Final Year Project

NFSC 299

Patterns and determinants of eating habits among the students of the American University of Beirut, Lebanon

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Abstract

Background: Healthy eating habits are one of the main factors in the prevention of chronic disease and the maintenance of a normal body weight. With the transition and adjustment to university, students' eating habits are altered and influenced by several factors. In fact, this phase is more likely to develop unbalanced dietary behaviors and other unhealthy lifestyle activities such as alcohol consumption, smoking…

Purpose: The purpose of this study is to assess the eating habits of the university students at the American university of Beirut, Lebanon and determine the factors that affect the student's eating behavior.

Methodology:

In conducting this study, a self-administered questionnaire was used for collecting data concerning the eating habits of 100 university students at the American university of Beirut (AUB). The questionnaire was divided into four parts: socio-economic and demographic, lifestyle habits, eating habits, and the psychological factors affecting student's eating habits. The data attained was statistically analyzed using the statistical Package for the Social Sciences (SPSS) version 24.0.

Results:

The results will be grouped by gender (Female/Male), in order to distinguish and analyze the results. The female and male students were not significantly different in all categories except in BMI, exercise status, and alcohol consumption ($p<0.05$). The females under study had a better BMI and exercise status than that of the males (p-value=0.009 and 0.02 respectively). It also appears that female students consumed less alcohol than male students (p-value=0.012). To determine the factors that are associated with the EHT of the students, simple linear regression was performed. Results show that rooms in the house, height, health consciousness, and exercise status (0.040, 0.049, 0.028, and 0.001 respectively) are the factors that affect the EHT.

Conclusion:

The findings of this study show that the eating habits of students are affected by their health consciousness and exercise status. Students that are more aware of their health status and its impact on their life, and also exercise regularly are found to have better eating habits. The recommendations and results discussed in this research, may help in progressing the intervention programs that are aiming to prevent the unhealthy factors associated with the eating habits of university students across Lebanon.

Literature Review

A major focus on the interactive relationship between lifestyle, diet and health have been developing over the years (O'Sullivan, 2010). It has been noticed that an unhealthy diet and lifestyle may increase the risk of struggling or dying from non-communicable diseases (NCDs), cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes (Ryan et al,. 2013). NCD is one of the most leading causes of death, each year 41 million people die from NCD, which corresponds to 71% of the worldwide death (WHO, 2018). Studies show that 15 million people in the age range of 30 to 69 are killed from NCD (WHO, 2018); more than 85% of these cases appeared to be from the low- and middle-income countries (Engelgau et al., 2011). According to the data from the Global Burden of Disease Study 2010, an increase in the risk of NCDs (cardiovascular disease, cancer, chronic lung diseases, and diabetes) in the Arab world has been identified, especially in the middle- and high-income countries. This increase might be due to several risk factors such as unhealthy diet, alcohol and tobacco consumption, and insufficient physical activity**.** Implementing a plan to prevent the widespread of NCDs in Arab countries is a must, and awareness of the importance of healthy diets should be spread since it's slightly known among the Arab population about the national policies, programs and plans that should be taken to progress and enforce a healthy diet, (Rahim et al., 2014). Over the past decades, Lebanon and other countries in the Middle East and in the North Africa (MENA) region, experienced a nutritional shift in food choices from the old Mediterranean diet into a modern westernized diet that includes low fiber intake, fruits and vegetables and a high intake of sugar, fat and salt (Popkin et al., 2018). Surveys from the World Health Organization (WHO) STEPwise approach to Surveillance (STEPS), showed that 79-96% of the population of the MENA region; Egypt, Jordan, Iraq, Kuwait, Saudi Arabia, Qatar, and Syria were consuming less than the recommended five servings of fruits and vegetable per day. Moreover, the sugar intake of total energy intake among the Lebanese and Jordanian population ranges from 11-14%, it increases to 10-20% among the Egyptian and Iraqi population, which are both considered significantly greater than the maximum value of 10% that the WHO recommended. As a result, based on the surveys conducted in the MENA region, it showed that the dietary lifestyle that children and young people are following is affecting their health negatively which led to the growth rates of overweight and obesity (Sibai et al., 2010).

When university students move from adolescence to young adulthood, they pass through many dietary changes and behavioral changes related to their lifestyle (Salameh et al., 2014). During

this stage, young adults move out from their parents' home and become more independent especially concerning their food choices. As indicated in previous studies, young adults' meals are based more on fast food, energy-dense and unhealthy snacks, as well as insufficient intake of fruits and vegetables (El-Kassas et al., 2016), and at this stage they become more used to skipping meals frequently especially breakfast (Salameh et al., 2014). Students' weak nutritional knowledge, lack of cooking healthy meals skills, and their busy schedule at university influence their food habits and nutritional status (Sharma et al., 2018). The dietary behavior of students is mostly attached to the environmental changes around them, in particular the increase in the availability of fast food places, convenience stores, and vending machines, also to the physical and psychological issues (Deliens et al., 2014), and socio-economic challenges university students pass through (Nabhani-Zeidan et al., 2011). Furthermore, a significant number of university students carry out undesirable health risk behaviors such as cigarette smoking, high alcohol intake, and high physical inactivity (Brunt et al., 2008).

Various studies have proven that the eating habits of adults and adolescents in Lebanon, are mainly affected by the altering environmental factors mentioned above that are making the youth adapt to unhealthy dietary patterns accompanied with low physical activity (Salameh et al., 2014). A study performed to examine and analyze the widespread of adult overweight and obesity, indicated a disturbing increment over a 12-year time frame (1997 and 2009) in obesity rates that reached to 21% and 11% respectively. The findings of the study highlight the importance of developing rules and nutritional strategies to decrease the high obesity rate in Lebanon. A solution proposed to reduce the prevalence of obesity among the Lebanese youth population is that universities can try to reach out their students by building nutrition education programs that might affect the students' eating habits positively by supporting them to adopt healthy food choices and habits (Nasreddine et al., 2012). By raising students' awareness about nutrition and healthy eating habits, students might work on managing a healthy body weight and this might also reduce the prevalence of overweight and obesity (Yahia et al., 2008).

During their transition into university, students experience stress and limited time. Such psychological factors affect their eating habits negatively, leading to unhealthy habits that are not always temporary but may remain until further stages in their life (Kagan et al., 1984). Also, a positive relation was found by researches between gaining weight and the psychological stress that university students are subjected to. Studies showed that when students due to stress

have food for comfort, eat to release stress, and consume high fat and sugar, their risk of obesity increases (El-Kassas et al., 2016).

Few studies were found on the relation between the following three factors (lifestyle habits, sociodemographic and economic, and psychological) and the eating habits of students in Lebanon. Therefore, the purpose of this study is to determine the association between these factors and the eating habits of the university students at the American university of Beirut, Lebanon, while also grouping the results and analyzing them based on the student's gender.

Methodology

Study population and procedure:

This study was done on a sample of 100 AUB students, to assess their eating habits, using descriptive cross-sectional design. The measures set were: the level of confidence at 95%, the margin of error at 0.05 and the design effect at 1. Both females and males, were chosen for the sample size. Students that contributed in this study were undergraduate or graduate AUB students who are 17 years of age or older. Recruitment of AUB students took place on campus, during their free time, using simple random sampling. Students who responded positively were contacted directly, and after receiving their oral consent, they were requested to complete a self- administered questionnaire. Students took around 15-20 minutes to complete the questionnaire. Also, field surveyors made sure to inform the students that it's a voluntarily participation and that their decision in not participating will definitely not influence their relationship with AUB.

Study Instruments:

The self-administrated multicomponent questionnaire used in the present study consisted of four parts related to: (1) **socio-economic and demographic** (age, gender, nationality, major, personal income…), (2) **lifestyle habits** (weight, height, alcohol consumption...), (3) **eating habits** (number of meals per day, type of meal, vegetables and fruits intake, daily water consumption, fast food, etc…) **(4) Psychological factors affecting eating habits.** Questions included in the last part of the questionnaire were taken from the **Compulsive Eating Scale (CES)** (Kagan et al., 1984) that was used to study the uncontrolled eating patterns among college students; statements included in this study were: "eat because of feeling lonely", "feel out of control when eating", "eat so much until stomach hurts", "eat because of feeling upset or nervous", "eat because of feeling bored" and "eat because of feeling happy". The options students had, were 'Yes' or 'No'.

Statistical analysis:

The data attained were statistically analyzed using the statistical Package for the Social Sciences (SPSS) version 24.0. Descriptive statistics were displayed as means and standard error (SE) for continuous variables or as frequencies and proportions for categorical variables. For

the anthropometric data, weights and heights were self-reported by the ones that filled the questionnaire and the Body Mass Index (BMI) were then calculated later by the ones that collected the data. The Body Mass Index (BMI) was calculated using the formula weight in kilograms divided by height in square meters (kg/m2). Based on the World Health Organization (WHO) studies on BMI cut-offs for adults, a BMI with a result lower than 18.5 kg/m^2 will be considered as underweight, 18.5-24.9 kg/m^2 as normal weight, greater than or equal to 25.0kg/m^2 as overweight, and greater than or equal to 30.0kg/m^2 as obese (WHO, 2018). Every item of the eating habit section was scored as (2) if the student's response was healthy or (1) if non-healthy. Scores were then added to get the eating habit total score (minimum=10 and maximum=20), a higher score on eating habits means better eating habits. To be able perform linear regression on categorical variables, the ones with more than two answers were split into a two response variable by the "recode into different variables" option on SPSS. For example, living situation was divided into living with parents and living alone/friends/roommates.

Descriptive analysis was used for all variables, to describe the basic features of the data of this study. The comparison of the mean eating habits scores within socio-demographic and psychological factors was performed using two tests: independent t-test and ANOVA (Analysis of Variance) test. Then, to determine which of the factors (social, living habits, and psychological) is linked to the eating habit score, the linear regression analysis method was performed, with the eating habit score as the dependent variable. For any of the analysis performed, a p-value less than 0.05 (usually ≤ 0.05) will be considered statistically significant.

Results

A) Socio-economic and Demographic:

The results used in the below section, belong to a study conducted on 100 AUB students that filled a questionnaire on the patterns and determinants of eating habits. Grouping data by gender (Female/Male) will be done, in order to distinguish and analyze the results. The questionnaire was filled by 79 females and 21 males (Figure 1), and the mean age of all students is 19.66 years old. Students' distribution in faculties based on their gender is represented in Figure 2, the figure shows that the majority of females under study belong to the faculty of art and science (FAS), and to the faculty of agriculture and food science (FAFS). On the other hand, the majority of the male students are from FAS, FAFS, and FEA (faculty of engineering). It can be seen that FAS has 38 females and 5 males, and FAFS has 32 females and 6 males. In Table 1, the socio-economic and demographic results of students based on their gender are presented. The chi-square test conducted shows that mother's degree and the gender of the students are statistically significant (p-value: 0.031).

Figure 1: Student distribution based on their gender

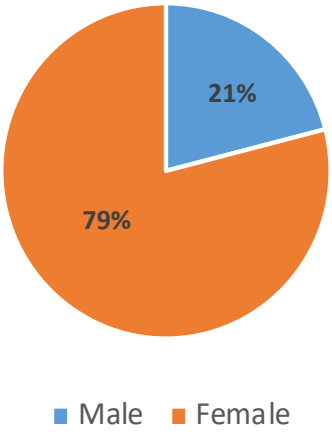
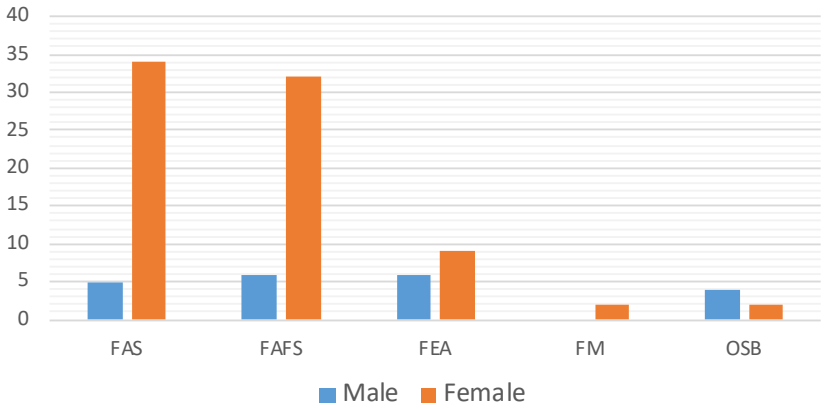


Figure 2: Faculty distribution of students based on their gender



Variables	Male	Female	Association
N	21	79	
Mean (SD) Age			
	19.33 (1.317)	19.75 (1.445)	p-value= 0.238
Nationality			
Lebanese	18	67	Chi-square: 0.070
Other	3	12	
Academic Degree			
Freshman	0	4	
Undergraduate	21	72	Chi-square: 0.368
Graduate MSc	0	3	
Living Situation			
Live alone	4	6	
Live with parents/relatives	15	48	Chi-square: 0.064
Live with roommates	2	25	
Mean (SD) rooms in the house			
	5.43 (2.336)	5.10 (2.279)	p-value= 0.562
Mean (SD) members in the house			
	4.29 (1.793)	4.44 (1.723)	p-value= 0.713
Mother Degree			
No Schooling	0	0	
Primary School	0	6	
Intermediate school	0	8	**Chi-square: 0.031**
High school	1	19	
Technical Diploma	2	7	
University degree	18	39	
Father Degree			
No Schooling	0	0	
Primary School	0	6	
Intermediate school	0	9	Chi-square: 0.177
High school	2	11	
Technical Diploma	2	10	
University degree	17	43	

Table 1: Socio-economic and demographic results of students based on their gender.

B) Lifestyle Habits:

The second section that students were asked to fill contained questions concerning their lifestyle, mostly about their weight, height, health consciousness, and alcohol consumption... Figure 3 clearly shows the calculated BMI distribution of the students, it can be seen that 57 females, which represent the majority, had a "normal" BMI. The number of students that were considered obese based on their BMI is very low (1 male and 2 females). None of the males fall under the "underweight" BMI range. Students were asked to describe their "weight status" using one of the four options: underweight, normal, overweight, and obese. The results of their answers were analyzed and represented in Figure 4, which shows the weight status of students based on their gender. The majority of the students, 44 females and 14 males, considered their weight status as "normal", however when looking at their actual BMI it appears that 58 females and 10 males lie under the range of "normal" BMI. On the other hand, 1 female and none of males considered themselves having an "obese" weight status, but actually 2 females and 1 male are obese. Table 2 shows the lifestyle habits results of students based on their gender, it can be shown from the table that there is a significant difference between the BMI categories of the students and their gender (p-value=0.009). The results of the chi-square test show that student's alcohol consumption and their exercise status are statistically significant with their gender (p-value: 0.012 and 0.021 respectively).

Figure 3: BMI distribution of students based on their gender

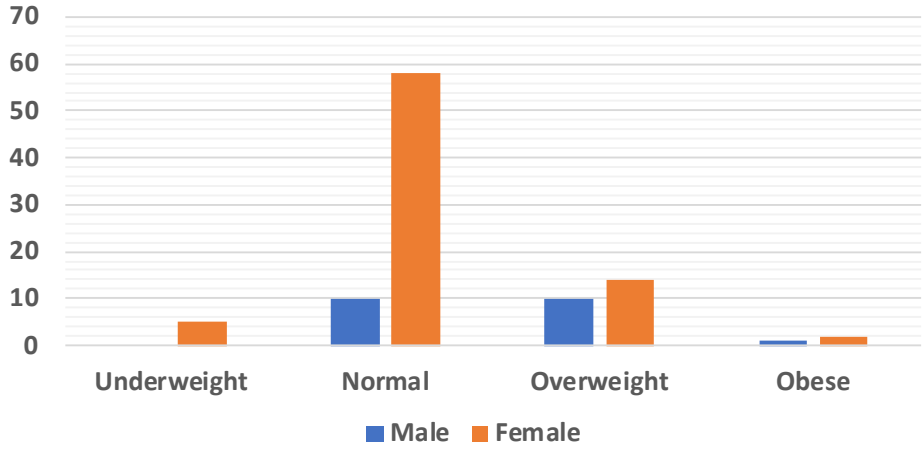


Figure 4: Weight distribution of students based on their gender

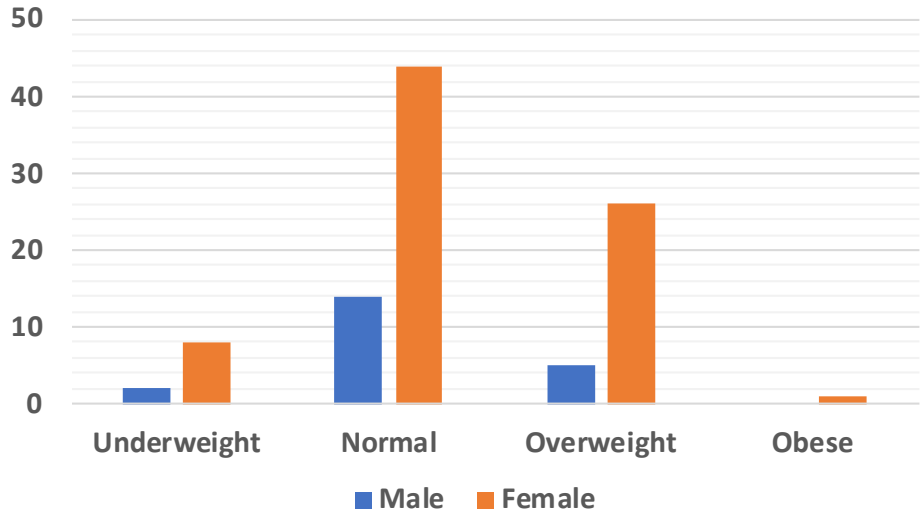


Table 2: Life-style habits results of students based on their gender.

Variable	Male	Female	Association
BMI categories			
Underweight <18.5	0	5	**p-value= 0.009**
Normal 18.5 – 24.9	10	58	
Overweight 25 - 29.9	10	14	
Obese >30	1	2	
Weight status			
Underweight	2	8	Chi-square= 0.787
Normal	14	44	
Overweight	5	26	
Obese	0	1	
Health conscious			
Yes	16	53	Chi-square= 0.262
No	4	26	
Alcohol consumption			
Two or three times per week	3	5	**Chi-square= 0.012**
Rarely	12	22	
Never	6	50	
Smoking status			
Current smoker	2	17	Chi-square= 0.070
Ex-Smoker	4	4	
Never smoke	15	58	
Exercises Status			
Yes	4	37	**Chi-square= 0.021**
No	17	42	

C) Psychological factors:

Students were asked to fill a table concerning the psychological factors affecting their eating habits. Table 3 shows the results of the psychological factors affecting student's eating habits based on their gender. As table 3 shows, the number of females is much greater in all the factors than that of the males, female students eat more when they feel lonely (42 females), out of control (46 females), feeling upset (51 females) ... It can also be shown that the majority of these female students eat the most when they are happy (59 females) and also when they're bored (57 females). The results of the chi-square test show no significant difference between the psychological factors listed in Table 3 and the student's gender.

Table 3: Psychological factors results based on student's gender

Variables	Male	Female	Association
Eat because of feeling lonely	10	42	Chi square = 0.612
Feeling out of control when eating	14	46	Chi square = 0.522
Eat so much	15	45	Chi square = 0.253
Eat because of feeling upset	15	51	Chi square = 0.602
Eat because of feeling bored	15	57	Chi square = 0.719
Eat because of feeling happy	12	59	Chi square = 0.095

D) Eating habit score (EHT)

To calculate the EHT, students had to answer questions concerning 10 items related to their eating habits (regular meals, snacks, vegetables and legumes…). The EHT was then calculated by adding up these items to get a score from 10-20, where 10 represents poor eating habits and 20 represents excellent eating habits. Figure 5 shows the EHT score mean for male students which was 16.71, in addition Figure 6 shows the EHT score mean for the female students which was 15.78. As shown in Table 4, there is no significance difference between the student's gender and their EHT score (p-value: 0.487), this means that the gender of the students does not affect their eating habits, there is no relation between gender and EHT. Additional

associations were made between EHT and the other factors to determine the factors affecting the EHT score. Table 4 shows the associations between EHT and the following three factors (social and demographic, lifestyle habits, psychological), using linear regression with EHT as dependent variable. The values shown are the p-values. Results show that rooms in the house, height, and health consciousness, exercise status (0.040, 0.049, 0.028, and 0.001 respectively) are the factors that affect the EHT score of the students because their p-values are statistically significant. (Table 4)

Figure 5: EHT score mean for male students

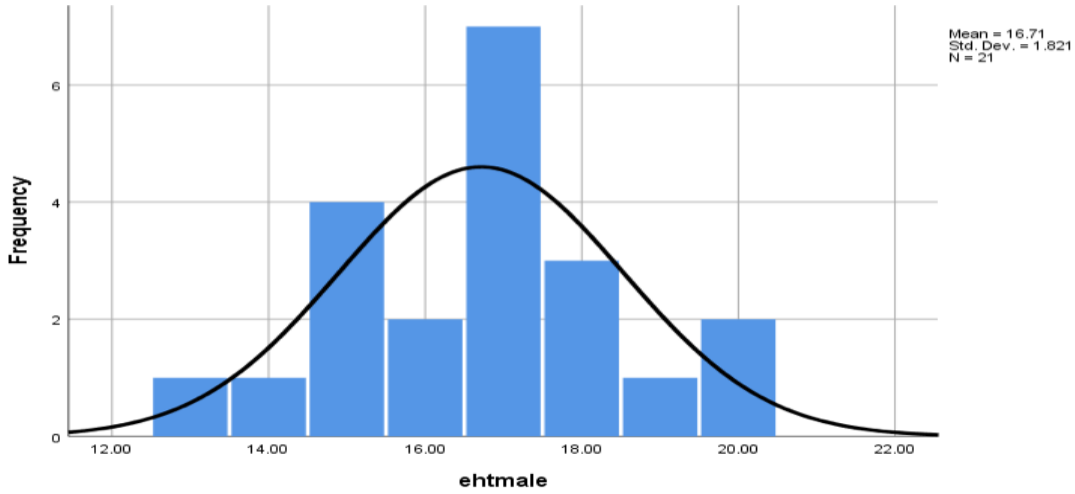


Figure 6: EHT score mean for female students

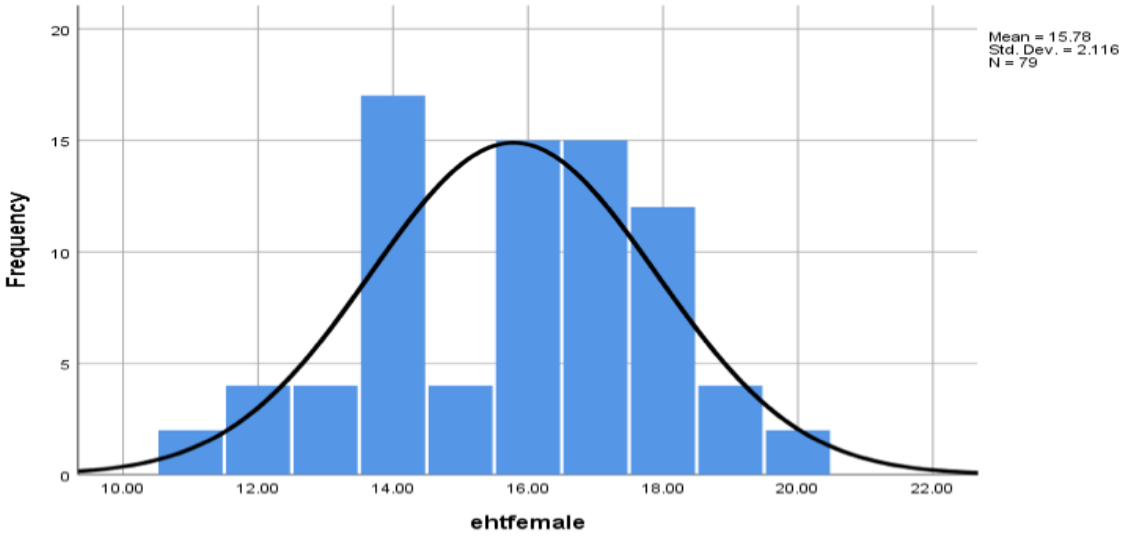


Table 4: Linear regression with EHT as dependent variable.

Association between EHT and socio-economic and demographic	
Gender	0.487
Age	0.467
Academic degree	0.070
Faculty	0.171
Major	0.816
Living situation	0.924
Rooms in the house	**0.040**
Members in the house	0.530
Income	0.260
Mother degree	0.243
Father degree	0.178
Association between EHT and Lifestyle habits	
Weight	0.699
Height	**0.049**
Health conscious	**0.028**
Alcohol consumption	0.243
Smoking status	0.197
Exercise status	**0.001**
Association between EHT and psychological factors	
Eat because of feeling lonely	0.551
Feeling out of control when eating	0.285
Eat so much	0.143
Eat because of feeling upset	0.921
Eat because of feeling bored	0.207
Eat because of feeling happy	0.157

Discussion

This study shows that among AUB students, the females under study had a better BMI (normal BMI) and weight status, are more health conscious, consume less alcohol and cigarettes, and have a better exercise status compared to that of the males. However, the difference in these parameters based on the student's gender was only significant (p-value<0.05) in the BMI, exercise status, and alcohol consumption. Since results are somehow similar and female students' results do not significantly differ from that of the male students, this proposes that any improvement plan that might be implemented should tackle both genders.

The students had different EHT score mean, where male students had a score mean of 16.71 and female students had a score mean of 15.78. To know the reasons behind the different scores, the association between EHT and the following factors: socio-economic and demographic, lifestyle habits, and the psychological factors affecting eating habits was done and significance was studied.

Results showed that the EHT score of the students was significantly affected by **the rooms in the house, height of the students, health consciousness, and exercise status**.

Studies that correlate with results that EHT is affected by the number of rooms in the house and the height of the students were not found (p-value= 0.04 and 0.049 respectively).
Results showed that EHT score is not significantly affected by the living situation of the students (p-value=0.924). However, several studies prove the opposite considering that the environmental changes university students pass through actually affect their EHT negatively. A study done to analyze the relationship between food consumption and living arrangements among university students, found that students living away from home consumed more sweets, cakes and snacks, and less vegetables and fruits (El Ansari et al., 2012). In fact, AUB is surrounded by a variety of fast-food chains and coffee shops that students visit frequently. Students staying at dorms consume more of this food than students who live at home and have an easier access to healthy food.

Both smoking and physical activity can affect the EHT, however in this study only physical activity was found significantly associated with EHT (p-value= 0.001), while smoking was not (p-value= 0.197). According to the study done by Global Burden of Disease (Rahim et al.,

2014), behavioral risk factors which include smoking consumption, unhealthy diets, and insufficient physical activity lead to obesity in adults and children. In other words, obesity elevate appetite and food cravings which lead to unhealthy eating habits. Another study also analyzed the nutrient intake of smoking students in Chungnam found that the frequency of missing meals, particularly breakfast in moderate smoker and heavy smoker was significantly high compared with non-smoker. The findings, also showed that heavy smokers appeared to drink coffee often more than the other two categories. They concluded that students who heavily smoke have unhealthy eating habit (Chloe et al., 2001). The result that regular exercise affects EHT correlates with a study done at the University of Texas, which discovered that daily physical exercise is related to healthy dietary habits. Students that exercise prefer lean meat, fruits and vegetable, and rarely consume processed products, sodas and other unhealthy choices (Joo et al., 2019).

Results showed that alcohol consumption was not significantly affected by EHT (p-value=0.243), yet a study done by researchers at the National Institute on Alcohol Abuse and Alcoholism (NIAAA), the National Institutes of Health (NIH), and the U.S. Department of Agriculture (USDA) found that there is a relation between eating habits and alcohol consumption. The study shows that people that consume large quantities of alcohol, even if not frequently, have unhealthy and imbalanced eating patterns (Jacka et al., 2011).

EHT was found to be affected by health consciousness (p-value= 0.028), this can be linked to a study done in Ghana on non-medical students. The study found a significant positive connection between health consciousness and eating habits (Botchway et al., 2015), it showed that individuals who are more aware of their health status and its impact on their life, appear to be more protective and conscious on what to consume, and happen to choose healthier food options.

All research studies face limitations, the limitations of this study might be due to several reasons. First, the study included 100 students which is considered an insufficient sample size, it's important to have a large sample size to get accurate and valid results. Second, the majority of the study sample is females, creating an unequal sized sample. Third, when using a self-administered questionnaire as a method to collect the data, there is a chance that some students might leave some questions unanswered and some might feel that it's hard for them to express their opinion in multiple choice questions only.

In this study, certain results were supported and linked to previous studies done on the eating habits. Conversely, available literature linked to the results of rooms in the house and the height of the students affecting EHT were not found. This suggests that further research must be done to study intensely the factors that affect the EHT of the students, and to reconsider and investigate the factors doubted to have an association with EHT.

Conclusion

Conducting this study in other universities across Lebanon is recommended, to be able to determine other factors that affect the eating habits of all university students across Lebanon. The findings of this study show that the eating habits of students are affected by their health consciousness and exercise status. Students that are more aware of their health status and its impact on their life, and also exercise regularly are found to have better eating habits. The eating habits of students can be influenced by several factors, assessing and controlling these factors will lead to better and healthier eating habits.

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