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BODY COMPOSITION STATUS OF THE LEBANESE UNIVERSITY STUDENTS ACCORDING TO GENDER AND ACADEMIC SPECIALISM, A COMPARATIVE STUDY

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Abstract. **Aim.** The purpose of the study is to identify, examine, and compare body composition status among Lebanese university students based on gender and specialization. **Materials and Methods.** A sample of 384 students from the Lebanese University, Faculty of Education, was studied. The sample was divided as follows: Athletic males (n = 100) and Athletic females (n = 100), non-athletic males (n = 70) and nonathletic females (n = 114). Body Composition was assessed using the method of multifrequency bioelectrical analysis. Five primary direct measures of body composition variables (BM, BH, BFM, SMM, TBW) and seven derived indirect measures (BMI, PBFM, BFMI, PSMM, SMMI, IH, MFI) were assessed. **Results.** All Lebanese students' subsamples were found in normal body weight except the non-sport male students that were found overweight. Comparative results showed that the Sport specialty students had better and healthier body composition profile than their non-sport colleagues. As for gender-based classification, as expected, male students were taller and heavier than females on average in both sport and non-sport specialization categories. **Conclusions:** Findings support the need from educational and health authorities to develop and evaluate health-promotion and obesity-prevention programs for university communities especially for female gender and non-athletic students' specialisms.

Keywords: University students, body composition, obesity, gender, specialism, lifestyle

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СОСТАВ ТЕЛА У СТУДЕНТОВ ЛИВАНСКОГО УНИВЕРСИТЕТА В ЗАВИСИМОСТИ ОТ ПОЛА И АКАДЕМИЧЕСКОЙ СПЕЦИАЛИЗАЦИИ, СРАВНИТЕЛЬНОЕ ИССЛЕДОВАНИЕ

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Аннотация. **Цель** данного исследования состояла в оценке, изучении и сравнении состава тела ливанских студентов в зависимости от пола и специализации. **Материалы и методы.** В исследование включили 384 студента педагогического факультета Ливанского университета. Выборку разделили следующим образом: студенты (n = 100) и студентки (n = 100), занимающиеся спортом, а также студенты (n = 70) и студентки (n = 114), не занимающиеся спортом. Состав тела оценивали методом многочастотного биоэлектрического анализа. Оценивали пять основных прямых переменных состава тела (BM, BH, BFM, SMM, TBW) и семь производных косвенных переменных (ИМТ, PBFM, BFMI, PSMM, SMMI, IH, MFI). **Результаты.** Все подвыборки имели нормальную массу тела, за исключением студентов мужского пола, не занимающихся спортом, у которых обнаружили избыточный вес. По результатам сравнительного анализа установили, что студенты спортивных специальностей имели более здоровый профиль состава тела, чем их сверстники, не занимающиеся спортом. Что касается распределения по полу, то, как и ожидалось, студенты мужского пола были в среднем выше и тяжелее девушек вне зависимости от их принадлежности к спорту. **Выводы.** Полученные результаты подтверждают необходимость разработки и оценки программы укрепления здоровья и профилактики ожирения, инициированной органами образования и здравоохранения. Указанная программа особенно актуальна для женщин и студентов, не занимающихся спортом.

Ключевые слова: студенты, состав тела, ожирение, пол, специальность, образ жизни

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Introduction

Body composition monitoring is the only clinically available method for distinguishing among the body components [1]. For a better understanding of the human body, body composition studies have been raised to a completely new level, where human body composition is considered holistically as fat mass, muscle mass, protein mass, bones, minerals, intracellular water, extracellular water, visceral fat area, and so on [2].

The risk of morbidity and mortality increases particularly with increasing abdominal fat, while the body mass index (BMI) alone does not represent an adequate predictive indicator of the individual health status [3].

High-quality diets were inversely associated with overall mortality and cancer mortality among cancer survivors, on the other hand, Physical activity (PA) declines during early adulthood with higher rates of inactivity in university students [4]. This stresses the importance of lifestyle adaptations in primary as well as secondary prevention of non-communicable diseases [5]. The human body is made up of various tissues, which are made up of cells, and those cells are made up of atoms, and those compartments influence each other, and the origin and consistency of that rela-

tionship are critical in body composition research. It enables better understanding of the biology of human body composition and, as a result, better control of human health [2].

The transition from high school to university life is a critical time for change, often accompanied by the adoption of negative lifestyle habits including unhealthy nutrition [6]. Educating university students about healthy behavioral choices and in general a healthy lifestyle can be greatly achieved in university settings. University age is considered the optimal life period in youth for acquiring and developing lifelong lifestyle habits, which will influence their whole life [7]. University students face a diversity of challenges, including acclimating to a new environment. They engage in unhealthy eating habits and lifestyles such as meal skipping, snacking, fast food consumption, smoking, excessive internet use, inactivity, and sedentary behavior during this era of their lives. Sedentary activities (such as watching television, sitting, and computing) have also been associated with obesity and weight gain [8]. Stress, obesity, and movement disorders such as hypokinesia are the most common causes of premature death, along with chronic non-communicable diseases from which neither children nor young people are immune [9].

Lebanon has been undergoing a nutritional transition in food choices over the last few years, shifting from the typical Mediterranean diet to a fast food pattern. The fast-food industry has an impact on the dietary habits of young Lebanese adults. As a result, young people are becoming increasingly overweight and obese [10, 11].

Accurate and noninvasive techniques are important to assess body composition, as examples of these techniques, Ultrasonography (US), Bioelectric impedance analysis (BIA), Computed Tomography (CT), and Dual X-ray absorptionmetry (DXA) [12].

There are no studies that deal with body composition of the Lebanese University Students and accordingly scientific data are missing in terms of evaluation of this phenomenon. This study will contribute to create a unique actual model including baseline data of body composition for Lebanese Universities' students of both genders, which can be used in the future for screening, explaining, understanding, and assessing the lifestyle variables of university students. Therefore, the purpose of the study is to identify, examine, and compare body composition status among Lebanese university students based on gender and specialization.

Based on previous research in this area of study, the majority of university students were found in normal body weight while the prevalence of overweight and obesity cases were more common among males compared to females. Physical Inactivity, lifestyle variables like consumption of vegetables per day, minutes of VPA per week, and consumption of liquids per and unhealthy dietary patterns carried significant impact on Body composition [6, 7, 13, 14, 15, 16].

Based on the above literature, our study hypothesize that:

- Students from Faculties of Physical Education and Sports Sciences have better body composition status than students of other university specialisms.
- There are significant differences in the means of Body Composition indices between female students of Physical Education and Sports Sciences and other University specialisms.
- There are significant differences in the means of Body Composition indices between male students of Physical Education and Sports Sciences and other University specialisms.

Materials and Methods

Participants and Study Design

Based on a previous study on Lebanese University students [17], and according to Qualtrics Experience Management [18], a sample of 384 participants is judged representative at the 95 percent confidence level, with a standard margin of error of 5% in a Lebanese population of approximately 180850-university student [19]. Therefore, the study sample consisted of 384 Lebanese university students divided as follows: Two hundred (200) sportive students, males (n = 100) and females (n = 100) recruited from the faculty of education, physical education and sport major at the Lebanese university, in addition, 184 students males (n = 70) and females (n = 114) were recruited from non- sport majors of the same faculty.

Participants were in college age, and the inclusion criteria were being regular full-time students attending in the three Bachelor's academic years of the academic programme. Exclusion criteria were having any chronic disease, serious injury, or disability that does not allow participation in body composition tests. Students were recruited randomly, via classroom (Physical Education and Sport Classes), and other specialisms through student affairs offices assistance.

Instruments and Procedures

Variables such as body height (BH), body mass (BM), body fat mass (BFM) and percentage of body fat mass (PBFM), skeletal muscle mass (SMM) and percentage of skeletal muscle mass (PSMM), body mass index (BMI), index of hypokinesia (IH), body fat mass index (BFMI), total body water (TBW), skeletal muscle mass index (SMMI), muscle fat index (MFI), had been assessed, according to previously published procedures [13, 17, 20].

This study's participants volunteered to take part. Agreeing to participate in this study, participants were asked to sign a consent form, carried out by having them signing their body composition record confirming their participation. The data have been collected during the 2021. The research protocol was recognized in the Declaration of Helsinki [21].

Body mass and composition were determined using the Bioelectrical Impedance Analysis method and the InBody 270 (Biospace Co. Ltd, Seoul, Korea). Weight status was classified into four categories: underweight (BMI < 18.5), normal weight (BMI between 18.5–24.9), overweight (BMI between 25–29.9), and obese (BMI > 30) [22]. The following percentage body fat ranges were considered normal: 10–20 % for males and 18–28 % for females [23].

Data Analysis

The IBM's Statistical Package for the Social Sciences (SPSS, version 25) has been utilized to conduct all the statistical analyses. The significant level have been set at $p < 0.05$. Descriptive statistics: presenting the measures of central tendency and variability Mean, Standard Deviation (SD), Minimum (Min), Maximum (Max), The coefficient of variation (cV%), and the Kolmogorov-Smirnov test for distribution homogeneity (KST). Inferential statistics were accomplished using the Multivariate Analysis of Variance (MANOVA) to determine the significant differences among the gender and specialty of the sample groups.

Results

Descriptive statistics

As expected, male students were taller and heavier than females on average in both sport and non-sport specialization categories. It can be noted that most primary (5) and derived (7) parameters' values are higher in male students, which contributes to higher total BM in males [13, 20]. Exceptions are found in a higher body fat content in females, body fat mass index, and IH. Even though the mean body fat percentage was higher in females than in males, but values were within the healthy body fat percentage range: 10–20% for males and 18–28% for females [23]. The mean estimated BMI ranges for all sample groups fall in the normal weight range [22] except for the non-sport male sample which showed an overweight value of 27 kg/m^2.

According to university specialization, BMI values showed that the majority of examined students in the sport sample (82 % male and 78 % female) had normal weight (BMI in range of 18.50 and 24.99 kg/m^2), while normal weight of BMI among the non-sport sample was shown in (25% male and 64 % female).

Males in both sport and non-sport samples were of equal height (BH = 177 cm) while non-sport sample males were heavier (Tables 1, 3). Sport males had lesser values of fat mass, IH, body fat mass index, but higher values of skeletal muscle mass percentage, total body water, muscle fat index, indicating better body composition status. Regarding Females (Tables 2, 4), body height values were similar with (164 cm for sport sample and 163 for non-sport sample). Non-sport females were heavier as expected. Other primary and derived parameters showed similar and close values between both specializations' students.

Multiple Analysis of Variance (MANOVA)

Table 5 displayed MANOVA results used to determine the existence of statistically significant difference between sets of primary direct measures (n = 5, BM, BH, BFM, SMM, and TBW) and derived indirect measures (n = 7, BMI, PBFM, BFMI, PSMM, SMMI, IH, MFI) body composition variables. In the function of university major, Wilks' lambda primary variables – 0.661, $F = 38.68$, $p = 0.000$; Wilks' lambda derived variables – 0.721, $F = 20.83$, $p = 0.000$. In the function of gender: Wilks' lambda primary variables – 0.219, $F = 269.52$, $p = 0.000$, Wilks' lambda derived variables – 0.331, $F = 108.36$, $p = 0.000$. The above results are statistical evidences that body composition parameters of the samples of male and female students among the sport and non-sport majors of the Lebanese University has statistically significant differences on a general level. The Bonferroni Post Hock test determined the multiple comparisons between the four sample groups: male sport sample (MSS), Female sport sample (FSS), male non-sport sample (MNSS), and Female non-sport sample (FNSS). Significant differences were established across the four sample groups in all primary and derived body composition parameters except in:

Table 1

Descriptive Statistics for male PE and Sport students

Variable	Mean	SD	Min	Max	cV (%)	KST
Age	21.5	2.9	18.0	38.0	13.3	0.000
BH (cm)	177.0	0.1	159.0	199.0	3.8	0.064
BM (kg)	72.8	10.2	52.9	102.2	13.7	0.200
BMI	23.2	2.4	18.6	29.3	10.4	0.200
BFM (kg)	9.0	4.0	2.9	23.0	45.0	0.058
PBFM (%)	12.0	4.3	5.0	23.6	35.6	0.200
SMM (kg)	34.7	9.6	10.6	67.2	25.8	0.012
PSMM (%)	47.7	6.7	26.9	68.8	12.7	0.094
TBW (%)	62.8	5.0	38.9	73.6	7.9	0.142
IH (Index Unit)	0.5	0.2	0.2	0.9	30.8	0.200
MFI (Index Unit)	3.9	2.1	1.2	8.5	37.7	0.000
SMMI	11.2	2.0	4.7	19.4	21.4	0.006
BFMI	2.8	1.2	1.0	6.8	42.8	0.146

Note: Here and in tables 2–4 SD – Standard Deviation, Min – Minimum, Max – Maximum, cV (%) – Coefficient of Variation, KST – Kolmogorov Smirnov Test.

Table 2

Descriptive Statistics for female PE and Sport students

Variable	Mean	SD	Min	Max	cV (%)	KST
Age	21.8	4.1	18.0	41.0	18.9	0.000
BH (m)	164.0	0.1	152.0	177.0	3.4	0.011
BM (kg)	56.4	7.0	42.3	73.0	12.5	0.033
BMI	20.9	2.3	15.9	27.7	10.9	0.200
BFM (kg)	12.3	4.7	5.4	24.5	38.7	0.000
PBFM (%)	22.2	5.8	11.0	35.4	27.6	0.001
SMM (kg)	18.8	3.5	12.6	30.2	18.9	0.023
PSMM (%)	33.3	3.4	25.5	42.0	8.1	0.027
TBW (%)	56.8	4.9	47.9	66.8	8.7	0.002
IH	1.0	0.2	0.6	1.5	20.3	0.200
MFI	1.5	0.6	1.0	2.8	27.3	0.126
SMMI	7.0	1.4	5.0	10.8	16.2	0.097
BFMI	4.5	1.7	1.9	9.8	37.2	0.000

Table 3

Descriptive Statistics for male students of non-sport majors

Variable	Mean	SD	Min	Max	cV (%)	KST
Age	23.6	4.1	17.0	35.0	17.2	0.097
BH (m)	177.0	0.1	163.0	191.0	3.9	0.200
BM (kg)	87.4	16.4	52.2	142.9	19.3	0.200
BMI	27.8	4.9	16.9	39.6	17.8	0.823
BFM (kg)	22.2	10.0	2.0	51.6	45.1	0.339
PBFM (%)	24.3	7.7	3.8	39.8	31.6	0.364
SMM (kg)	40.8	14.0	24.5	99.0	31.5	0.200
PSMM (%)	46.7	5.8	32.0	70.2	13.0	0.032
TBW (%)	50.7	7.7	36.1	65.7	15.2	0.134
IH	0.9	0.2	0.2	1.7	24.6	0.007
MFI	1.8	1.0	1.4	10.4	54.5	0.000
SMMI	13.0	4.8	6.9	28.9	23.3	0.200
BFMI	7.1	3.1	0.6	14.7	44.5	0.297

Table 4

Descriptive Statistics for female students of non-sport majors

Variable	Mean	SD	Min	Max	cV (%)	KST
Age	21.9	4.7	18.0	48.0	21.4	0.000
BH (m)	163.0	0.1	150.0	175.0	3.2	0.004
BM (kg)	59.7	10.1	42.3	81.0	17.0	0.200
BMI	22.4	3.4	15.5	29.7	15.2	0.069
BFM (kg)	15.5	6.1	3.8	31.3	43.7	0.064
PBFM (%)	24.1	7.5	8.9	38.7	31.2	0.003
SMM (kg)	20.0	5.1	12.4	34.8	24.4	0.046
PSMM (%)	33.5	3.6	26.3	42.2	8.6	0.200
TBW (%)	53.4	4.7	44.0	62.6	8.7	0.045
IH	1.1	0.2	0.5	1.5	22.3	0.000
MFI	1.1	0.4	0.7	3.3	38.2	0.000
SMMI	7.5	2.1	4.7	11.7	22.0	0.972
BFMI	5.6	2.3	1.4	11.0	41.7	0.071

Table 5

MANOVA results – general differences between analysed sets of variables (primary and derived) with respect to gender and major of respondents

Variable	Multivariate Tests					
	Effect	Value	F	Hypothesis df	Error df	Sig.
Major based primary	Wilks' Lambda	0.661	38.68	5.0	378.0	0.000
Major based derived variables	Wilks' Lambda	0.721	20.83	7.0	376.0	0.000
Gender based primary variables	Wilks' Lambda	0.219	269.52	5.0	378.0	0.000
Gender based derived variables	Wilks' Lambda	0.331	108.36	7.0	376.0	0.000

• Primary (original) B.C. variables: BH in the sport males and non-sport male's sample groups, p = 1.00; BH in the sport females and non-sport females sample groups, p = 1.00

B – Derived (Index) B.C. variables:

• PBFM in the non-sport males and the non-sport females sample groups, p = 1.00; SMM in the sport females and the non-sport females sample groups, p = 1.00; PSMM in the sport males and non-sport males sample groups, p = 1.00; SMMI in the sport females and non-sport females sample groups, p = .898; IH in the sport females and non-sport females sample groups, p = .381.

The mean body fat mass percentage was higher in females than in males as expected, but values were within the healthy body fat percentage normative ranges [23]. Three student samples (sport males n = 100, sport females n = 100, non-sport females n = 114) were found within the PBFM healthy ranges (10–20 % males and 18–28 % females) while the non-sport males sample (n = 70) average was (24.3%). However, non-sport females were within the normal healthy ranges. The status of healthy BM in female students might be attributed to the general fact which considers females more worried about their body shape and weight than males at young ages [6]. "Thinness" body shape style is found to be more favorable in university settings as a mark of beauty based on sociocultural beliefs [24]. Based on university specialty, the percent body fat mass (PBFM) in the Lebanese physical Education and sport male students (12 %) was consistent with those percentages of the male students of the University of Belgrade, Serbia (13.01 %) [13], and slightly lower than the university students of Gdansk, Poland (14.28 %), the university students of Muricia, Spain (14.73 %) [25]. However, Lebanese females showed similar PBFM results (22.2 %) with the Serbian female colleagues (23.8 %) in which both gender scores were within the healthy PBFM ranges [20]. As for the non-sport sample, the Lebanese male scores of PBFM (24.3 %) which was above healthy average, was consistent with the average of Abu Dhabi police officers (25.31 %) [26], but higher than the PBFM percentage of the Korean university students (19.8 %) [16].

Regarding the BMI values, the third Lebanese sample group (non-sport males) was the only overweight sample scoring (27.8 kg/m^2), while all the three other samples were considered having normal BMI normative ranges (18.50–24.99 kg/m^2) [22]. Males showed higher BMI values than females. However, all students' samples' BMI means were within the healthy BMI ranges except the third sample (n = 70) which included (36 % overweight level, and 36 % obese level) compared to sample four (non-sport females) which showed only (23 % overweight level, and 0 % obesity level).

Nevertheless, the higher prevalence of overweight/obesity among our Lebanese non-sport male students (72 %) compared to that among Lebanese non-sport female students (23.0 %) is consistent with other studies [14, 27, 28] but is still alarming. Obesity at a younger age is a predisposing factor for adulthood obesity [27], and students who are overweight or obese at a younger age are more likely to stay obese as they get older [27].

Our study data revealed that significantly more males than females had a BMI greater than 25 kg/m^2 (46 % vs. 15 %). As compared to another previous Lebanese study [29], conducted at the Lebanese American university, males' results in our study were found alarming since the majority of the Lebanese American university students (64.7% n = 143) were of normal weight (49 % male students compared to 76.8% female students). However, these results could be misleading and should be interpreted with attention since the BMI scale is not a sufficiently reliable indicator of dietary status. Overweight among young physically active students may be attributed to the result of the high percentage of muscle mass [30]. Lebanese male physical education and sport sample students' BMI average (23.2 kg/m^2) was consistent with their colleagues in other countries like Serbia (24.5 kg/m^2) [13], Poland (24.17 kg/m^2), and Spain (23.64 kg/m^2) [25]. Regarding PBFM, the Lebanese male sport students attained better averages (12 %) than the Polish (Gdansk) males (14.28 %), and the Spanish (Murcia) Students (14.73 %), male university students from Madrid (Spain) (16.5%), Valencia (Spain) (18.75 %) and Valparaíso (Chile) (22.7 %) [25].

In Addition, the Lebanese female sport students' BMI average (20.9 kg/m^2) was similar to the Serbian university of Belgrade female BMI average for well trained (21.7 kg/m^2) [13], or for general students population (22.02 kg/m^2) [20].

As expected, male students were taller and heavier than females on average in both sport and non-sport specialization categories. It can be noted that most primary and derived parameters' values were higher in male students, which contributes to higher total body mass (BM) and body height (BH) in males. According to university specialty classification, the sport specialty students had better body composition averages than non-sport specialties had. Sport males had lesser values of fat mass, IH, BFMI, but higher values of skeletal muscle mass percentage, TBW, MFI, indicating better and healthier body composition status. Non-sport females were heavier as expected. Other primary and derived parameters showed similar and close values between both specializations' students.

In comparing descriptive results of the Lebanese students' body composition samples with samples of other countries like Serbia [13], South Korea [16], UAE [26], Poland and Spain [25], similar results were shown in total body water percentage (TBW) between Lebanese and Serbian students scoring (62.8 %, 63.9 % respectively for sport males, and 56.8 %, 55.83 % respectively for sport females). The percentage of skeletal muscle mass (PSMM) ranges were satisfactory (Around 50 %) in both Lebanese male student sample groups (Sport and non-sport) and were higher than the percentage of Abu Dhabi male police officers (42.2 %). In BFMI presented as body fat relative to body high, the Lebanese non-sport male students showed similar results with Abu Dhabi police officers with (7.1 and 6.95, respectively). However, Lebanese sport male students showed lesser value (2.8) indicating better body composition status. SMMI presented as SMM relative to body high, showed higher values in the Lebanese non-sport males (13.0) compared to Abu Dhabi police officers (11.19), while the Lebanese sport males showed similar SMMI value with an average of (11.20). The MFI presented as skeletal muscle mass relative to body fat mass (BFM), showed lower average in Lebanese sport males (3.9) compared to the Korean university students (4.6). In addition, the Korean female students showed better result (6.9) than the Lebanese sport females (1.5). Finally, the scores of IH which is an index unit presented as PBFM relative to BMI, were lesser and better in Lebanese sport males (0.5) compared to Abu Dhabi police officers average (0.94).

Finally, the MANOVA test used to determine the existence of statistically significant difference between sets of primary direct measures and derived indirect measures of body composition variables among the sport and non-sport ma-

jors of the Lebanese University showed statistically significant differences on a general level. On the gender-based level, and in the sport students' sample (Tables 1, 3), significant differences were detected in all primary (BH, BM, BFM, SMM, and TBW) and derived (BMI, PBFM, BFMI, PSMM, SMMI, IH, FMI) body composition variables where males were found heavier, taller, with higher BMI average, higher SMM, PSMM, SMMI, TBW, FMI, while females scored higher averages in BFM, PBFM, BFMI, and IH. However, the gender-based classification among the non-sport samples (Tables 2, 4) indicated significant differences between genders in all variables except in PBFM where males scored slightly higher averages than females.

On the university specialization level, and in males' university specialization classification, MANOVA has showed significant difference between sport males and non-sport males in most body composition indices except BH, and PSMM. However, females of both specializations showed significant differences in most indices except BH, SMM, SMMI, and IH. These results indicated an obvious supremacy in healthier body composition status of the sport sample students on their non-sport sample peers. The reasons lies in the level of physical activity, since it has been shown that exercise training have one of the major influences on the linear growth and muscle mass development [30].

Conclusion

Based on the obtained results, we can conclude the following: the body composition measurements of the Lebanese University students found supremacy and domination for male students over female students and for sport sample over the non-sport sample. Sport specialty students had better body composition averages than non-sport specialties had. Sport males had better body composition status than non-sport males with significant differences in 10 variables (BM, BMI, BFM, PBFM, BFMI, SMM, SMMI, TBW, IH, and MFI). Sport females also showed better body composition status than non-sport females with significant differences in 8 variables (BM, BMI, BFM, PBFM, BFMI, SMMI, TBW, and MFI). Non-sport male students' sample were found overweight while other student samples were found within the healthy normal weight average. This study created a unique actual model including baseline data of body composion for Lebanese Universities' students of both genders, which can be used in the future for screening, explaining, understanding, and assessing the lifestyle variables of university students. Moreover, and based on the research findings, the three research hypotheses have been accepted

Few limitations have been encountered by the author in this research. To begin with, the studied sample was representing only one faculty from one Lebanese university "The Lebanese University, Faculty of Education" out of around 40 national private and public universities in Lebanon. Secondly, the number of students in both gender categories of the non-sport sample was not equal, which could have influenced the results subjectively. This could, however, be attributable to the quantity of students in each field of study.

Finally, the study findings support the need from educational and health authorities to develop and evaluate health-promotion and obesity-prevention programs for university communities especially for female gender and non-athletic students' specialisms. Further studies in Lebanon should study lifestyle behaviors of larger samples engaging more universities from different Lebanese regions, socio-economic backgrounds, academic specialties, and higher ages including Master and Ph.D. Lebanese students.

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