

## Original Article/Özgün Araştırma

### Perceptions of university students on nutrition as a useful tool to manage anxiety and depression levels

### Üniversite öğrencilerinin kaygı ve depresyon düzeylerini yönetmek için yararlı bir araç olan beslenmeye ilişkin algıları

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#### Abstract

**Objective:** Mental health problems among university students are an emergent public health issue and prevention is crucial. Dietary interventions are currently being investigated as additional treatment options for mental illness. This work aimed (i) to measure and correlate the general status of physical-mental health and diet habits of undergraduate students (n=164, 96 females and 68 males) from different universities, in England and Türkiye; (ii) to develop a specific questionnaire to measure their knowledge on nutrition for mental health (as only general nutrition knowledge questionnaires were available), and (iii) to identify barriers for healthier food choices and sustainable behavioural changes.

**Materials and methods:** The study was based on a cross-sectional survey. Undergraduate students were invited by email and their participation was voluntary and anonymous. Values were expressed as means and standard deviation. A significance level of 0.05 was set.

**Discussion and conclusion:** The results showed that more than 1/3 presented a medium to a high level of somatization symptoms while more than 1/4 presented a moderate to severe level of anxiety and depression. Moreover, results showed a significant negative correlation between nutritional knowledge with physical status, anxiety and depression level and a significant positive correlation with adherence to the Mediterranean diet. Cost, time, convenience and no healthy options on campus canteens/restaurants were the main reported barriers against a healthier diet. Most of the students showed poor nutritional knowledge on how nutrition may impact mental health, but a high interest in learning about nutrition to improve their physical and mental health. Nutrition education and the support of a nutritional team may be alternative tools at the universities to help students manage their anxiety/depression, general health status and academic performance.

**Keywords:** nutrition, mental health, anxiety, depression, nutritional knowledge, university students

#### Öz

**Amaç:** Üniversite öğrencilerinde görülen mental sağlık sorunları acil çözüme kavuşması gereken bir halk sağlığı sorunu olup, bu sorunun önlenmesi büyük önem arz etmektedir. Günümüzde diyet uygulamalarının mental sağlığı iyileştirme çalışmaları ek tedavi seçeneği olarak araştırılmaktadır. Bu çalışma ile (i) İngiltere ve Türkiye’de bulunan farklı üniversitelerde eğitim gören lisans öğrencilerinin

(n=164, 96 kadın ve 68 erkek) beden-mental sağlığı ve beslenme alışkanlıklarının genel durumunu ölçmek ve ilişkilendirmek; (ii) mental sağlık için beslenme konusundaki bilgilerini ölçmek amacıyla özel bir anket geliştirmek (yalnızca genel beslenme bilgisi anketleri mevcut olduğundan) ve (iii) kesitsel bir anket kullanılarak daha sağlıklı gıda seçimleri ve sürdürülebilir davranış değişikliklerinin önündeki engelleri belirlemek amaçlanmıştır.

**Materyal ve yöntem:** Çalışma, kesitsel bir araştırma olarak yapılandırılmış olup, lisans öğrencileri e-posta ile çalışmaya davet edilmiş, katılımları gönüllük esasına göre isimleri gizli tutulmuştur. Çalışmada değerler ortalama ve standart sapma olarak ifade edilmiş ve anlamlılık düzeyi 0,05 olarak belirlenmiştir.

**Tartışma ve sonuç:** Çalışmanın sonuçları, öğrencilerin 1/4'ten fazlasının orta ile şiddetli düzeyde anksiyete ve depresyon, 1/3'ten fazlasının ise orta ile yüksek düzeyde somatizasyon belirtileri olduğunu göstermiştir. Ayrıca, beslenme bilgisi ile fiziksel durum, anksiyete ve depresyon düzeyi arasında anlamlı bir negatif korelasyon, beslenme bilgisi ile Akdeniz diyetine bağlılık arasında ise anlamlı bir pozitif korelasyon olduğunu göstermiştir. Daha sağlıklı beslenmenin önündeki başlıca engeller maliyet, zaman, kolaylık ve kampüs kantinlerinde/restoranlarında sağlıklı seçeneklerin olmaması olarak belirlenmiştir. Öğrencilerin çoğunun beslenmenin mental sağlık üzerindeki etkisi konusunda yetersiz bilgiye sahip olduğu, ancak fiziksel ve mental sağlıklarını iyileştirmek için beslenmeyi öğrenmeye büyük ilgi duydukları görülmüştür. Beslenme eğitimi ve bir beslenme ekibinin desteği, üniversitelerde öğrencilerin kaygı/depresyon, genel sağlık durumu ve akademik performanslarını yönetmelerine yardımcı olacak alternatif araçlar olabileceği değerlendirilmiştir.

**Anahtar kelimeler:** beslenme, mental sağlık, anksiyete, depresyon, beslenme bilgisi, üniversite öğrencileri

## 1. Introduction

Depression and anxiety are common mental disorder conditions with increasing prevalence, and depression is the leading cause of mental and physical disability worldwide (DALYs GBD, 2018). According to the World Health Organization (WHO, 2017), the global statistic of people living with depression is estimated to be 4.4% (322 million people) whereas anxiety disorders affect more than 260 million people, which is 3.6% of the global population.

Patients affected by major depressive disorder experience poor physical health. They have a functional impairment and decreased quality of life and are more likely to develop cardiovascular disease and obesity (WHO, 2018). This happens even among young patients (Carney et al., 2021).

Mental health problems among university students are an emergent public health issue and evidence-based prevention is crucial (Dahlin et al., 2011) and it is particularly predominant in higher education (Yusoff et al., 2013; Hubble and Bolton, 2020). Studies also have shown that the number of depression and anxiety cases has been increasing among university students in recent years (Arslan et al., 2009; Kivrak et al., 2016), with evidence that these levels are inversely related to students' life quality (Oztasan et al., 2016). According to the Institute for Public Policy Research (IPPR) report, in 2015/16, 15, 395 UK-domiciled first-year university students disclosed a mental health condition-almost five times the number ten years ago (Thorley, 2017). In Türkiye, the high prevalence of depression, anxiety and stress symptoms among university students is alarming, mainly among first- and second-year students, with higher anxiety and stress scores among females (Bayram and Bilgel, 2008). Moreover, among undergraduate students, the symptoms of depression, anxiety, and distress are more common when contrasted with age-matched peers (Winzer et al., 2018).

Data has shown that better-quality nutrition is related to better mental health outcomes (Sánchez-Villegas et al., 2009; Lai et al., 2014; Meegan et al., 2017). The role of nutrition in the development of mental disorders and symptoms has become a recent research focus over the past decade (O'Neil et al., 2014), and dietary interventions are currently being investigated as additional treatment options for mental illness (Libuda et al., 2017; Marozoff et al., 2020).

Research outcomes on all these emerging scientific areas transfer the responsibility for the general

status of health and wellness to the individual's food choice, validating the importance of nutritional education for a healthier society, and stimulating disease prevention more than its treatment. Nutritional knowledge ensures the nutrient needs throughout the life cycle are met (Worsley, 2002) and contributes to better food choices and adequate nutritional intake among university students (Nani, 2016). However, studies have shown a limited level of university students' knowledge of healthy and unhealthy diet habits, in addition, they emphasize the necessity of promoting nutritional information programmes and healthy lifestyle behaviours among students to implement a healthy behavioural change (Sakamaki et al., 2005; Yahia et al., 2016; Nasir and Tahir, 2017). Studies among university students stated that the consumption of 'unhealthy' foods (e.g. sweets/cookies/snacks/fast food) was significantly positively correlated with perceived stress, depressive symptoms and increase of mental disorder risk (Popa and Ladea, 2012; El Ansari et al., 2014), whereas the Mediterranean diet (MD) has been related to a low incidence of depression.

In this context, from our research group perspective, nutritional education is a powerful instrument to manage the scary statistics on physical and mental public health. To the best of our knowledge, there is not enough research measuring the perception of university students on nutrition as a protective factor and an efficient tool that may modify how individuals cope with anxiety and stress and how it may help them prevent the development of a mental disorder. Moreover, no research study was found measuring this perception in different nations with different economic development, social and cultural customs as well as dietary patterns (such as the Mediterranean and non-Mediterranean countries) and how these differences influence students' food choices and general health status.

This cross-cultural study aimed to compare the data taking into consideration their economies (level of development); geography; social, cultural and climatic differences; and evaluate if these factors influence students' food choices and general health status. England and Türkiye were selected for this research as they present different cultural, social and economic characteristics, but a very close prevalence of depression and anxiety disorders. According to the detailed report of the WHO (WHO, 2017), the depression disorder ratios in the population are given as 4.5% in England and 4.4%

in Türkiye whereas the anxiety disorders are given as 4.2% and 4.0%, respectively.

Thereby, according to the presented background, this work aimed (i) to measure and correlate the general status of body-mind health and diet habits of undergraduate students from different universities, in England and Türkiye; (ii) to explore their perception of nutrition as a useful tool to manage anxiety and depression; (iii) to identify factors that are barriers for healthier food choices and sustainable behavioural changes.

## 2. Methods

### 2.1. Study design

This study is based on a cross-sectional survey designed to measure the general physical health quality, the level of anxiety, depression and adherence to a healthy diet. The survey was followed by questions to assess the participants' perception of nutrition as a useful tool to manage mental health and by questions and comments to identify factors that are barriers to healthier food choices and sustainable behavioural changes.

### 2.2. Sampling

Participants in this study are undergraduate students from two universities in England (St Mary's University, Twickenham, London and the University of Reading, Reading) and two universities in Türkiye (Yasar University, Izmir and Beykoz University, Istanbul). Ethical approval was obtained at each participating university, and data were collected simultaneously at the four universities, in both countries. The universities were selected by convenience, being the workplaces of the research group involved in this study. As English is the educational language for the Turkish selected universities, the same questionnaire was applied in both countries and its translation was not necessary.

Respondents were invited to be part of this study through e-mails, informed by themselves when decided to be a volunteer in this study, after receiving a brief explanation of the research proposal. This procedure was taken from the European General Data Protection Regulation (GDPR), introduced on 25<sup>th</sup> May 2018 (GDPR, 2018). The invitations sent from the research group explaining the research study, with a link to the online survey, were administered via Google forms. Before proceeding to complete the questionnaire, the student was required to sign an electronic informed consent form ([Appendix A](#)). The participation was voluntary and anonymous and the data was confidential and protected.

### 2.3. Questionnaire components

The questionnaire consists of six sections (from A to F) with closed/open-ended questions and comments ([Appendix B](#)). Section A is related to demographic information, such as age, gender, weight (kg), height (m), and university of origin (6 questions).

Section B measures the general physical health status, using a modified version of the standardized Patient Health Questionnaire - PHQ-15 (Kroenke et al., 2002), a brief self-report scale of somatic symptoms. A 14-item version of the PHQ-15 was used, hereinafter referred to as the PHQ-15. The item on *sexual pain and problems* was left out for ethical reasons and for not being relevant in this study. The self-rated symptom burden with higher scores implies a higher burden. Scores range from 0-4 (no - minimal); 5-9 (low); 10-14 (medium) and 15-28 (high).

Section C evaluates mental health. Anxiety, measured with the 7-item Generalized Anxiety Disorder Scale - GAD-7 (Löwe et al., 2008), and depression assessed by the Patient Health Questionnaire 9-item depression scale - PHQ-9, (Kroenke et al., 2001) both within the last two weeks. The anxiety questionnaire was used as a screening tool and a severity measure of both generalized anxiety disorder as well as other common anxiety disorders. Scores range from 0-4 (no - minimal); 5-9 (mild); 10-14 (moderate) and 15-21 (severe). The depression questionnaire evaluates the presence of the nine Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria for major depression. Scores range from 0-4 (no - minimal); 5-9 (mild); 10-14 (moderate) and 15-19 (moderately severe) and 20-27 (severe).

Section D measures adherence to the Mediterranean diet, a recognised healthy diet for physical and mental health, using the validated 14-item Mediterranean Diet Adherence Screener (MEDAS) Questionnaire (Schröder et al., 2011). Each matched criterion counts for 1 point. Scores range from zero (no adherence) to 14 (100% adherence).

Section E assesses the student's knowledge of certain recognised nutrient properties and eating habits as a way to manage anxiety and depression. The questionnaire was developed based on the scientifically proven benefits of some foods and habits. A score of 1 was given for the correct answer and 0 for incorrect responses. The total score for this section was 20. A pilot with Human Nutrition postgraduate students was conducted to

select and adjust the 20 questions in the final version.

Finally, section F, allows the student to express their health/wellness perception and the main difficulties of implementing a healthier eating habit and/or sustaining it. In addition, the evaluation of how they are interested in nutritional knowledge as a tool for implementing healthier habits and managing emotions. All questionnaires used in the study are validated except Nutritional Knowledge Questionnaire.

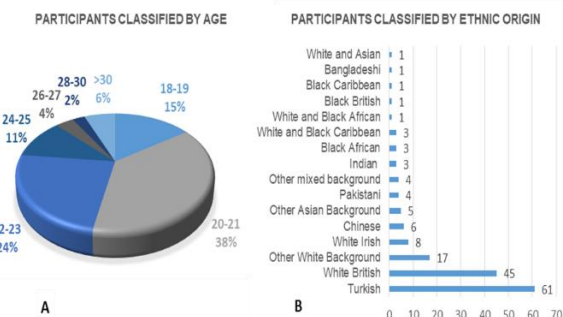
#### 2.4. Data analysis

The statistical data were analysed using the Statistical Package for Social Sciences (IBM SPSS, version 24, Chicago, IL, USA). Values are expressed as means and standard deviation (SD). Variables were assessed for normality by the Shapiro-Wilk test. Independent sample t-tests were used to test for differences between group means of parametric samples. Mann Whitney-U tests were used to test for differences between group means of non-normally distributed variables (non-parametric samples). Analysis of Variance (ANOVA) was used to compare means among the four universities; the correlation between health status, adherence to the Mediterranean diet and nutritional knowledge was also assessed using Spearman's correlation coefficient. A significance level of 0.05 was set. Open-ended comments were coded to quantify the responses.

### 3. Results and discussion

A total of 164 students (96 females and 68 males, respectively, 58.5% and 41.5%), with a

predominant (77%) age range of 18-23 years, fully completed the survey, during the period from 1<sup>st</sup> May to 15<sup>th</sup> July 2018. As seen in Figure 1.A and 1.B, the majority of the participants (88%) are 18-25 years old which indicates that the majority are emerging adults.



**Figure 1.** Participants classified by age range (A) and ethnic origin (B).

A significant difference ( $p \leq 0.05$ ) was found between females and males in the parameters of weight, height, and body mass index (BMI); however, no significant difference ( $p > 0.05$ ) was found between the countries. In the gender comparison, 52.08% of the female and 58.82% of the male students were within the healthy BMI range. Almost 1/4 of the students are overweight or obese, while more than 1/5 are underweight. The number of overweight and obese students was more than twice as high in males, while underweight cases were more than four times in females, and especially high in Turkish female students (Table 1).

**Table 1.** Characteristics of the participants.

Sample Characteristics	Males	Females	Total	p-value
Weight (kg)	77.98 ± 13.74	60.29±11.03	67.63±15.00	0.00
Height (m)	1.78 ± 0.73	1.66±0.68	1.71±0.09	0.00
*BMI (kg/m <sup>2</sup> )	24.55 ± 3.82	21.87±3.68	22.98±3.96	0.00
Normal (BMI:20-24.9)	58.82%	52.08%	54.88%	
Overweight (BMI:25-29.9)	22.06%	10.42%	15.24%	
Obese (BMI>30)	11.76%	5.21%	7.93%	
Underweight (BMI<19.9)	7.35%	32.29%	21.95%	
BMI (kg/m <sup>2</sup> ) – UK Students	24.98±3.81	22.32±3.69	23.07±3.89	0.000
Normal (BMI:20-24.9)	60.71%	60.56%	60.61%	
Overweight (BMI:25-29.9)	21.43%	11.27%	14.14%	
Obese (BMI>30)	14.29%	5.63%	8.08%	
Underweight (BMI<19.9)	3.57%	22.54%	17.17%	
BMI (kg/m <sup>2</sup> ) – TR Students	24.24±3.85	20.60±3.42	22.84±4.08	0.000
Normal (BMI:20-24.9)	57.50%	28.0%	46.15%	
Overweight (BMI:25-29.9)	22.50%	8.0%	16.92%	
Obese (BMI>30)	10.0%	4.0%	7.69%	
Underweight (BMI<19.9)	10.0%	60.0%	29.23%	

The total mean ( $\pm$ SD) sum-scores of the PHQ-15 was 7.94 ( $\pm$ 5.32), indicating a low (5-9) risk for somatization. The mean for females was 9.30 ( $\pm$ 4.88), whereas for males, was 6.01 ( $\pm$ 5.37). On the other hand, the total mean ( $\pm$ SD) sum-scores of the GAD-7 was 6.51 ( $\pm$ 5.45), indicating a mild (5-9) anxiety level. The mean for females was 7.50 ( $\pm$ 5.67), whereas for males, was 5.10 ( $\pm$ 4.83) (Table 2). Both in general physical status levels and generalized anxiety disorder levels, a significant difference ( $p \leq 0.05$ ) was found between females and males whereas no significant difference ( $p > 0.05$ ) was established between the countries.

The total mean ( $\pm$ SD) sum-scores of the PHQ-9 was 6.88 ( $\pm$ 5.10), indicating a mild (5-9) depression level. The mean for females was 7.31 ( $\pm$ 5.12), whereas for males, was 6.26 ( $\pm$ 5.05). The statistical results also showed no significant difference ( $p > 0.05$ ) in the mental health (depression levels) between females and males for both countries (Table 2). Students in Türkiye presented a higher level of depression. A moderate to severe level of depression ( $> 10$  points) was reported by 26.2% of all the students ( $13.86 \pm 2.98$ ), being 35.4% in Türkiye and 17.2% in England. The data for depression are summarized in Table 2.

**Table 2.** Mean  $\pm$  SD of the General Physical Status Questionnaire, Generalized Anxiety Disorder Questionnaire, and Patient Health Questionnaire – Depression.

Population	General Physical Status Questionnaire (0-28 points) PHQ-15		Generalized Anxiety Disorder Questionnaire (0-21 points) GAD-7		Patient Health Questionnaire– Depression (0-27 points) PHQ-9	
	Mean $\pm$ SD	p-value	Mean $\pm$ SD	p-value	Mean $\pm$ SD	p-value
All students (n=164)	7.94 $\pm$ 5.32		6.51 $\pm$ 5.45		6.88 $\pm$ 5.10	
Females (n=96)	9.30 $\pm$ 4.88		7.50 $\pm$ 5.67		7.31 $\pm$ 5.12	
Males (n=68)	6.01 $\pm$ 5.37	0.000	5.10 $\pm$ 4.83	0.006	6.26 $\pm$ 5.05	0.172
Students in the UK (n=99)	7.84 $\pm$ 5.27		6.09 $\pm$ 5.68		6.12 $\pm$ 5.12	
Students in Türkiye (n=65)	8.09 $\pm$ 5.44	0.661	7.14 $\pm$ 5.05	0.065	8.03 $\pm$ 4.89	0.008

The somatic physical symptoms and the mental health symptoms correlation results showed a strong significant positive correlation when the physical status was compared with both anxiety and depression levels, and a very strong significant positive correlation between anxiety and depression. Table 3 illustrates the results of the correlation analysis.

**Table 3.** Correlation analysis between physical and mental symptoms.

Variables	1	2
Physical Status		
Anxiety Level	0.0641**	
Depression Level	0.618**	0.775**

\*\*Correlation is significant at the 0.01 level (2-tailed).

To assess the MD adherence in the student population, MEDAS scores were divided into three groups: low (1-5 points), medium (6-8 points) and high (9-14 points). The total mean ( $\pm$ SD) sum-scores of the MEDAS was 5.04 ( $\pm$ 2.01), meaning a 36% (low) adherence level. The mean for females was 5.22 ( $\pm$ 2.00), whereas for males, was 4.79 ( $\pm$ 2.02). When the students were split by countries, UK and Türkiye, a significant difference ( $p < 0.05$ )

were shown. Low adherence was reported by 60.37% of the students, while medium adherence by 33.54%. Only 6.09% of the population reported a high level of adherence (above 60%) to the Mediterranean Diet. The data are summarized in Table 4. The 14-Item MEDAS questionnaire, the criteria of adherence and the population distribution for each answer is shown in [Appendix C](#).

**Table 4.** Mean  $\pm$  SD of Adherence to the Mediterranean Diet.

Population	Mediterranean Diet Adherence Screener (MEDAS) Questionnaire (0-14 points)	
	Mean $\pm$ SD	p-value
All students (n=164)	5.04 $\pm$ 2.01	
Females (n=96)	5.22 $\pm$ 2.00	
Males (n=68)	4.79 $\pm$ 2.02	0.107
Students in the UK (n=99)	5.43 $\pm$ 2.07	0.001
Students in Türkiye (n=65)	4.45 $\pm$ 4.89	

SD: Standard Deviation. Means bearing the same letter are not significantly different ( $p > 0.05$ ) as determined by the Tukey test

The adherence to the MD was correlated with physical and mental status using the Spearman's correlation coefficient (rs). Results showed a weak

significant negative correlation to physical status and depression level (Table 5).

**Table 5.** Correlation analysis between the adherence to the MD with physical and mental symptoms.

		Adherence to the Mediterranean Diet
Physical Status	R	-0.220**
	P	0.005
Depression Level	R	-0.240**
	P	0.002
Anxiety Level	R	-0.140
	P	0.073

\*\*Correlation is significant at the 0.01 level (2-tailed)

To assess the nutritional knowledge for mental health, the nutritional knowledge questionnaire scores were divided into two groups: good knowledge (>10 points or 50% or more of correct answers) and poor knowledge (<10 points or less than 50% of correct answers).

The total mean ( $\pm$ SD) sum scores of the Nutrition Knowledge Questionnaire was 8.41 ( $\pm$ 2.17), meaning 42.05% (poor) of knowledge on nutrients and food habits to manage mental health issues, such as anxiety and depression. No significant difference ( $p>0.05$ ) was detected between females and males. 69.5% of the student population showed poor nutritional knowledge to manage mental health issues, while the remaining students presented good nutritional knowledge (Table 6). The Nutritional Knowledge for Mental Health Questionnaire, the criteria for receiving 1 point, and the population distribution for each answer are shown in [Appendix D](#).

**Table 6.** Mean  $\pm$  SD of Nutritional Knowledge to manage mental health issues.

Population	Mean $\pm$ SD	p-value
All Students (n=164)	8.41 $\pm$ 2.17	
Females (n=96)	8.54 $\pm$ 2.19	0.336
Males (n=68)	8.22 $\pm$ 2.15	
Students in the UK (n=99)	5.43 $\pm$ 2.07	0.147
Students in Türkiye (n=65)	4.45 $\pm$ 4.89	

SD: Standard deviation. Means bearing the same letter are not significantly different ( $p>0.05$ ) as determined by the Tukey test.

The nutritional knowledge was correlated to physical, mental status (anxiety and depression) and the adherence to the Mediterranean Diet using the Spearman's correlation coefficient (rs). The nutritional knowledge showed a very weak significant negative correlation with physical status, anxiety and depression level and a weak

significant positive correlation with adherence to the MD (Table 7).

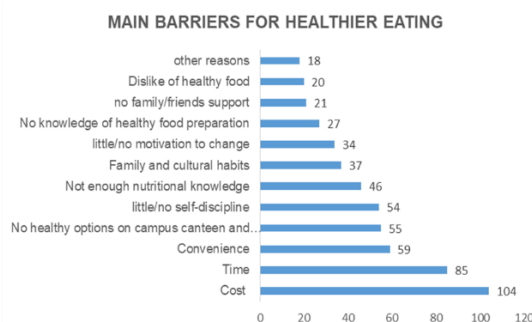
**Table 7.** Correlation analysis of Nutritional Knowledge with physical and mental symptoms and with the adherence

		Nutritional Knowledge	
Physical Status	r	-0.163*	
	p	0.037	
Anxiety Level	r	-0.162*	
	p	0.039	
Depression Level	r	-0.259**	
	p	0.001	
Adherence to the MD	r	0.296**	
	P	0.000	

\*Correlation is significant at the 0.01 level (2-tailed)

\*\*Correlation is significant at the level (2-tailed)

This reported perceptions and opinions in this section were spread in groups of females, males, UK and Türkiye university students. The result of question 9, the main reported difficulties to implement a healthier eating habit, is depicted in Figure 2, while the other answers are expressed in [Appendix E](#).



**Figure 2.** Main reported barriers to healthier eating. The number of votes each state received is expressed beside the bars. The students have voted in all the alternatives considered barriers for them.

In the health perception analysis, the students reported that the six main barriers to healthier eating are: cost, time, convenience, no healthy options on the campus canteen or restaurant, little/no self-discipline and not enough nutritional knowledge for better choices. Some of the reported factors reinforce the necessity of more nutritional education and support to improve the students eating habits, such as not enough nutritional knowledge, little/no self-discipline, little/no motivation to change, no knowledge of healthy food preparation and dislike of healthy food (Fig.2). The students perceived their physical health as in a better condition than the measured one by the General Physical Status Questionnaire. The opposite was observed for their mental health, which they perceive as much worse when the poor

and fair reported conditions levels were compared with the moderate to severe levels ( $\geq 10$  points) of anxiety and depression measured by the questionnaires as expressed in [Appendix E](#).

The student's perception of their weight classification is also different from the calculated BMI. In general, they overestimated the normal and overweight conditions and underestimated the obese and underweight situations. Women overestimated their level of overweight and underestimated their level of underweight, while men underestimated their level of obesity (Table 1 and [Appendix E](#)).

The most common daily eating habit reported is 3 meals with snacks, followed by 2 meals with snacks. Only 3% of the population nibbles with no specific meals. Males and students in Türkiye reported nibbling more compared to females and students in the UK. The same was found for the high number of times eating in restaurants and takeaways weekly, although the average for most of the students is only 1-2 times per week ([Appendix E](#)).

Most of the students were reported as active; however, most females and students in Türkiye reported a light activity level. Most of the students (73.2%) stated showed to believe in the correlation of the physical health state with diet. However, only 56.1% agreed with the relation between diet and mental health status. The vast majority of the students (91.5%) agreed that nutritional knowledge may motivate better food habits and 73.2% were interested in accessing this knowledge through free courses, while 54.3% are willing to pay for the information. More than 2/3 (76.9%) of the students reported being interested in the service of a university nutrition team, with expertise in nutritional psychiatry, food sensitivities and nutritional deficiencies, indicating that there is a demand for more education in the area of nutrition for a better health and wellness state ([Appendix E](#)).

Twenty-nine students answered the open-ended questions, and most of them mentioned that it would be very useful to receive nutritional knowledge to improve their health status. Those who had previous knowledge about the effect of nutrition on health came from their undergraduate courses in the areas of sports, health and nutrition.

As a result, the students showed a low level of adherence to a healthy diet and a low level of knowledge about nutrition for mental health, but they showed a high interest in getting free and even paid courses to access nutritional information to improve their health status. Many studies have

reported that nutrition education may improve students' dietary habits and food choices (Ha and Caine-Bish, 2009; Lin and Dali, 2012; Philippou et al., 2017) and according to the way the information is delivered, it may cause a positive behavioural change. However, the students have pointed out the cost of healthy food and the lack of a healthy option in the campus canteen/restaurant as very important barriers to a healthier food habit, and for convenience reasons, they eat unhealthy meals. In research with German students Hilger et al. (2017) reported very similar results. Intervention studies centring on university canteens demonstrated that offering higher food quality, variety and reduced prices resulted in healthier eating habits (Guagliardo et al., 2011; Michels et al., 2008). In the modern world, the ages between 18-25 ages are redefined by Arnett (Arnett, 2000) as emerging adulthood, which is mainly a transitional period in the life span when identity, career and relationship formation are extended. This period corresponds to increased flexibility and potential for changes and the students experience an increased amount of responsibility and independence concerning their lifestyle choices, and begin to establish long-lasting behaviours that are associated with long-term health risks (Robertson et al., 2017). In this context, it is important to understand that the healthier food habit among university students should be achieved through collaborative work among educators, government, universities and campus canteens/restaurants.

The strength of this study is mainly that there were no previous studies about university students' nutritional knowledge assessment on nutrition as a useful tool to manage anxiety and depression levels among British and Turkish in general and among university students in particular. The current study provides a useful survey to measure nutrition knowledge to manage mental health issues to encourage healthy habits in the emerging adulthood period. There is a growing understanding that post-secondary students should be targeted for health promotion efforts, including recommendations that their health is a 'very important but neglected public health concern' (Kwan et al., 2013).

In recent years, the use of food to treat mild to moderate mental disorders such as anxiety and depression has raised. The current revolution is wider, comprising the quickly accumulating knowledge of how inflammation, gut microbiome imbalance (dysbiosis), oxidative stress, and impaired mitochondrial output impact brain function (Kaplan et al., 2015). In this scenario, diet, specifically some nutrients, cannot be neglected as



an essential factor for mental disorder prevention. Physiologically, nutrition is interrelated with mental disorders through hormonal, neurotransmitter and signalling pathways in the gut that control brain functions such as appetite, sleep, reward mechanisms, mood and cognitive function (Lang et al., 2015). Vitamins and minerals are required by all biochemical pathways as co-factors for proper enzyme function, and insufficient nutrient amounts can negatively influence a wide variety of metabolic processes. Several different nutrients have been studied and reported to be involved in pathways relevant to mental disorders and brain function (Kaplan et al., 2015; Ross, 2003). Scott (2011) states that a diet based on real whole food serves as the basis for ending anxiety, providing vital nutrients that are essential for the production of neurotransmitters and hormones by the body. The author also reinforces the importance of respecting our biochemical individuality, taking into consideration that there is no single anti-anxiety/depression food solution. The nutrients and their amounts will not be the same for everybody.

Additionally, a healthy diet has been highlighted as an alternative to the widespread use of drugs for treating these mental conditions worldwide. The adverse side effects of the drugs are urgently demanding the use of alternative approaches (Khan & Alam Khan, 2016; Moncrieff, 2016). Clinicians, in general, have usually underestimated and underutilized therapeutic lifestyle changes despite the profuse evidence of their positive therapeutic potential and nutrition is considered a significant one (Walsh, 2011). Therefore, the results of the current study further support the use of healthy eating to prevent and manage anxiety and depression.

The current study presents some limitations. Data for the research were collected from a cross-sectional, limited size and convenience sample, which excludes the ability to extrapolate the findings to all university students in both studied countries. Additionally, the research design disallows the ability to determine causal relationships between the variables. A higher significant negative correlation between adherence to the MD and physical and mental health issues could be found if the students presented a better level of adherence to a healthy diet. The same was expected if their level of nutritional knowledge was not very low. However, our results collaborate on a new field to be explored among university students and youths, education through nutrition for mental health support. This study evidenced the interest of university students in learning more about how food choices and lifestyles affect

physical and mental health. The service of a university nutrition team, with expertise in nutritional psychiatry, food sensitivities and nutritional deficiencies may be a good alternative to improve students' general physical and mental health, as well as their academic performance. According to El Ansari et al. (2012), the student's transition from school to university coincides with changing living arrangements, which might also result in a reorientation of eating behaviours and in an appropriate time for education on Nutrition with lasting healthier choices. Similarly, Genc and Genc (2019) found very low adherence to Mediterranean Diet, especially among the students who don't live together with their family during the education period.

When we educate university students about healthy habits, we are preparing future professionals, opinion leaders, business managers, doctors, teachers and parents to contribute to the formation of future generations. Through education, we may prevent diseases instead of treating them, which is much more efficient, pleasant, and cheaper.

The research findings open up an area for more investigation and training. Future research may wish to investigate nutrition knowledge for mental health in specific populations, provide them with information and support for better food habits, and measure the reduction of mental health issues among the focused group post-intervention.

#### 4. Conclusion

The mental health status among university students is a cause for concern in both studied countries as well as their adherence to a healthier diet. Nutrition is an underexplored therapeutic resource by the students to prevent and treat diseases, especially mental disorders. Despite the increasing scientific evidence and public knowledge of the health benefits of the Mediterranean Diet, student adherence to this dietary pattern is low, even in Mediterranean countries as Türkiye, which showed more westernised and globalized dietary habits. Social and economic circumstances and the globalization pressure may be related to this tendency. Despite the low level of nutritional knowledge for managing mental health issues, the students showed a high level of interest in learning about how nutrition can be a useful tool to improve their health status and academic performance.

Study results suggest that Nutrition Education and the support of a nutritional team may be alternative tools at the universities Wellbeing Service to help students manage their anxiety/depression, general health status and academic performance.

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