variables and food literacy among university students?

RQ3: Is there a link between food literacy and variables such as age, gender, BMI, or lifestyle choices (e.g., smoking, alcohol consumption)?

### 2.2. Validated Instrument

The questionnaire used as a foundation was derived from the study conducted in Portugal on the food literacy scale, led by Guine et al. [28]. This validated questionnaire was translated by an authorized translator with the authors' consent, and it encompassed anthropometric data, activity level, dietary patterns, knowledge, attitudes, and behaviors associated with food literacy. Food literacy had 25 items and was classified into three distinct sections: literacy about healthy eating patterns, literacy about labeling and food choices, and literacy about nutritional value and composition.

### 2.3. Data Collection

Information was gathered via a questionnaire from adult participants who willingly agreed to take part in the study, after receiving details about its objectives and conditions via a questionnaire. The invitations were distributed via email and social media. Between July and October 2023, students voluntarily filled out the online survey. This study respected the Declaration of Helsinki. To ensure confidentiality, all data were collected and handled anonymously.

Inclusion criteria of the participants:

- enrollment in a Romanian university as a student;
- voluntary participation in the survey;
- possession of a device with internet access.

Data were collected from the electronic database created using the online platform Google Forms. Subsequently, the data were analyzed using Excel 2019 version and SPSS software version 20. Non-normally distributed variables are represented by the median (interquartile range), standard deviation, or mean. The Student's *t*-test was used to compare the means between two groups, the Pearson test for correlations, and the ANOVA test for

comparing the means of a quantitative variable. A two-tailed test was used for testing the null hypotheses.

Statistical significance was determined as a  $p$ -value less than 0.05.

### 3. Results

#### 3.1. Sample Characteristics

Our sample included a total of 120 students from ten different universities in western, central, and eastern Romania, students who voluntarily filled out the online questionnaire, which was distributed via email and social media.

The sample was predominantly represented by women, 78.3% (no. = 94), while the male gender accounted for a mere 21.7% (no. = 26) of the group.

The average age of the students who enrolled in the study was 25 years old, with a minimum age of 19 years old and a maximum age of 48 years old. The majority of the students were between 19 to 25 years old.

The following describes the distribution of the cohort across the ten universities:

“Grigore T. Popa” University of Medicine and Pharmacy in Iasi (no. = 42), “Alexandru Ioan Cuza” University in Iasi (no. = 19), University of Agricultural Science and Veterinary Medicine “Ion Ionescu de la Brad” in Iasi (no. = 3), National University of Arts “George Enescu” in Iasi (no. = 2), Technical University “Gheorghe Asachi” in Iasi (no. = 2), “Stefan cel Mare” University in Suceava (no. = 13), “George Emil Palade” University of Medicine, Pharmacy, Science and Technology of Targu Mures (no. = 35), “Carol Davila” University of Medicine and Pharmacy Bucharest (no. = 2), The Academy of Economic Studies Bucharest (no. = 1), Victor Babes University of Medicine and Pharmacy in Timisoara (no. = 1).

As for the higher education profile, the fields of specialization in our sample included: Nutrition and Dietetics (no. = 38), General Medicine (no. = 18), General Medical Assistance (no. = 10), General Pharmacy (no. = 9), Dental Medicine (no. = 1), Dental Technical (no. = 1), Diabetes, Nutrition, and Metabolic Disease (no. = 2), Gastroenterology (no. = 1), Medical Bioengineering—balneology, physical therapy, and rehabilitation (no. = 12), Psychology (no. = 2), Veterinary Medicine (no. = 3), Law (no. = 1), Marketing (no. = 5), International Relations and European Studies (no. = 2), Communication and Public Relations (no. = 1), International Business and Economics (no. = 2), Accounting and Business Information Systems (no. = 1), Economics and Business Law (no. = 1), Computer Science (no. = 1), Geography (no. = 3), Geodesy (no. = 1), Mechanical Engineering (no. = 1), Music Composition (no. = 2), Language and Literature (no. = 1).

Considering the course type, the majority of the participants (73.3%) were enrolled in bachelor’s degree programs, while 18.3% were pursuing master’s degrees; 6.7% were completing medical residencies, and a mere 0.8% were pursuing doctoral programs.

According to our analysis of academic performance, 11.66% of the sample perceived their academic performance as excellent, while nearly half, meaning 43.33%, perceived it as very good. Additionally, 34.16% of the participants viewed their academic performance as good. Conversely, 10.83% of the sample considered their academic performance to be reasonable. Academic performance based on gender is shown in Table 1.

**Table 1.** Academic performance based on gender.

Variable	Group	Female		Male		Total	
		78.3%	No. = 94	21.7%	No. = 26	100%	No. = 120
Academic performance	Excellent	10.8%	13	0.83%	1	11.66%	14
	Very good	35.8%	43	7.5%	9	43.33%	52
	Good	26.6%	32	7.5%	9	34.16%	41
	Reasonable	5%	6	5.83%	7	10.83%	13

### 3.2. Body Weight and Eating Habits

Concerning body weight, the body mass index (BMI) varied between 16.65 and 48.42 kg/m<sup>2</sup>. In our sample, 24.36% of the students were overweight, with a BMI above 24.9 kg/m<sup>2</sup>.

Close to half (no. = 54) of the students reported having weight issues, of which 15 suffered from eating disorders. Among these eating disorders, bulimia (no. = 3), anorexia (no. = 1), and binge eating (no. = 5) were most frequent.

In terms of meal planning, a significant 63.4% of students failed to have three main meals per day. Regarding the time dedicated to meal preparation, 76.3% of the students reported that they consume home-cooked meals, while 15.1% prefer to order food; 7.5% choose fast food; and 1.1% prefer ready-to-eat meals.

When analyzing the preferred specialists for nutrition education and counseling, we noticed that 44.2% of the sample would be willing to consult a dietitian; 26.7% would opt for a diabetes, nutrition, and metabolic diseases doctor; 15% would choose a specialist doctor; 11.7% would approach a general practitioner; 1.7% would seek advice on the internet; and 0.8% would consult a pharmacist.

### 3.3. Lifestyle—Physical Activity, Tobacco Use, and Alcohol Consumption

Regarding physical activity, our findings showed that 10% of the students classify themselves as highly active, 60.8% as moderately active, and 28.3% as inactive.

When asked if they ever smoked tobacco, nearly half of the students, 48.3% specifically, responded that they had never smoked. However, 35% of the students reported that they are currently smoking, while 16.7% have ceased.

Concerning alcohol consumption within the past year, we observed that a significant proportion of the sample (84.2%) responded affirmatively, with 15% of them consuming three or more alcoholic beverages weekly, whereas a minority of 5.8% stated that they had never consumed alcohol.

The gender distribution between smoking and alcohol consumption is shown in Table 2.

**Table 2.** Tobacco use and alcohol consumption based on gender.

Variables		Female		Male		Total	
		78.3%	No. = 94	21.7%	No. = 26	100%	No. = 120
Tobacco use	I currently smoke	23.33%	28	11.66%	14	35%	42
	I used to smoke, but I stopped	13.33%	17	2.5%	3	16.7%	20
	I never smoked	40.8%	49	7.5%	9	48.3%	58
Alcohol consumption	Yes	64.16%	77	20%	24	84.2%	101
	No	9.17%	11	0.83%	1	10%	12
	Never consumed	5%	6	0.83%	1	5.8%	7

### 3.4. Food Literacy

Based on the food literacy scale used by Guine et al. [28,29], we divided food literacy in three sections: (a) literacy about food nutritional value and composition; (b) literacy about labeling and food choice; (c) literacy about healthy eating practices, presented in detail in Supplementary Materials. There were 25 items used to measure food literacy. Each item was scored on a four-point scale (1—very difficult, 2—difficult, 3—easy, and 4—very easy).

Additionally, we were interested in determining whether variables such as gender (Table 3(a,b)), age (Table 4), body mass index (Table 5), academic performance (Table 6), or consumption of alcohol, drugs, or tobacco (Table 7) were associated with food literacy within our sample, using null hypothesis testing. This is the hypothesis that states that there is no significant association or difference between the studied groups. In addition, we

aimed to determine whether there are any differences between medical and non-medical students regarding food literacy (Table 8).

**Table 3.** (a) Level of food literacy according to gender. (b) Relationship between food literacy sections and gender.

(a)						
Variable	Gender	Food Literacy Level			Chi-Square Test	
		Low	Medium	High	Stat.	<i>p</i>
Sex	Female	21 (17.5%)	56 (46.6%)	17 (14.16%)	1.781	0.185
	Male	11 (9.16%)	13 (10.83%)	2 (1.66%)		
	Total	32 (26.66%)	69 (57.5%)	19 (15.83%)		
(b)						
Food Literacy		Gender			ANOVA	
		Male (No. = 26)	Female (No. = 94)	Total (No. = 120)		
		M ± SD	M ± SD	M ± SD	F	<i>p</i>
Literacy about healthy eating practices		3.19 ± 0.71	3.42 ± 0.53	3.37 ± 0.58	3.12	0.08
Literacy about food nutritional value and composition		3.06 ± 0.71	3.55 ± 0.57	3.44 ± 0.63	12.92	0.00
Literacy about labelling and food choice		2.99 ± 0.70	3.41 ± 0.68	3.32 ± 0.70	7.76	0.006

Legend: stat—statistics; *p*—significance ( $p < 0.05$ ). No.—number; M—mean value; SD—standard deviation; F—test statistic.

**Table 4.** Association between food literacy and age.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-Sided)
Pearson Chi-Square	1584.818 <sup>a</sup>	1540	0.208
Likelihood Ratio	453.817	1540	1.000
Linear-by-Linear Association	1.582	1	0.209
N of Valid Cases	120		

<sup>a</sup> 1633 cells (100.0%) have an expected count less than 5. The minimum expected count is 0.01. df = degrees of freedom.

**Table 5.** Association between food literacy and BMI (Body Mass Index).

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-Sided)
Pearson Chi-Square	7359.211 <sup>a</sup>	7420	0.690
Likelihood Ratio	846.854	7420	1.000
Linear-by-Linear Association	0.085	1	0.771
N of Valid Cases	120		

<sup>a</sup> 7597 cells (100.0%) have an expected count of less than 5. The minimum expected count is 0.01; df = degrees of freedom.

**Table 6.** Relationship between food literacy and academic performance.

Academic Performance	Food Literacy Level			Chi-Square Test	
	Low	Medium	High	Stat.	<i>p</i>
Poor (No. = 0)	-	-	-	196.77	0.735
Reasonable (No. = 13)	7	3	3		
Good (No. = 41)	16	21	4		
Very good (No. = 52)	8	35	9		
Excellent (No. = 14)	1	10	3		
Total (No. = 120)	32	69	19		

Legend: No.—number; stat—statistics; *p*—significance ( $p < 0.05$ ).



**Table 7.** Association between food literacy, smoking, drugs, and alcohol consumption.

a. Group Statistics					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Tobacco	M	26	3.1308	0.80388	0.15765
	F	94	3.5527	0.50664	0.05226
Alcohol	M	26	3.1462	0.82473	0.16174
	F	94	3.6447	0.48827	0.05036
Drugs	M	26	3.2154	0.83316	0.16340
	F	94	3.7298	0.49139	0.05068
b. Independent Samples Test					
t-Test for Equality of Means					
	t	df	p-Value	Mean Difference	Std. Error Difference
Tobacco	−2.540	30.696	0.016	−0.42189	0.16609
Alcohol	−2.943	30.007	0.006	−0.49853	0.16940
Drugs	−3.007	29.968	0.005	−0.51440	0.17108

**Table 8.** Relationship between food literacy sections and fields of specialization.

Food Literacy	Fields of Specialization			ANOVA	
	Medical (No. = 94)	Non-Medical (No. = 26)	Total (No. = 120)	F	p
	M ± SD	M ± SD	M ± SD		
Literacy about healthy eating practices	3.40 ± 0.54	3.22 ± 0.72	3.37 ± 0.58	0.90	0.344
Literacy about food nutritional value and composition	3.50 ± 0.57	3.27 ± 0.83	3.44 ± 0.63	2.54	0.113
Literacy about labelling and food choice	3.39 ± 0.63	3.11 ± 0.93	3.32 ± 0.70	3.03	0.084

Legend: No.—number; M—mean value; SD—standard deviation; F—test statistic; *p*—significance ( $p < 0.05$ ).

We defined the level of food literacy as low, medium, and high based on the score for each student. In our sample, 57.5% of the students have a medium food literacy, with 46.6% female and 10.83% male. The level of food literacy according to gender is presented in Table 3(a).

According to the results, women have the highest level of food literacy, compared to men; however, due to their prevalence, the findings cannot be taken as conclusive. The relationship between food literacy sections and gender is shown in Table 3(b).

Since the value  $p = 0.208$  is higher than the chosen level of significance ( $\alpha = 0.05$ ), we do not reject the null hypothesis. Rather, we conclude that there is insufficient evidence to suggest an association between age and food literacy.

Since the  $p$ -value = 0.690 and is greater than the chosen significance level ( $\alpha = 0.05$ ), we do not reject the null hypothesis. Considering this, we conclude that the evidence is insufficient to support a correlation between body mass index (BMI) and food literacy.

Given that all  $p$  values are equal to 0.05 or higher, there is no significant correlation between food literacy and the students' self-reported academic performance. However, it is feasible to deduce that the students who achieved a very good academic performance are the ones with the highest food literacy.

There are significant differences between both genders when it comes to knowledge concerning the consumption of tobacco, alcohol, and drugs, 0.5%  $p$ -value in all instances, with females being more informed.

According to the results, medical students have the highest level of food literacy; however, due to their prevalence in the sample, the finding cannot be taken as conclusive.



#### 4. Discussion

Food literacy is a fundamental skill set that helps individuals to make informed and healthy choices about food. By fostering a deeper understanding of nutrition, culinary skills, sustainability, and critical thinking, food literacy initiatives contribute to healthier individuals and communities.

This study aimed to evaluate food literacy among Romanian higher education students to serve as a pilot study in order to create tailored nutrition programs, to improve healthy eating behaviors in university students.

In the present study, food literacy was defined as low, medium, and high and was assessed based on three distinct sections: literacy about healthy eating patterns, literacy about labelling and food choices, and literacy about nutritional value and composition.

In our sample, 57.5% of the students have a medium/moderate food literacy, with 46.6% female and 10.83% male.

Our study revealed similar results to those observed among students in Portugal [29], where the majority of the students, mostly women, had a moderate level of literacy. Additionally, the participants of both studies were predominantly non-smokers who consumed alcohol regularly. Since 2016, Romania has adopted similar national policies to those of Portugal concerning smoking in enclosed public spaces, including open areas in close proximity to educational institutions or facilities.

When it comes to tobacco use and alcohol consumption, our study observed significant differences between both genders, women being more informed than men. Although most of the students included in our study were non-smokers, the prevalence of alcohol consumption was relatively high. This may be due to students' increased social behavior, which often leads them to frequent partying [30].

Despite the fact that the majority of our sample declared themselves as moderately active, which could be considered as positive, since insufficient physical activity was associated with a higher BMI among Romanian students [31], nearly half of the students reported having weight issues, with 24.36% of the sample being overweight or obese. Several studies conducted on Romanian university students showed similar results [31,32].

Changes in body weight are a prevalent concern among college students [33]. The fact that some of them leave home and must adapt to a new environment, the stress caused by change and exams, and a disorganized diet all lead to inappropriate food choices and consequently to weight gain [34–40]. In our study, more than half of the students, 63.4% specifically, fail to have three main meals per day, and their preferences for ordered food (15.1%), fast food (7.5%), and ready-to-eat meals (1.1%) could derive from lack of knowledge, time, skills, or environmental conditions. Research by Lee et al. [41] revealed that lack of time as well as the influence of companions and costs were among the main causes that led to students eating out more frequently. In contrast, we found no significant correlation between BMI, skipping meals, and the type of food consumed.

Compared to Palumbo et al. [3], who found an association between BMI and low food literacy, our study did not have sufficient evidence to support a correlation between this variable and food literacy. However, the findings regarding eating disorders among students were consistent with several previous research studies [12,38,42], indicating that women were more likely to experience binge-eating, bulimia, or anorexia. Additional research [43,44] revealed that students—especially women and nutrition science students—frequently engage in emotional eating behaviors.

Young adults who possess adequate food literacy, as well as a higher awareness of the impact of poor nutrition, may be motivated to adopt more sustainable and conscientious dietary practices. By doing so, they may be able to recognize the early signs of eating disorders, as well as other conditions, and be more receptive to seeking professional assistance in order to manage the current situation effectively and navigate these difficult phases successfully. Consulting with a certified dietician can motivate individuals to embrace a healthy lifestyle and reach weight loss in a health-conscious manner, particularly

when faced with weight-related issues. Unfortunately, in Romania, insurance companies do not currently cover the cost of nutrition consultations.

However, if health policies were established in partnership with the Ministry of Education to incorporate nutrition classes into the curriculum, students would have access to reliable and authorized information to assist them in making informed food choices.

In regard to the differences between the fields of specialization, we found that medical students had a higher level of food literacy than non-medical students. Students who pursue careers in the medical field may be more conscious of healthy eating, and they may also find it simpler to search, find, and comprehend information related to wellbeing. However, our finding cannot be considered conclusive due to the preponderance of medical students in the sample. Another finding in our study showed that students with better food literacy tended to perform better academically. The connection between food literacy and academic performance could be attributed to the impact of nutrition on cognitive function.

Adequate nutrition is crucial for brain development and function, and students with a better understanding of food choices may be more likely to nourish their bodies in a way that positively influences cognitive abilities. Therefore, incorporating nutrition education into the curriculum may contribute not only to students' physical well-being but also to their cognitive development and academic achievement.

In what concerns the first section—literacy about healthy eating patterns, irrespective of socio-economic demographic background, it is essential for each individual to possess the necessary tools in order to make sustainable and mindful decisions regarding food. Childhood is a critical time for establishing healthy eating habits, and parents have the responsibility to create an environment that supports their children's healthy development. When it comes to learning how to obtain pleasure from healthy eating and sustainable foods, one of the most important strategies is repeated exposure [45,46].

An individual's food literacy may be influenced by the barriers they encounter. Truman et al. [1] identified different types of barriers related to knowledge (lack of information), attitudes (lack of interest), skills (lack of application skills), resources (lack of time), and environmental conditions (context-specific limitations of home, school, food-choice environment, and social norms). According to a different survey [47], university students face four barriers: their physical environment, the university lifestyle, personal considerations, and self-confidence.

Unfortunately, our study did not evaluate the barriers encountered by students included in our sample when it comes to nutritional knowledge. However, we intend to incorporate this subject into future research. As for the healthy eating practices, our sample had a moderate level of food literacy. This means that it is relatively easy for them to find and understand information about different diets (e.g., a low-calorie diet, vegetarian diet, gluten-free diet) and healthy eating practices on the internet or on the official Romanian website of the Ministry of Health. While possessing an in-depth understanding of nutrition does not guarantee that young adults will implement that knowledge effectively in their daily lives, it could encourage them to make more sustainable and conscientious dietary decisions. They could discern and evaluate information obtained from different websites and utilize that knowledge to support their dietary choices.

With respect to the second section—literacy about labelling and food choices, in Romania, most of the products have the nutritional score displayed on the shelf or on the food labelling, making it easier for the consumers to find the healthier choice. There are also online apps where they can verify this score. Despite this, our sample had the lowest level of food literacy when it came to labelling and food choices, making it challenging for them to comprehend and implement concepts like the Mediterranean diet, portion sizes, nutritional traffic light, and how to read food labels. Comparing the adherence of Spanish and Romanian students to the Mediterranean diet, one study found that Romanian students consumed more processed foods (such as sweets and fried foods), pasta, and rice, meaning that they were less committed to the Mediterranean diet than their Spanish counterparts [48].

Research has shown that pleasure-oriented advertising can effectively influence dietary choices, especially in those with less nutritious diets [49]. Another study showed that students are strongly influenced by food advertisement, making more unhealthy food choices, such as frequent intakes of sugar-sweetened beverages and high fat pastries [50].

Nutrition courses, culinary art programs, or curricula centered upon food literacy could be used to fight food insecurity and promote food literacy. According to an Appalachian State University research study, students who participated in a food literacy-based curriculum showed an increase in their confidence in their ability to read food labels, plan meals, prepare balanced meals, and cook with basic or raw items [51].

Regarding nutritional value and composition, we found that students had the highest level of food literacy. This means that they are aware of the food pyramid, the differences between complex and simple carbohydrates, healthy and unhealthy fats, the appropriate intake of protein, or water intake. The Romanian food pyramid is divided into seven food groups. Physical activity and water intake are foundational components, followed by grains and other cereals, vegetables, fruits, dairy products, meat and fish, saturated fats, and concentrated sweets [52].

The results of this research paper showed no correlation between food literacy and BMI or age.

#### *Strengths and Limitations*

This research paper's strength is its unique focus on food literacy among students in Romania. It serves as a pilot study for the development of future studies on this topic and on a larger scale. Also, it is a starting point for future research on comparing food literacy among students from different specializations.

Firstly, the main limitation of our study is the small number of students recruited, so therefore the results cannot be generalized for the entire student population in Romania. Our pilot study could lay the foundation for similar studies for our country on a larger scale, with the aim of developing further educational curricula and community programs regarding nutrition striving towards a healthier future.

Secondly, since the questionnaire was completed online, the responses relied on students' self-reported evaluations. Some participants might have offered answers they perceived as correct rather than their genuine responses. Uncertainties persist regarding the students' accuracy in providing anthropometric measurements (weight and height) and their adherence to the instructions, potentially leading to difficulties in comprehending the questions.

Thirdly, there is a noticeable difference in the group sizes when it comes to certain variables, such as the percentage of males included in the study or the distribution between medical and non-medical specialties.

#### **5. Conclusions**

The current study showed a moderate level of food literacy among our sample of Romanian higher education students.

Incorporating food literacy into educational curricula and community programs is essential for shaping a generation that values and practices food literacy for a healthier future; therefore, this study can serve as a foundation for the development of such initiatives.

We consider that proper and regulated information, projects, and community interventions, as well as programs that will include more of the teenagers themselves in community interventions for healthy lifestyle and nutrition, and adequate online programs and applications that will involve more the connection between experts and teenagers, could induce a change in their lifestyle and reduce the burden of risky behaviors and environmental impact. Correct information, adequate programs, new and updated protocols, and proper communication with teenagers focused on their problems, knowledge, and practices could be the keywords for good outcomes.

**Supplementary Materials:** The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su16031034/s1>.

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**Data Availability Statement:** Data are available upon request from the authors.

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## References

1. Truman, E.; Elliott, C. Barriers to Food Literacy: A Conceptual Model to Explore Factors Inhibiting Proficiency. *J. Nutr. Educ. Behav.* **2018**, *51*, 107–111. [\[CrossRef\]](#)
2. Palumbo, R.; Annarumma, C.; Adinolfi, P.; Musella, M.; Piscopo, G. The Italian Health Literacy Project: Insights from the assessment of health literacy skills in Italy. *Health Policy* **2016**, *120*, 1087–1094. [\[CrossRef\]](#)
3. Palumbo, R.; Adinolfi, P.; Annarumma, C.; Catinello, G.; Tonelli, M.; Troiano, E.; Vezzosi, S.; Manna, R. Unravelling the food literacy puzzle: Evidence from Italy. *Food Policy* **2019**, *83*, 104–115. [\[CrossRef\]](#)
4. Gibbs, H.D.; Ellerbeck, E.F.; Gajewski, B.; Zhang, C.; Sullivan, D.K. The Nutrition Literacy Assessment Instrument is a Valid and Reliable Measure of Nutrition Literacy in Adults with Chronic Disease. *J. Nutr. Educ. Behav.* **2018**, *50*, 247–257.e1. [\[CrossRef\]](#)
5. Nutbeam, D. Health literacy as a public health goal: A challenge for contemporary health education and communication strategies into the 21st century. *Health Promot. Int.* **2000**, *15*, 259–267. [\[CrossRef\]](#)
6. Bacărea, A.; Bacărea, V.; Cîmpeanu, C.; Teodorescu, C.; Seni, A.; Guiné, R.; Tarcea, M. Demographic, Anthropometric and Food Behavior Data towards Healthy Eating in Romania. *Foods* **2021**, *10*, 487. [\[CrossRef\]](#)
7. Cullen, T.; Hatch, J.; Martin, W.; Higgins, J.W.; Sheppard, R. Food Literacy: Definition and Framework for Action. *Can. J. Diet. Pract. Res.* **2015**, *76*, 140–145. [\[CrossRef\]](#)
8. Vidgen, H.A.; Gallegos, D. Defining food literacy and its components. *Appetite* **2014**, *76*, 50–59. [\[CrossRef\]](#)
9. Ares, G.; De Rosso, S.; Mueller, C.; Philippe, K.; Pickard, A.; Nicklaus, S.; van Kleef, E.; Varela, P. Development of food literacy in children and adolescents: Implications for the design of strategies to promote healthier and more sustainable diets. *Nutr. Rev.* **2023**, *4*, 111–113. [\[CrossRef\]](#)
10. Mukhamedzhanov, E.; Tsitsurin, V.; Zhakiyanova, Z.; Akhmetova, B.; Tarjibayeva, S. The Effect of Nutrition Education on Nutritional Behavior, Academic and Sports Achievement and Attitudes. *Int. J. Educ. Math. Sci. Technol.* **2023**, *11*, 358–374. [\[CrossRef\]](#)
11. Scaglioni, S.; Arrizza, C.; Vecchi, F.; Tedeschi, S. Determinants of children's eating behavior. *Am. J. Clin. Nutr.* **2011**, *94* (Suppl. S6), S2006–S2011. [\[CrossRef\]](#)
12. Iorga, M.; Manole, I.; Pop, L.; Muraru, I.-D.; Petrariu, F.-D. Eating Disorders in Relationship with Dietary Habits among Pharmacy Students in Romania. *Pharmacy* **2018**, *6*, 97. [\[CrossRef\]](#)
13. Hill, D.; Conner, M.; Clancy, F.; Moss, R.; Wilding, S.; Bristow, M.; O'Connor, D.B. Stress and eating behaviours in healthy adults: A systematic review and meta-analysis. *Health Psychol. Rev.* **2021**, *16*, 280–304. [\[CrossRef\]](#)
14. Yun, T.C.; Ahmad, S.R.; Quee, D.K.S. Dietary Habits and Lifestyle Practices among University Students in Universiti Brunei Darussalam. *Malays. J. Med. Sci.* **2018**, *25*, 56–66. [\[CrossRef\]](#)
15. Voinea, L.; Vrâncănu, D.M.; Filip, A.; Popescu, D.V.; Negrea, T.M.; Dina, R. Research on Food Behavior in Romania from the Perspective of Supporting Healthy Eating Habits. *Sustainability* **2019**, *11*, 5255. [\[CrossRef\]](#)
16. Bilbîie, A.; Drucă, E.; Dumitrescu, R.; Aducovschi, D.; Sakizlian, R.; Sakizlian, M. Determinants of Fast-Food Consumption in Romania: An Application of the Theory of Planned Behavior. *Foods* **2021**, *10*, 1877. [\[CrossRef\]](#)
17. Georgescu, M.; Tarcea, M.; Hadmaș, R.; Seni, G.; Teodorescu, C.; Szazs, S.; Guine, R.; Abram, Z. Romanian Population Perception about Food Risk Behavior Starting from their Social and Cultural Profile. *Bull. Univ. Agric. Sci. Veter. Med. Cluj-Napoca Food Sci. Technol.* **2020**, *77*, 10–16. [\[CrossRef\]](#)



18. Coman, M.A.; Forray, A.I.; Broucke, S.V.D.; Chereches, R.M. Measuring Health Literacy in Romania: Validation of the HLS-EU-Q16 Survey Questionnaire. *Int. J. Public Health* **2022**, *67*, 1661–8564. [\[CrossRef\]](#)
19. Forray, A.I.; Coman, M.A.; Chereches, R.M.; Borzan, C.M. Exploring the Impact of Sociodemographic Characteristics and Health Literacy on Adherence to Dietary Recommendations and Food Literacy. *Nutrients* **2023**, *15*, 2853. [\[CrossRef\]](#)
20. Stotz, S.A.; Moore, K.R.; McNulty, M.; Begay, K.; Scarton, L.; Jiang, L.; Adedoyin, I.; Brega, A.G. Evaluation of a Synchronous, Online Diabetes Nutrition Education Program for American Indians and Alaska Natives with Type 2 Diabetes: Facilitators and Participants' Experiences. *J. Nutr. Educ. Behav.* **2023**, *55*, 114–124. [\[CrossRef\]](#)
21. Chaib, A.; Zarrouq, B.; Ragala, M.E.A.; Lyoussi, B.; Giesy, J.P.; Aboul-Soud, M.A.; Halim, K. Effects of nutrition education on Metabolic profiles of patients with type 2 diabetes mellitus to improve glycated hemoglobin and body mass index. *J. King Saud Univ. Sci.* **2023**, *35*, 102437. [\[CrossRef\]](#)
22. Vargas, E.J.; Zelis, R. Integrating nutrition education into the cardiovascular curriculum changes eating habits of second-year medical students. *J. Clin. Lipidol.* **2014**, *8*, 199–205. [\[CrossRef\]](#)
23. Pace, R.; Eaves, D.; Dawkins, N.; Bovell-Benjamin, A.; Huang, Z.; Phillips, B.; Oh, J.-H.; Bromfield, E.; Sohail, S. Nutrition Awareness, Education and Action to Reduce Cardiovascular Disease. *J. Nutr. Educ. Behav.* **2009**, *41*, S44. [\[CrossRef\]](#)
24. The Organisation for Economic Co-Operation and Development. Romania: Country Health Profile 2019 | En | OECD. Available online: <https://www.oecd.org/publications/romania-country-health-profile-2019-f345b1db-en.htm> (accessed on 1 December 2023).
25. Hendrie, G.A.; Cox, D.N.; Coveney, J. Validation of the General Nutrition Knowledge Questionnaire in an Australian community sample. *Nutr. Diet.* **2008**, *65*, 72–77. [\[CrossRef\]](#)
26. Parmenter, K.; Waller, J.; Wardle, J. Demographic variation in nutrition knowledge in England. *Health Educ. Res.* **2000**, *15*, 163–174. [\[CrossRef\]](#)
27. Spronk, I.; Kullen, C.; Burdon, C.; O'Connor, H. Relationship between nutrition knowledge and dietary intake. *Br. J. Nutr.* **2014**, *111*, 1713–1726. [\[CrossRef\]](#)
28. Guiné, R.P.F.; Florença, S.G.; Aparício, G.; Cardoso, A.P.; Ferreira, M. Food Literacy Scale: Validation through Exploratory and Confirmatory Factor Analysis in a Sample of Portuguese University Students. *Nutrients* **2022**, *15*, 166. [\[CrossRef\]](#)
29. Guiné, R.P.F.; Florença, S.G.; Aparício, M.G.; Cardoso, A.P.; Ferreira, M. Food Knowledge for Better Nutrition and Health: A Study among University Students in Portugal. *Healthcare* **2023**, *11*, 1597. [\[CrossRef\]](#)
30. Lemma, A.; Salelew, E.; Demilew, D.; Tesfaye, W.; Shumet, S.; Kerebih, H. Alcohol use disorder and associated factors among University of Gondar undergraduate students: A cross-sectional study. *J. Subst. Abus. Treat.* **2021**, *129*, 108373. [\[CrossRef\]](#)
31. Maria, L.L.; Ovidiu, S.; Lencu, C.; Laza, V. Dietary patterns, physical activity, body mass index, weight-related behaviours and their interrelationship among Romanian university students-trends from 2003 to 2016. *Nutr. Hosp.* **2018**, *35*, 375–383. [\[CrossRef\]](#)
32. Lotrean, L.M.; Florea, M.; Lencu, C. Lifestyle and Cancer Prevention—Opinions and Behaviors Among Romanian University Students. *Int. J. Gen. Med.* **2021**, *14*, 1525–1532. [\[CrossRef\]](#)
33. Crombie, A.P.; Ilich, J.Z.; Dutton, G.R.; Panton, L.B.; A Abood, D. The freshman weight gain phenomenon revisited. *Nutr. Rev.* **2009**, *67*, 83–94. [\[CrossRef\]](#)
34. Peltzer, K.; Pengpid, S.; Samuels, T.A.; Özcan, N.K.; Mantilla, C.; Rahamefy, O.H.; Wong, M.L.; Gasparishvili, A. Prevalence of Overweight/Obesity and Its Associated Factors among University Students from 22 Countries. *Int. J. Environ. Res. Public Health* **2014**, *11*, 7425–7441. [\[CrossRef\]](#)
35. Vella-Zarb, R.A.; Elgar, F.J. The 'Freshman 5': A Meta-Analysis of Weight Gain in the Freshman Year of College. *J. Am. Coll. Health* **2009**, *58*, 161–166. [\[CrossRef\]](#)
36. Vadeboncoeur, C.; Townsend, N.; Foster, C. A meta-analysis of weight gain in first year university students: Is freshman 15 a myth? *BMC Obes.* **2015**, *2*, 22. [\[CrossRef\]](#)
37. Gropper, S.S.; Simmons, K.P.; Connell, L.J.; Ulrich, P.V. Changes in body weight, composition, and shape: A 4-year study of college students. *Appl. Physiol. Nutr. Metab.* **2012**, *37*, 1118–1123. [\[CrossRef\]](#)
38. Vila-Martí, A.; Elío, I.; Sumalla-Cano, S. Eating Behavior during First-Year College Students, including Eating Disorders—RUVIC-RUNEAT-TCA Project. Protocol of an Observational Multicentric Study. *Int. J. Environ. Res. Public Health* **2021**, *18*, 9457. [\[CrossRef\]](#)
39. Deliens, T.; Clarys, P.; De Bourdeaudhuij, I.; Deforche, B. Determinants of eating behaviour in university students: A qualitative study using focus group discussions. *BMC Public Health* **2014**, *14*, 53. [\[CrossRef\]](#)
40. Telleria-Aramburu, N.; Arroyo-Izaga, M. Risk factors of overweight/obesity-related lifestyles in university students: Results from the EHU12/24 study. *Br. J. Nutr.* **2022**, *127*, 914–926. [\[CrossRef\]](#)
41. Lee, M.; Bevin, J.; Clark, J.; Stern, E.; Taylor, S. A Perspective into Decisions, Habits, and Knowledge of Eating Behaviors of College Students. *J. Acad. Nutr. Diet.* **2013**, *113*, A24. [\[CrossRef\]](#)
42. Poínhos, R.; Oliveira, B.M.; Correia, F. Eating behavior in Portuguese higher education students: The effect of social desirability. *Nutrition* **2015**, *31*, 310–314. [\[CrossRef\]](#)
43. Ferreira-Pêgo, C.; Rodrigues, J.; Costa, A.; Sousa, B. Eating behavior: The influence of age, nutrition knowledge, and Mediterranean diet. *Nutr. Health* **2020**, *12*, 111–115. [\[CrossRef\]](#)
44. Kowalkowska, J.; Poínhos, R. Eating Behaviour among University Students: Relationships with Age, Socioeconomic Status, Physical Activity, Body Mass Index, Waist-to-Height Ratio and Social Desirability. *Nutrients* **2021**, *13*, 3622. [\[CrossRef\]](#)

45. Nicklaus, S. The role of food experiences during early childhood in food pleasure learning. *Appetite* **2016**, *104*, 3–9. [[CrossRef](#)]
46. Schwartz, C.; Scholtens, P.A.; Lalanne, A.; Weenen, H.; Nicklaus, S. Development of healthy eating habits early in life. Review of recent evidence and selected guidelines. *Appetite* **2011**, *57*, 796–807. [[CrossRef](#)]
47. Hafiz, A.; Gallagher, A.; Devine, L.; Hill, A. University student practices and perceptions on eating behaviours whilst living away from home. *Int. J. Educ. Res.* **2023**, *117*, 102–133. [[CrossRef](#)]
48. Chacón-Cuberos, R.; Badicu, G.; Zurita-Ortega, F.; Castro-Sánchez, M. Mediterranean Diet and Motivation in Sport: A Comparative Study between University Students from Spain and Romania. *Nutrients* **2018**, *11*, 30. [[CrossRef](#)]
49. Trudel-Guy, C.; Bédard, A.; Corneau, L.; Bélanger-Gravel, A.; Desroches, S.; Bégin, C.; Provencher, V.; Lemieux, S. Impact of pleasure-oriented messages on food choices: Is it more effective than traditional health-oriented messages to promote healthy eating? *Appetite* **2019**, *143*, 104392. [[CrossRef](#)]
50. Kalog, G.L.S.; Kasim, F.; Anyebuno, B.; Tei, S.; Kubuga, C.K.; Mogre, V.; Aryee, P.A. Food advertisement influences food decision making and not nutritional status: A study among university students in Ghana. *BMC Nutr.* **2022**, *8*, 72. [[CrossRef](#)]
51. Morgan, M.; Griffin, J. Improving Food Security and Food Literacy Among Students Enrolled in a Basic Food Science Lab at Appalachian State University. *J. Acad. Nutr. Diet.* **2019**, *119*, A146. [[CrossRef](#)]
52. Food and Agriculture Organization of the United Nations. Food-Based Dietary Guidelines—Romania. Available online: <https://www.fao.org/nutrition/education/food-dietary-guidelines/regions/countries/romania/en/> (accessed on 1 December 2023).

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