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## Original Research Article

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# Physical Activity and Smoking Habits in Relation to Weight Status among Lebanese University Students

## Abstract

**Purpose:** Understanding factors that impact overweight or obesity is an essential step towards formulating programs to prevent or control obesity in young adults. Thus, we aim to assess the prevalence of physical activity and smoking habits in relation to weight status among a sample of university students.

**Methods:** A cross-sectional survey was conducted among 220 students, chosen randomly from the Lebanese American University campus, using a self reported questionnaire that included age, field of study, physical activity (International Physical Activity Questionnaire) and smoking habits. Anthropometric measurements were taken to calculate body mass index. Adiposity measure was determined as percentage body fat using bioelectrical impedance.

**Results:** This study showed that the majority of the students were physically active. Vigorous-intensity physical activity practice was observed more among male than female students. Overweight students showed lower physical activity levels compared to normal weight students and higher percentage of body fat. The majority of students reported that they never smoked. Smokers in general were of normal weight than overweight.

**Conclusion:** Our findings suggest that the prevalence of physical activity among students was high and it was *associated with students' weight status; whereas, smoking was uncommon. Promoting* physical activity, as a weight control strategy, among students especially females is recommended.

**Keywords:** Body mass index; Body fat; Obesity; Overweight; Physical activity; Smoking.

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## Introduction

Obesity, physical inactivity and smoking are of public health concerns due to their association with chronic diseases such as heart disease, hypertension and type II diabetes [1, 2, 3]. Lebanese young adults are at increased risk of overweight and obesity due to the rapid shift in dietary and lifestyle patterns associated with globalization and sedentary lifestyles [4]. Considering the current “obesigenic” environment and the shift in food choices from staple crops to highly processed foods, young adults are prone to unhealthy behavior practices. Physical inactivity and smoking are key determinants for unhealthy behaviors. Therefore, we aim to examine physical activity and smoking habits in relation to weight status among a sample of university students. The findings from our study can provide insights for designing effective health promotion programs that are tailored to students’ needs.

## Methods

### Participants

Students were recruited randomly, by a trained student accompanied by an LAU professor, from the Lebanese American University campus in Beirut during the spring 2008 semester. Out of 230 students who were approached, 220 university students agreed to participate in this study.

### Design and sample

This study was a cross-sectional survey. Students voluntarily entered into the study and were provided with adequate information about the study protocol. The study was approved by the university research board. Students who agreed to participate in this study were asked to sign a consent form according to the Helsinki declaration. Of 220 students, 123 were enrolled in

undergraduate science programs and 97 were in non-science majors.

### Data Collection

Students first filled out a questionnaire about their physical activity and smoking habits. Then, their anthropometric measurements were taken within two days.

#### *Physical Activity Questionnaire*

The International Physical Activity Questionnaire - short form (IPAQ-S) was used to assess students’ activity levels [9]. The validity and reproducibility of the questionnaire had been tested and accepted internationally for assessment of physical activity levels among university students [10, 11]. Prior to questionnaire administration, students were informed by an LAU professor about the importance of filling out the questionnaire completely and truthfully and were given instructions on how to fill out the IPAQ questionnaire. The questionnaire took approximately 10 minutes to complete and a trained research assistant was present to assist students. The short-form of the IPAQ consists of seven-item-self-report instrument that assess physical activity (at least 10 minutes at a time) across different domains (work, house/yard work, transportation and leisure time/exercise or sport). Physical activity levels are assessed by asking students questions on how often (the number of days per week) and for how long (the average time in minutes) he/she has been active at vigorous intensity, moderate intensity and walking activities. The IPAQ assigns MET levels of 8.0, 4.0, and 3.3 to vigorous-, moderate-intensity, and walking activities, respectively. MET-min-wk is calculated as: MET level x minutes of activity/day x days per week. Each students’ physical activity level was computed and recorded in metabolic equivalent minutes per week (MET-min-wk). According to the IPAQ scoring protocol, students were grouped into three categories (high, moderate, low). A detailed description of the scoring protocol is available on-line (International Physical Activity Questionnaire, 2005) [9].

### Anthropometric measurements

After filling out the questionnaire, students' anthropometry were measured including height and weight, percentage body fat and body mass index (BMI). Weight, percentage body fat and BMI were determined using Tanita scale body fat analyzer 300 A (TBF 300). As fluctuations in body hydration status may affect body composition results, Tanita scale measurements were taken in the morning (at least three hours after waking up) when students were on an empty bladder, not having exercise, food or drink for at least three hours before having the measurements. Students were asked to wipe off the bottom of their feet before stepping onto the measuring platform, since unclean foot pads may interfere with conductivity. Height measurements were taken with a secured metal ruler. Students were asked to take off their shoes for height measurements. BMI was calculated to assess students' weight status. According to guidelines stated by the National Institutes of Health, weight status was classified into four categories: underweight (BMI  $\leq$  18.5), normal weight (BMI between 18.5 – 24.9), overweight (BMI between 25- 29.9), and obese (BMI  $\geq$  30) [3]. Normal range for percentage body fat was considered as follows: 10-20% for males and 20-30% for females.

### Data Analysis

Statistical analyses were performed using the Statistical Package for Social Sciences (version 13.0, SPSS, Inc) software. Analysis of variance (ANOVA) was used to examine differences in the physical activity levels of students. Descriptive

statistics were expressed as means  $\pm$  SD. Data for physical activity was analyzed according to IPAQ guidelines. Results for physical activity levels were expressed as percentages. Percentages were computed for all levels of physical activities (walking, moderate and vigorous). MET-min per week was calculated for each of walking, moderate and vigorous physical activity levels. In addition, levels of physical activity were examined in relation to weight status among male and female students. Parametric variables were analyzed using *student's- test*, while chi-squared analyses were conducted for non-parametric variables. All reported *P* values were made on the basis of 2-sided tests and compared to a significance level of 5%; differences were considered statistically significant at  $P < 0.05$ . A correlation coefficient was found to describe the strength of the relationship between BMI & % body Fat.

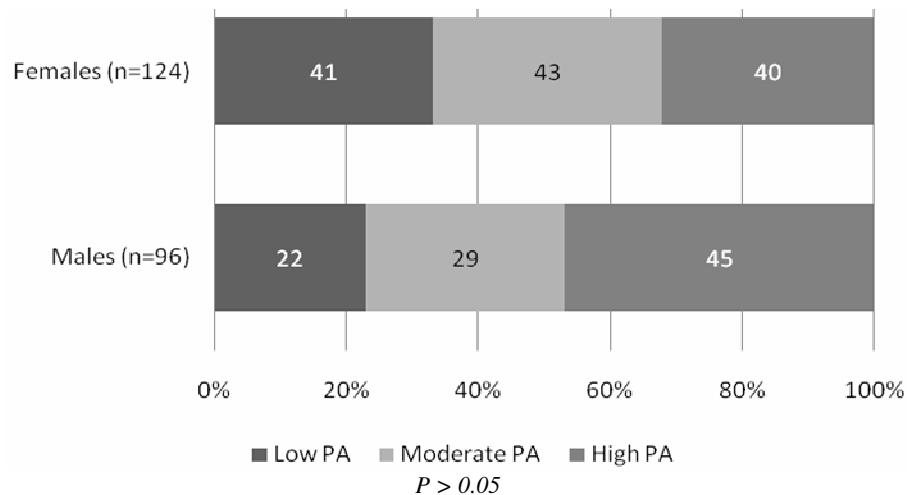
## Results

### Participant characteristics

Characteristics of the participants are presented in Table 1. A sample of 220 students (124 females and 96 males), mean age  $20.11 \pm 1.87$ , participated in this study. For age, weight, height, BMI, and percentage body fat, the *t-test* for independent samples was done to compare if there was a difference between males and females. As shown in **Table 1**, all the variables, except age, showed a significant difference between males and females ( $p < 0.001$ ). Of the 220 students, 123 were enrolled in science majors. For the "major of students" (science major vs. non-science major),

**Table 1:** Characteristics of the participated students (means  $\pm$  SD)

Variable	Total	Males	Females	P-Value
Number of Students	N = 220	N = 96	N = 124	
Age (years)	20.1 $\pm$ 1.87	20.3 $\pm$ 2.00	19.9 $\pm$ 1.757	>0.05
Weight (kg)	67.7 $\pm$ 15.82	79.6 $\pm$ 12.76	58.6 $\pm$ 11.23	<0.001
Height (m)	1.7 $\pm$ 0.09	1.8 $\pm$ 0.06	1.6 $\pm$ 0.05	<0.001
BMI	23.6 $\pm$ 4.11	25.3 $\pm$ 3.66	22.2 $\pm$ 3.94	<0.001
% Body Fat	23.7 $\pm$ 8.18	17.8 $\pm$ 4.52	28.3 $\pm$ 7.37	<0.001
Non-Science	97 (44.1%)	34 (35.4%)	63 (50.8%)	
Science	123 (55.9%)	62 (64.6%)	61 (49.2%)	0.023



**Figure 1:** Levels of physical activity (PA) by gender

a chi-square test was done since the variable is a categorical variable. The science major includes students majoring in biology, chemistry and nutrition. Results indicated that there is a significant difference between males and females; while females were equally divided between the two majors only one third of males chose non-science majors.

#### Prevalence of physical activity (PA) by gender

The frequency of physical activity levels by gender is presented in **Figure 1**. The majority of students were physically active. Seventy eight percent of males and 67% of female students reported moderate or high PA levels. However, there are differences in physical activity levels between gender. Vigorous-intensity physical activity practice was observed more among male students than females (46.9% vs. 32.3%, respectively). Low physical activity level (low PA) was more prevalent among female students compared to males (33.1% vs. 22.9% respectively).

#### Levels of physical activity (PA) by gender and weight status

Overweight students showed lower physical activity levels compared to normal weight students. 57.1% and 25.0% of overweight female and male students reported low physical activity

levels compared to 28.3% and 20.8% of normal weight students. Overweight female students showed significant lower physical activity levels compared to normal weight female students (57.1% vs. 28.3%) ( $P$ - Value = 0.034) (Table 2). There were no statistical significant differences between the percentage of overweight male students with low physical activity level and the percentage of normal weight male students with similar physical activity level (25.0% vs. 20.8%, respectively) ( $P > 0.05$ ) (Table 2). Students' weight status was correlated to percentage body fat. There was a significant positive correlation between BMI and percent body fat ( $r=0.38$ ,  $P<0.0001$ ). This indicates that higher BMI is associated with higher percent of body fat in our sample of students.

#### Prevalence of smoking among students

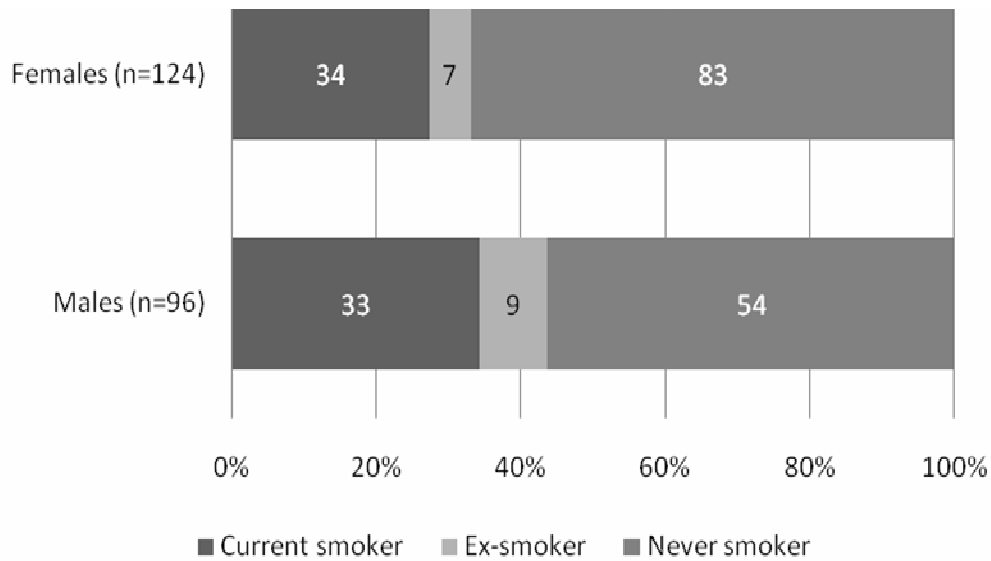
Among the 220 students, 66.9% of female students reported that they never smoked compared to 56.3% of males. Low percentage of students reported current smoking (27.4% in females and 34.4% in males) (Figure 2).

A higher percentage of female students with normal body weight reported current smoking compared to overweight students (28.2% vs. 23.8%) (Table 3). Similar findings were observed among male students. The percentage of students who reported current smoking among males was

**Table 2:** Levels of physical activity (PA) by gender and weight status

Weight Status	Levels of Physical Activity			Total
	Low PA	Moderate PA	High PA	
<b>Females<sup>1</sup></b>				
Normal	29 (28.3%)	39 (37.9%)	35 (34.0%)	103
Overweight	12 (57.1%)	4 (19.0%)	5 (23.8%)	21
<b>Males<sup>2</sup></b>				
Normal	10 (20.8%)	15 (31.3%)	23 (47.4%)	48
Overweight	12 (25.0%)	14 (29.2%)	22 (45.8%)	48

<sup>1</sup>P =0.034; <sup>2</sup> P >0.05

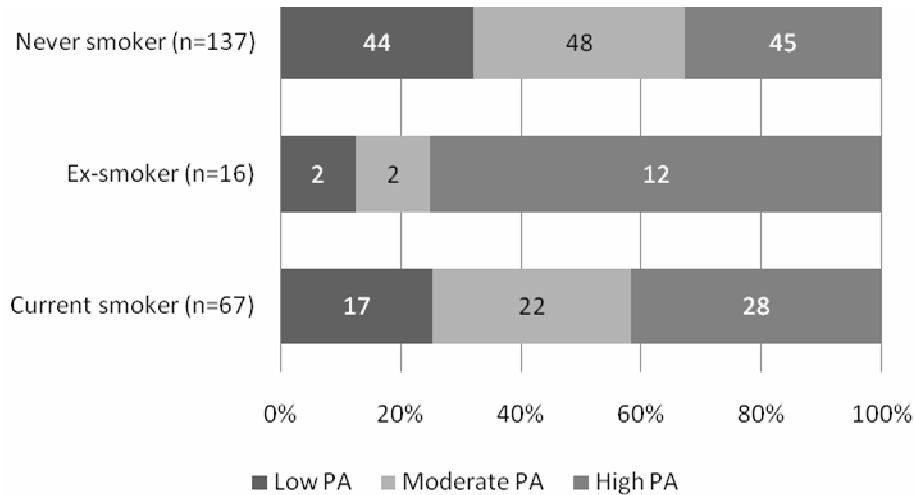


**Figure 2:** Smoking habit among students by gender

**Table 3:** Smoking habit among students by gender and weight status [N (%)]

Weight Status	Current smoker	Ex-smoker	Never smoked	Total
<b>Females</b>				
Normal	29 (28.3)	39 (37.9)	35 (34.0)	103 (100)
Overweight	N=12 (57.1)	4 (19.0)	5 (23.8)	21 (100)
<b>Males</b>				
Normal	19 (39.6)	5 (10.4)	24 (50.0)	48 (100)
Overweight	14 (29.2)	4 (8.3)	30 (62.5)	48 (100)

P >0.05



$P < 0.05$

**Figure 3:** Smoking habit versus levels of physical activity among students

higher in normal weight than overweight students. 62.5% of overweight male students reported that they never smoked compared to 50% in the normal weight category (Table 3).

#### Smoking habit versus levels of physical activity among students

The correlation between students' smoking habit and levels of physical activity was statistically significant. Students who reported high level of physical activity were distributed, based on their smoking status, as follows: 33% were "never smoker", 75% were "ex-smoker" and 42% were "current smoker". For low level of physical activity, students were distributed as follows: 32% were "never-smoker", 12.5% were "ex-smoker" and 25% were "current-smoker".

#### Discussion

This study assesses the prevalence of physical activity and cigarette smoking habits in relation to weight status among a sample of Lebanese university students. Levels of physical activity were assessed by using the short form of international physical activity questionnaire (IPAQ). Results showed that the majority of students were physically active. However, there was a gender difference in practice of physical

activity levels. Male students participated in vigorous physical activity levels more often than females and were more active than females. This observation is consistent with previously reported studies among college students [12, 13]. In a study conducted among college students, the author reported that male students participated in vigorous exercises and muscular strength/endurance activities more often than female students [12]. Likewise, a similar finding was reported in another study conducted among undergraduate science major students at the University of Juiz de Flora in São Paulo [13]. The author reported that male students were having higher levels of physical activity than females [13]. Similarly, a study conducted in Saudi Arabia among 1064 Saudi males and females reported that males participated in vigorous activity more than females [14]. In Egypt, a study conducted among 600 students attending Alexandria University hostels reported that 33.8% of the studied sample were physically inactive and 25.3% were overweight or at risk of being overweight [15]. Overweight students showed lower physical activity levels compared to normal weight students. It appears that the higher the physical activity level, the less the percentage body fat among students. Female students with low percentage of body fat showed



higher physical activity level compared to female students with high percentage of body fat. Similar findings were observed among male students, the higher the activity levels, the lower the percentage body fat. As expected, underweight students showed higher physical activity levels compared to overweight and obese students. This is commensurate with the statement of the World Health Organization (WHO), "The principal causes of the accelerating obesity problem worldwide are sedentary lifestyles and high-fat, energy-dense diets" [16]. Our results indicated that there is an association between physical activity and smoking habit. Seventy five percent of students who reported "ex-smoker" were practicing high level of physical activity. Thus, it appears that students who quitted smoking tried to compensate the effect of smoking by more exercise. Previous research studies reported smoking as a weight control strategy [6, 7, 8]. A recent study conducted among 1219 university students aged between 17 to 28 years in Jordan reported that smoking habit was associated with overweight and obesity [17]. The authors reported that the prevalence rate of smoking 22.1% and it was higher among overweight and obese students (84.2 % and 91.1%, respectively) compared to non-smokers (15.8% and 8.9% respectively) [17]. In our study smoking was not common among students and it was not influenced by students' weight status. This could be explained by the socioeconomic status of the studied students. The authors in the Jordan study reported that 45% of their students had a low-family income which is opposite to our study population. Students attend the Lebanese American University are of high socioeconomic standard. Our study showed that there was no gender difference in smoking habit among students. A similar finding to our results was reported in a previous study indicating that smoking was not associated with trying to lose weight among university students [18]. Developing programs to promote physical activity among students should be a priority for Health-care providers since these students are the future leaders, and physical activity practiced during university life may continue through adulthood.

## Conclusion

Our findings suggest that the prevalence of physical activity among students was high and it was associated with students' weight status; whereas, smoking was uncommon. It appears that students' physical activity level is a determinant of their weight status and percentage of body fat: the more the exercise, the less the body fat. Gender differences were observed in physical activity practice. Male students were engaged in vigorous physical activity more than females. This observation is consistent with a recent published paper on the prevalence of physical activity among adults in 20 countries [19]. Smoking habit was not common among students regardless of weight status. As regular physical activity is an important determinant for promoting good health [20], developing programs specially tailored to enhance physical activity among university populations, especially females, is essential. Students who practice physical activity during their university life may develop a long lasting adulthood practice of physical activity [21, 22, 23, 24]. Our findings add further support for a need to promote physical activity among students, particularly female students.

### *Limitations of the study*

The main limitation of this study is its generalizability. The Lebanese American University is a private university located in Beirut, Lebanon and students who attend it are usually of high socioeconomic status, therefore, the results of this study may not apply to public Lebanese universities. However, we believe that critical baseline information was provided in this study and results may facilitate the formulation of protocols to promote physical activity among all university students. Other limitations of this study stem from small sample size and

cross-sectional design. Small sample size limits the statistical power to detect significant differences in our analyses. Cross-sectional design cannot distinguish whether the low physical activity is a result or a cause of higher weight status.

### Contributions of Authors

We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. **NY** carried out questionnaire design, manuscript preparation and total coordination of the study. **AA** contributed to data analysis. **AA** contributed in the data collection and data entry. **SR** was actively involved in study's implementation, collection and coordination of data. All authors read and approved the final manuscript.

### Competing interests

The authors declare that they have no competing interests.

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