

ORIGINAL ARTICLE

# Knowledge, Attitude and Practice on Healthy Diet among University Students in Portugal

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ABSTRACT

**Background:** Scientific investigations revealed that dietary habits of students attending higher education are still inadequate and below the recommended consumption of fruits and vegetables with higher consumption of foods rich in fats, salt and sugar. This study aimed to evaluate the knowledge, attitude and practice on healthy diet among Portuguese university students.

**Methods:** A cross-sectional study was conducted among 840 university students, using a self-reported questionnaire, previously validated. The questionnaire, in addition to the sociodemographic questions, included a scale of healthy dietary knowledge, attitude and behavior.

**Results:** The university students were shown to have low healthy dietary knowledge, moderate healthy dietary attitude and unhealthy dietary habits during the last 7 days. Regarding healthy dietary knowledge, the female students and respondents of natural sciences had the highest score. Considering healthy dietary practice, the older students and the students who changed residence at the time of entrance to higher education had the lowest score. There was a statistically significant and positive correlation between knowledge and practice, knowledge and attitude and finally between attitude and practice.

**Conclusion:** These findings might help health educators and policy makers to promote and to develop healthy dietary attitudes and practices. Interventions targeting university students seem to be necessary to increase the knowledge on healthy dietary behaviours regarding three main topics of planning and preparing healthy meals, nutritional recommendations and food labels.

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## Introduction

Healthy dietary habits are simple and low risk methods to promote and improve well-being and life expectancy (1). Excessive consumption of saturated fats was shown to be associated with an increase in cholesterol level and risk of cardiovascular disease (2). Therefore, an increase in consumption

of fruits and vegetables, whole grains and seeds and a decrease in the consumption of foods rich in saturated fat, sugar and salt are recommended to maintain a balance between calorie intake and energy expenditure, in order to prevent excessive weight gain (2).

Healthy dietary habits among university students'

were reported to be poor because they are going to experience independence after entry to a higher education level and to make food by themselves (3, 4). So the habits acquired during the academic path would tend to be continued throughout the life (4-6). Several studies reported unhealthy diets among university students including high consumption of fast food and foods high in fat and sugar (4, 6-11) and low consumption of fruits and vegetables (3, 6, 12-18).

It seems that the most recent studies were directed towards a more conscious approach to dieting habits, considering organic foods (19). Dietary habits involve behavioral predisposition in relation to intra- and inter-personal factors (17), which include nutritional knowledge and attitude towards the consumption of certain types of foods. In this sense, the relationship between dietary behavior, attitude and nutritional knowledge could provide information on the best ways to achieve healthy lifestyle standards (20).

However, the association between nutritional knowledge and healthy food choices is not as clear as it may seem, revealing weak correlations to reach the conclusion that increasing knowledge about healthy diets would lead to better dietary habits (20). However, some methodological flaws denote to studies that seek association between nutritional knowledge and dietary habits that revealed a weak association between these two variables. The biggest flaw was found in the scales used to measure nutritional knowledge, many of which are developed for specific studies and do not undergo the necessary psychometric assessments to certify the validity and reliability (21).

More recently through the use of accurate assessment techniques, several studies suggested that knowledge is an important factor in explaining variations in food choice (8, 12, 22-26), verifying that the increase in nutritional knowledge was associated with better diet habits and lower rate of obesity (25, 27, 28).

In addition, attitude is a determining factor to choose healthy diets, and it is recommended that education on food choice should focus on changing the attitude and expectations (12). Therefore, this study aimed to determine the knowledge, attitude and practice on healthy diet among Portuguese university students.

## Materials and Methods

In a cross-sectional study, data from 840 university students of one university in Portugal were collected using a validated self-reported questionnaire. A stratified sampling method was used according to the year of study (1<sup>st</sup> or 3<sup>rd</sup> years) and the scientific

area. The different undergraduate and master degrees were enrolled and divided into various scientific areas (as defined by the Foundation for Science and Technology) including human and social, law and economic, exact and natural and engineering sciences.

Currently, there are several scientific instruments to monitor the dietary behaviors among young adults. Therefore, the development of the instruments presented in this investigation was carried out in three stages of scale construction (1<sup>st</sup> stage), content validity (2<sup>nd</sup> stage), and psychometric validity (3<sup>rd</sup> stage) according to the procedures defined before (29). For the scale construction (1<sup>st</sup> stage), a systematic review of the literature was undertaken to identify the questions and items commonly used to assess knowledge, attitudes and food habits among students of higher education (22).

Based on this review, an analytical matrix was created for each of the dimensions to be analysed, and those with the same semantic similarities were eliminated. For the content validity (2<sup>nd</sup> stage), 10 PhD students from several Portuguese universities were included while their work was in the area of Health Education. The feedback was received from 5 of them as well as all the proposed semantic changes. Similarly, the instrument was applied to 12 university students, using the method of “thinking aloud” to identify items that might be confusing, to help exclusion of less relevant or redundant items, and to verify sufficient pre-coded response options (29). After the suggested redrafting, the preliminary version of the questionnaire survey was presented to a sample of 32 students, not included in the final sampling.

Healthy dietary habits were assessed using four food groups during the past 7 days including vegetables, fruits, sweet products and fast food. The frequency of consumption of the four food groups was evaluated by the following response categories of never; one to three times a week; four to six times a week; one or two times a day and three or more times a day. Additionally, we asked students about the number of times they skipped breakfast or lunch and/or dinner in the last 7 days.

Healthy dietary attitudes were measured using a 5 point scale by how much students agreed or disagreed with 5 statements, with responses ranging from strongly agree to strongly disagree. For healthy dietary knowledge, we used a 6-item scale with options for the answer including true, false, and don't know. Sociodemographic data were sex, age, scientific area of study, academic year, weight and height (to calculate BMI), being in a love relationship, professional situation and

current residence. For all students in the sample, the instrument was applied in classroom context and paper-and-pencil format, after giving informed consent. All ethical research procedures on humans were approved by the university ethics committee.

Data were analysed using the IBM SPSS Statistics for Windows (version 26.0, IBM Corp., Armonk, NY, USA). Descriptive analyses of frequency distributions and contingency tables were provided to characterise the baseline for the sample's healthy dietary knowledge, attitude and habits. In addition, independent t-test, and one-way variance (ANOVA) were conducted to explore differences between groups according to sociodemographic variables. The significance level was considered at 0.05.

For the analyses of healthy dietary behaviors, the categories were grouped and we considered unhealthy dietary practices by skipping breakfast; skipping lunch or/and dinner; insufficient fruit consumption (two or less times per day); insufficient consumption of vegetables (two or less times per day); higher consumption of sweet products (four or more times per week) and higher fast food consumption (four or more times per week). Then the number of healthy dietary behaviors, ranging from 0 to 6 healthy dietary practices was recorded.

For the knowledge scale, the number of correct responses was recorded to present an overall

knowledge score to determine the mean too. So the higher the scale value, the higher the level of knowledge was. The healthy dietary attitude was subject to Cronbach's alpha analysis and its reliability (29), and one item was excluded to reach a better reliability ( $\alpha=0.671$ ). In addition, inter-item correlations were determined ranging from 0.484 to 0.219. To read the results of this scale, the higher the average of the scale, the more would be the positive attitudes towards healthy dietary.

## Results

Among the enrolled subjects, 464 students were in the first year of study (55.2%) and 376 students in their last year of study (44.8%). Regarding the scientific area, 302 (36.0%) students were from engineering sciences, 270 (32.1%) students from human and social sciences, 136 (16.2%) students from exact and natural sciences and 132 (15.7%) students in the area of law and economic sciences. Most students were female (55.4%,  $n=465$ ), were not in a love relationship (58.3%,  $n=486$ ), changed their residence area (64.9%,  $n=537$ ), were full-time students (88.8%,  $n=739$ ) and had a body mass index (BMI) corresponding to a normal weight (73.1%,  $n=599$ ). The average age of the participants was 20.78 years ( $SD=4.221$ ), ranging from 18 to 54 years, and only 3% of the students were 30 years or older.

**Table 1:** The sociodemographic variables and healthy dietary practices reported among university students

		Healthy dietary practices		ANOVA	
		Mean±SD	Z	p	
Scientific area	Engineering sciences	2.94±1.065	1.535	0.204	
	Exact and natural sciences	2.91±1.183			
	Law and economic sciences	2.70±1.110			
	Human and social sciences	2.81±1.205			
BMI	Low weight	2.80±1.052	1.379	0.252	
	Normal weight	2.89±1.164			
	Over-weight	2.72±1.049			
				<b>t-student</b>	
				<b>t</b>	<b>p</b>
Year of study	1st year	2.86±1.091	0.020	0.984	
	3rd year	2.86±1.1961			
Sex	Male	2.78±1.098	-1.734	0.083	
	Female	2.92±1.167			
Age	<20	2.97±1.075	2.377	0.018	
	≥20	2.78±1.178			
Love relationship	Yes	2.81±1.150	-1.074	0.283	
	No	2.89±1.123			
Current residence	Displaced	2.62±1.115	-4.590	0.001	
	Not displaced	3.00±1.127			
Professional situation	Full time student	2.86±1.144	.411	0.681	
	Worker/Student	2.81±1.134			
Total		2.86±1.139			

BMI: Body Mass Index; Z: test results in the ANOVA table; t: test results in the independent samples test table; p: significance level

The minority of students reported vegetable intake (6%, n=50), as well as fruits (10.10%, n=85) that was below the recommendations (three or more times a day). The majority of university students (56.20%, n=472) reported a regular breakfast during the week and 75.60% (n=636) of students did not skip lunch and/or dinner. Furthermore, 7.4% (n=62) and 55.5% (n=465) of students presented a high consumption of fast food and sweet products during the last week (four or more times a week), respectively.

The university students reported  $2.86 \pm 1.139$  healthy dietary practices, according to their age [ $t(825) = 2.377$ ,  $P = 0.018$ ] and residence [ $t(814) = -4.590$ ,  $P = 0.000$ ]. Thus, younger students who did not change their residence were the ones who declared the most healthy dietary practices, compared with older and students who changed their residence at the time of entering the higher education level, respectively (Table 1).

The healthy dietary knowledge was at a low level with  $2.58 \pm 1.313$  correct answers, in a total of 6 possible correct responses. Table 2 shows statistically significant differences between healthy dietary knowledge and the scientific area [ $F(3,824) = 4.223$ ,  $P = 0.006$ ], indicating that students in the exact and natural sciences field demonstrated more healthy dietary knowledge compared to students of the law

and economic sciences field. Furthermore, t-test showed significant differences between healthy dietary knowledge and the sex of respondents that means male students had a lower level of healthy dietary knowledge in comparison to the female students [ $t(826) = -2.3028$ ,  $P = 0.043$ ].

The scale for healthy dietary attitudes was  $13.54 \pm 3.492$  ranging from 4 to 20, with the highest value corresponding to positive attitudes towards a healthy diet. Through the bivariate analysis shown in Table 3, there were no significant differences between healthy dietary attitudes and sociodemographic variables.

The results showed that there was a positive and significant relationship between knowledge and practice, knowledge and attitude and attitude with practice. The value between knowledge and practice was 0.071 ( $P < 0.05$ ), between knowledge and attitude was 0.091 ( $P < 0.001$ ), and between attitude and practice was at the highest level of 0.207 ( $P < 0.001$ ).

## Discussion

This study assessed healthy dietary practices, knowledge and attitudes towards among students at one of the universities in Portugal. Our data showed that university students had inadequate healthy dietary habits, similarly identified in USA (26), Spain

**Table 2:** The sociodemographic variables and healthy dietary knowledge among university students

		Healthy dietary knowledge		
		Mean±SD	ANOVA	
			Z	p
Scientific area	Engineering sciences	2.51±1.301	4.223	0.006
	Exact and natural sciences	2.93±1.367		
	Law and economic sciences	2.42±1.267		
	Human and social sciences	2.55±1.297		
BMI	Low weight	2.59±1.229	0.007	0.99
	Normal weight	2.57±1.313		
	Overweight	2.57±1.350		
		t-student		
			t	p
Year of study	1st year	2.55±1.302	-0.629	0.530
	3rd year	2.61±1.328		
Sex	Male	2.47±1.321	-2.028	0.043
	Female	2.66±1.302		
Age	<20	2.51±1.325	-1.312	0.19
	≥20	2.63±1.303		
Love relationship	Yes	2.58±1.266	-0.191	0.85
	No	2.59±1.342		
Current residence	Displaced	2.56±1.361	-0.469	0.639
	Not displaced	2.61±1.276		
Professional situation	Full time student	2.57±1.332	-0.740	0.459
	Working student	2.67±1.130		
Total		2.58±1.313		

BMI: Body Mass Index; Z: test results in the ANOVA table; t: test results in the independent samples test table; p: significance level

**Table 3:** The sociodemographic variables and healthy dietary attitudes demonstrated among university students

Healthy dietary attitudes		ANOVA		
		Mean±SD	Z	p
Scientific area	Engineering sciences	13.32±3.413	1.847	0.137
	Exact and natural sciences	13.16±3.440		
	Law and economic sciences	13.84±3.203		
	Human and social sciences	13.83±3.718		
BMI	Low weight	13.48±3.430	0.024	0.976
	Normal weight	13.52±3.502		
	Overweight	13.58±3.478		
		13.53±3.488	<b>t-student</b>	
			<b>t</b>	<b>p</b>
Year of Study	1st year	13.69±3.447	1.357	0.175
	3rd year	13.36±3.543		
Sex	Male	13.51±3.316	-0.223	0.824
	Female	13.56±3.633		
Age	<20	13.56±3.329	-167	0.868
	≤20	13.52±3.610		
Love relationship	Yes	13.35±3.697	-1.175	0.240
	No	13.64±3.343		
Current residence	Displaced	13.52±3.375	-0.205	0.838
	Not displaced	13.57±3.516		
Professional situation	Full time student	13.53±3.468	0.028	0.977
	Worker/Student	13.52±3.704		
Total		13.54±3.492		

BMI: Body Mass Index; Z: test results in the ANOVA table; t: test results in the independent samples test table; p: significance level

(10), Italy (31), Germany (32), and UK (33) which was due to inadequate fruit and vegetable intake (11, 33) and consumption of fast foods (4, 6-11).

Contrary to a number of studies (6, 10, 26, 31, 32, 34) in which female students tended to have healthier dietary habits compared to male students, this study did not find any difference between male and female gender among university students in terms of healthy dietary practices (11, 35). Staying in higher education level tended to worsen student's lifestyle, particularly in regard to healthy dietary habits. Although in the present study, we did not verify the existence of any differences regarding the year of study, but we found that the younger students had healthier dietary habits in comparison to the older students.

It is also important to highlight the sociodemographic variable of "current residence", because students who had left their family home reported a higher level of unhealthy dietary practices compared to students who did not change their residence after entering the higher educational level (4, 6, 11, 18, 36). In terms of knowledge about healthy dietary habits, several researchers showed that university students had a lower level of knowledge on healthy dietary habits (24).

In our study, there was also a low level of healthy dietary knowledge, being higher among students in the area of the exact and natural sciences. In the

same line and contrary to other researches (23, 37), we found that girls had more knowledge than boys on healthy dietary habits (26, 38). We found moderate healthy dietary attitudes without any statistical differences concerning sociodemographic variables. An interesting finding of our study was to be in agreement with other studies (32, 39, 40) reporting the lack of time to prepare healthy meals due to academic commitments as the main barrier to reach healthy dietary habits. The correlation observed between on healthy dietary behaviors, knowledge and attitudes were of great interest, suggesting that intervention programs may address a range of on healthy dietary behaviors in addition to programs directed to nutritional intake.

The limitations of our study should be noted. First, weight and height were based on self-reporting. Self-reported height and weight were not as accurate as physical anthropometric measurements. The same for the other questions, that is, the data were collected through a self-report questionnaire and, therefore, a recall error was possible. In addition, dietary behavior during the past seven days may not be representative of a typical healthy dietary behavior. Restricting our study was generalizing our findings in a single university to all university students in Portugal. University degree in the area of health sciences was excluded from the sample

due to biases that could have been caused based on knowledge (24). Despite this methodological option, the dietary behavior of the students of this scientific area should be analysed, as they may practice as health professionals in future.

### Conclusion

The results of our study identified the need for multifaceted programs to educate and motivate students to make healthy food choices, breaking down barriers about the difficulties of having a healthy diet. These intervention programs can be targeted at university students who have less consumption of fruits and vegetables, difficulties in time management and planning healthy meals, and those who changed residence at the time of entering a higher education level. The high prevalence of unhealthy dietary behaviors denoted to the need for interventions that promote patterns of healthy dietary behaviors among university students. University authorities must have strategies to overcome the lack of time barrier, such as offering time management courses.

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### Conflict of Interest

None declared.

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