**Body composition, physical fitness, physical activity and nutrition in Polish and Spanish female students of Sports Sciences**

**Guillermo F. López-Sánchez, Łukasz Radzimiński, Maria Skalska, Joanna Jastrzębska, Lee Smith, Dorota Wakuluk and Zbigniew Jastrzębski**

**ABSTRACT**

**Objectives**: It is important to study differences in body composition, physical fitness and lifestyle behaviours between university students from different countries to develop country-specific recommendations on health promotion to provide to students when transitioning to university. The objective of this study was to analyze the differences in body composition, physical fitness and lifestyle between Polish and Spanish students of Physical Activity and Sports Sciences. **Equipment and methods:** 230 female students participated. 188 females were from Poland and 42 females from Spain. Polish females were 21.2±1.9 yr old and Spanish females 21.1±2.2. The body composition variables measured were: body weight (kg), fat-free mass (FFM, kg and %), fat mass (FM, kg and %), total body water (TBW, kg and %), and basal metabolic rate (BMR, kcal), body mass index (BMI, kg/m2), fat-free mass index (FFMI, kg/m2), fat mass index (FMI, kg/m2). The physical fitness variables measured were: squat jump (SJ, height in cm, power in watts and w/kg), counter movement jump (CMJ, height in cm, power in watts and w/kg), running speed 10, 20, 30 m (time in s), progressive aerobic cardiovascular endurance run (PACER, stage, final speed in km/h, distance in m, VO2max in ml/kg/min). Lifestyle variables measured were: vigorous physical activity (VPA, days/week, min/week), moderate physical activity (MPA, days/week, min/week), walking (days/week, min/week), sitting (min/week), meals/day, vegetables/day, fruits/day, seafood/week, dairy products/week, sweets, chips, fast food/week, litres of liquid/day, litres of sugary drinks/day, alcohol/week, and cigarettes/day. **Results:** Polish females had more favourable profiles than Spanish females for body composition and physical fitness, and consumed more vegetables, more fruits and more liquids. Spanish females did more physical activity, consumed more seafood, more dairy products, less sweets, chips, fast food, less sugary drinks, less alcohol and less tobacco than Polish females. **Conclusions:** Curricula should be adapted, in Poland to promote a healthier lifestyle and in Spain to improve body composition and physical fitness.

**Keywords:** fitness, physical activity, diet, obesity, diabetes.

**1. INTRODUCTION**

The transition to university implies changes in lifestyle, a distancing from the family nucleus, greater independence, and an increase in social relations with the peer group [1]. Many university students assume new responsibilities, becoming a vulnerable population group from the point of view of nutrition and lifestyle [2-3]. These new responsibilities can provoke a reduction in time dedicated to take part in physical activity and may also result in a decrease in the quality of diet, and as consequence of this, body composition and physical fitness of students may worsen considerably during the years of university [2-3]. Findings of studies carried out in several countries around the world have showed how insufficient activity, poor quality diet and smoking are serious health concerns among university students [4-5].

Some studies have shown that students of Physical Activity and Sports Sciences have a healthier lifestyle, a better cardiovascular profile and less body fat than students of other university disciplines [6]. This may be due to the curricula of Physical Activity and Sports Sciences, which promote an active and healthy lifestyle, in addition to having practical lessons where students are physically active.

However, there are no studies comparing differences in body composition, physical fitness and lifestyle between students of Sports Sciences from different countries, particularly from Northern and Southern Europe. Such a study is needed to provide country specific recommendations on health promotion to students when transitioning to university.

Therefore, the objective of this study was to analyze differences in body composition, physical fitness and lifestyle between students of Physical Activity and Sports Sciences of two different countries of Europe: Poland (Northern Europe) and Spain (Southern Europe).

**2. METHODS**

**2.1. Participants**

The sample composed of 230 female students of Physical Activity and Sports Sciences. All participants were Caucasian and were studying at university. According to the country, 188 females were from Poland and 42 females from Spain. According to age, Polish females were 21.2±1.9 yr old and Spanish females 21.1±2.2. Inclusion criteria were: being females, and 3rd year Bachelor students of Sports Sciences in Gdansk (Poland) or Murcia (Spain). Exclusion criteria were: having any disease or injury that does not allow participation in physical fitness tests. The participants were selected randomly from those attending the 3rd year Bachelor in Sports Sciences in Gdansk (Poland) or Murcia (Spain). The Polish 3rd year Bachelor students studied at Gdansk University of Physical Education and Sport (Poland) and the Spanish 3rd year Bachelor students at the Faculty of Sports Sciences of the University of Murcia (Spain). Each week, Polish students participated in 22 hours of lessons (10 h inactive theoretical lessons, 4 h inactive practical lessons and 8 h active practical lessons), while Spanish students participated in 21 hours of lessons (11 h inactive theoretical lessons, 5 h inactive practical lessons and 5 h active practical lessons). In accordance with the Helsinki Declaration, the students were provided with detailed information about the research procedures and gave their written consent. This study received ethics approval from the research ethic committees of the institutions.

**2.2. Procedures**

All tests were administered by trained research assistants. All tests were carried out in 2017 (February, March, April and May).

*2.2.1. Body Composition Analysis*

All participants were measured for selected body mass and body composition variables. Measurements were performed in the morning, more than three hours after waking up and after last eating and drinking. Body mass and body composition were assessed with the bioelectrical impedance method (body’s inherent resistance to an electrical current) using a Tanita BC 418-MA body composition analyzer (Tanita, Tokyo, Japan). All the recommendations for the analysis of bioelectrical impedance were followed. The device was calibrated to account for the weight of clothing (0.2 kg). Afterwards, data regarding age, sex and body height of the subject were entered. Stadiometer HM - 250P Leicester (Marsden Scales, Rotherham, United Kingdom) was used to measure the height. Then, the subjects stood on the scale with their bare feet and hands on the marked places. The device analyzes body composition based on the differences of the ability to conduct electrical current by body tissues (different resistance) due to different water content. The variables measured were: body weight (kg), fat-free mass (FFM, kg and %), fat mass (FM, kg and %), total body water (TBW, kg and %), and basal metabolic rate (BMR, kcal). Additionally, the following were calculated: body mass index (BMI, kg/m2), fat-free mass index (FFMI, kg/m2) and fat mass index (FMI, kg/m2). TANITA BC 418-MA is a reliable system, with a good same-day test-retest reliability, no mean bias from test to test, and excellent limits of agreement (<1%). It is on a par with assessment by skinfold thickness and provides a non-invasive alternative, which requires less operator training [7].

*2.2.2. Jump tests*

The following vertical jumps were evaluated: Squat Jump (SJ) and Counter Movement Jump (CMJ). Jump tests were carried out on an Optojump jump platform, obtaining flight time and jump height. The Optojump photocell system has a strong concurrent validity and excellent test-retest reliability for the estimation of vertical jump height: high intraclass correlation coefficients for validity (0.997–0.998), excellent test-retest reliability (0.982-0.989), low coefficients of variation (2.7%), and low random errors (±2.81 cm) [8]. To calculate peak anaerobic power output or PAPw, Sayers formula was used [9]: *PAPw (Watts) = 60.7 ∗ jump height (cm) + 45.3 ∗ body mass (kg) – 2055.* The resulting *PAPw* obtained with this formula was divided by the body mass of the participant.

*2.2.3. Running speed tests (10, 20, 30 m)*

In Spain running speed tests were performed on a synthetic surface (outdoor). The chosen distances were 10, 20 and 30m, starting from the standing position. The air temperature was ≈20°C, the air pressure was ≈1000 mmHg, and the humidity was ≈60%. No precipitation occurred three days before the tests. The wind speed did not exceed 2 m/s, the starting line was always placed in the same manner to minimize the air resistance, and the students ran in the direction of the wind. In Poland the tests were performed indoor on a synthetic surface. External conditions were similar to Spain. Participants carried out a 10-min warm-up to prepare the subjects for the running speed tests. The warm-up involved 5 min of running at 55% of HRmax and 5 min of stretching (static and dynamic). The running speed was measured for the following runs: 10, 20, and 30 m runs (from a standing position). The times were measured using an electronic TAG Heuer system (model HL 2-31, Switzerland), recommended by Yeadon, Kato, & Kerwin [10], and it included two photocells with a mechanism for preventing premature switching on (starting line) and off (finishing line). This is a reliable system, with a low margin of error (<0.026 m/s) [10]. Each distance was covered by the students separately. The time between crossing the starting line and reaching the finishing line was measured. Times between other photocells within the distance were not considered. The runs were performed twice, and the shorter time results were analyzed. The students always started the run from a standing position with their forward foot on the starting line. The recovery time between the tests was 5 min. Active recovery (2.5 min of marching alternated with 2.5 min of static stretching) was administered to the students during the breaks. This protocol has been used in several previous studies [11-13].

*2.2.4. PACER (Progressive Aerobic Cardiovascular Endurance Run) test*

The external conditions were the same as the in speed tests. This PACER test is an audible, continuous and incremental maximum test until fatigue is reached. The objective of this test is to measure the maximum aerobic power. It consists of running for as long as possible between two lines with a separation of 20m in two directions, running back and forth. In the test, the subject moves from one point to another making the change of direction to the rhythm imposed by a sound signal. The participants were placed behind the starting line one meter away from each other. When the tape recorder started and the participants heard the signal of exit they moved until the opposite line (20m) and stepped on it, waiting to return till they hear the following signal to continue. The line had to be stepped on at the same time as the signal sounded. The test ended when the subject reached fatigue or when he was unable to step behind the line in time for two consecutive times. The speed obtained in the last completed stage was considered as the final speed reached and it was used to estimate the VO2max [14]. The reliability of PACER is very high, with a correlation between test and retest of *r*=0.97 [14].

*2.2.5. Lifestyle evaluation*

Lifestyle was evaluated with a questionnaire of 14 items. All participants reported how much vigorous physical activity (VPA) and moderate physical activity (MPA) they did (days/week and minutes/week). The questionnaire provided definitions for VPA and MPA: https://www.who.int/dietphysicalactivity/physical\_activity\_intensity/en/ [15]. Participants also reported time spent walking (days/week and minutes/week) and time spent sitting (mins/week). Moreover, they reported several diet aspects: meals/day, vegetables/day, fruits/day, seafood/week, dairy products/week, sweets, chips, fast food/week, litres of liquid/day, and litres of sugary drinks/day. Finally, participants also indicated how many times they drank alcohol per week and how many cigarettes they smoked per day. This questionnaire was piloted by the research team and tested in 40 students (20 Polish and 20 Spanish) to check that there were not problems in any items. During this test, the 40 students did not report any problems of understanding with any item. The questionnaire was designed according to World Health Organization (WHO) recommendations for a healthy lifestyle [15].

**2.3. Data analysis**

A record sheet was designed in which the values obtained by each student in each of the tests were recorded. SPSS v. 23 was used for all analyses and the significance was set at p<0.05 in all the cases. Kołmogorow-Smirnow test was applied to check normality and Levene test was used to check homogeneity of variance. Descriptive statistics were analysed and the significant differences between Polish and Spanish students were studied using the independent samples t-test. In addition, the effect size was calculated using Cohen’s *d* [16].

**3. RESULTS**

All participants completed the study. Polish females had favourable results compared to Spanish females for body composition, weight, BMI (p<0.05) and fat mass. (Table 1).

| **Table 1.** Comparison of body composition of females from Gdansk and Murcia | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Gdansk (n=188) | Murcia (n=42) | Dif. | *t* | df | Sig. | *d* |
| Height (m) | 1.67 ± .06 | 1.64 ± .06 | .02 | 1.896 | 177 | .060 | .323 |
| Weight (kg) | 60.41 ± 9.01 | 62.43 ± 11.86 | 2.01 | 1.149 | 178 | .252 | .196 |
| BMI (kg/m2) | 21.59 ± 2.81 | 22.86 ± 2.74 | 1.26 | 2.490 | 177 | .014\* | .425 |
| FM (%) | 25.10 ± 6.46 | 26.77 ± 4.77 | 1.67 | 1.783 | 80.387 | .078 | .304 |
| FFM (%) | 74.89 ± 6.46 | 73.22 ± 4.77 | 1.67 | 1.783 | 80.387 | .078 | .304 |
| TBW (%) | 54.76 ± 4.70 | 54.02 ± 6.02 | .74 | .818 | 176 | .415 | .139 |
| FM (kg) | 15.69 ± 5.95 | 16.89 ± 5.08 | 1.19 | 1.145 | 178 | .254 | .195 |
| FFM (kg) | 44.72 ± 4.15 | 45.53 ± 8.48 | .81 | .582 | 43.159 | .563 | .099 |
| TBW (kg) | 32.75 ± 3.01 | 33.51 ± 6.33 | .76 | .731 | 42.906 | .469 | .124 |
| BMR (kcal) | 1389.15±122.64 | 1418.43±247.52 | 29.27 | 1.023 | 177 | .308 | .174 |
| FMI (kg/m2) | 5.56 ± 2.01 | 6.17 ± 1.61 | .61 | 1.742 | 177 | .083 | .297 |
| FFMI (kg/m2) | 16.03 ± 1.36 | 16.68 ± 1.84 | .65 | 2.437 | 177 | .016\* | .415 |
| Values are Mean ± SD. p<.05\* p<.01\*\*. BMI (body mass index), FM (fat mass), FFM (fat-free mass), TBW (total body water), BMR (basal metabolic rate), FMI (fat mass index), FFMI (fat-free mass index). | | | | | | | |

Polish females had higher levels of physical fitness than Spanish females, with better results in squat jump, countermovement jump (p<0.05), 10 m and 20 m running speed (p<0.05), and cardiovascular endurance. Spanish females had better values in 30 m running speed. (Table 2).

| **Table 2.** Comparison of physical fitness of females from Gdansk and Murcia | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Gdansk (n=188) | Murcia (n=42) | Dif. | *t* | df | Sig. | *d* |
| SJ Height (cm) | 23.53 ± 4.13 | 22.83 ± 4.21 | .70 | .942 | 194 | .347 | .161 |
| CMJ Height (cm) | 28.58 ± 4.57 | 23.51 ± 4.03 | 5.07 | 6.333 | 194 | .000\*\* | 1.081 |
| SJ (watts) | 2116.58 ± 455.63 | 2159.40 ± 625.26 | 42.82 | .464 | 159 | .643 | .079 |
| CMJ (watts) | 2418.63 ± 478.33 | 2200.52 ± 610.94 | 218.11 | 2.311 | 159 | .022\* | .394 |
| SJ (w/kg) | 35.01 ± 4.19 | 34.25 ± 4.29 | .76 | .961 | 159 | .338 | .164 |
| CMJ (w/kg) | 40.12 ± 4.76 | 34.94 ± 4.14 | 5.18 | 6.094 | 159 | .000\*\* | 1.040 |
| Sprint 10 m (s) | 1.93 ± 0.38 | 2.11 ± 0.14 | .18 | 4.437 | 135.584 | .000\*\* | .757 |
| Sprint 20 m (s) | 3.32 ±0.66 | 3.67 ± 0.23 | .35 | 4.901 | 135.279 | .000\*\* | .836 |
| Sprint 30 m (s) | 5.19 ± 0.33 | 5.15 ± 0.34 | .04 | .603 | 170 | .548 | .103 |
| PACER (Stage) | 7.21 ± 1.63 | 6.62 ± 1.70 | .59 | 1.658 | 149 | .099 | .283 |
| PACER Final Speed (km/h) | 11.39 ± .83 | 11.22 ± .86 | .17 | .961 | 149 | .338 | .164 |
| PACER Distance (m) | 1088.25 ± 335.97 | 1005.60 ± 314.77 | 82.65 | 1.135 | 149 | .258 | .1937 |
| PACER VO2max (ml/kg/min) | 40.98 ± 5.01 | 39.92 ± 5.20 | 1.06 | .961 | 149 | .338 | .164 |
| Values are Mean ± SD. p<.05\* p<.01\*\*. SJ (squat jump), CMJ (countermovement jump), PACER (Progressive Aerobic Cardiovascular Endurance Run test). | | | | | | | |

Spanish females had favourable physical activity habits compared to Polish females, doing more vigorous physical activity, more moderate physical activity (p<0.05), more walking, and spending less time sitting (p<0.05). (Table 3).

| **Table 3.** Comparison of physical activity of females from Gdansk and Murcia | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Gdansk (n=188) | Murcia (n=42) | Dif. | *t* | df | Sig. | *d* |
| VPA (days/week) | 2.79 ± 1.26 | 3.22 ± 1.77 | .42 | 1.365 | 58.631 | .177 | .233 |
| VPA (mins/week) | 198.61 ± 128.85 | 257.43 ± 207.47 | 58.82 | 1.629 | 52.228 | .109 | .278 |
| MPA (days/week) | 2.57 ± 1.39 | 4.12 ± 2.06 | 1.55 | 4.309 | 56.646 | .000\*\* | .735 |
| MPA (mins/week) | 180.96 ± 141.43 | 373.00 ± 433.18 | 192.03 | 2.734 | 43.056 | .009\*\* | .466 |
| Walking (days/week) | 4.82 ± 2.01 | 5.60 ± 2.18 | .77 | 1.931 | 117 | .056 | .329 |
| Walking (mins/week) | 263.45 ± 244.61 | 323.00 ± 451.85 | 59.54 | .779 | 50.588 | .440 | .133 |
| Sitting (mins/week) | 2515.66 ± 942.35 | 1786.75 ± 1356.68 | 728.91 | 3.061 | 57.760 | .003\*\* | .522 |
| Values are Mean ± SD. p<.05\* p<.01\*\*. VPA (vigorous physical activity), MPA (moderate physical activity). | | | | | | | |

Spanish females consumed more seafood (p<0.05), more dairy products (p<0.05), less sweets, chips, fast food, less sugary drinks, less alcohol (p<0.05) and less tobacco. Polish females consumed more vegetables (p<0.05), more fruits and more liquids. (Table 4).

| **Table 4.** Comparison of nutrition of females from Gdansk and Murcia | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Gdansk (n=188) | Murcia (n=42) | Dif. | *t* | df | Sig. | *d* |
| Meals/day | 4.20 ± .84 | 4.37 ± .97 | .17 | 1.008 | 122 | .315 | .172 |
| Vegetables/day | 2.82 ± 3.36 | 1.63 ± 1.19 | 1.18 | 2.157 | 122 | .033\* | .368 |
| Fruits/day | 2.00 ± 1.24 | 1.90 ± 1.25 | .10 | .414 | 119 | .679 | .071 |
| Seafood/week | 1.22 ± 1.13 | 2.53 ± 1.82 | 1.31 | 4.159 | 54.059 | .000\*\* | .709 |
| Dairy products/week | 5.50 ± 2.92 | 7.45 ± 5.86 | 1.95 | 2.476 | 122 | .015\* | .422 |
| Sweets, chips, fast food/week | 2.25 ± 1.59 | 1.80 ± 1.47 | .45 | 1.503 | 122 | .135 | .256 |
| Liquids (litres/day) | 1.89 ± .73 | 1.73 ± .76 | .16 | 1.127 | 119 | .262 | .192 |
| Sugary drinks (litres/day) | .31 ± .52 | .18 ± .28 | .13 | 1.787 | 118.036 | .077 | .305 |
| Alcohol/week | 1.09 ± .96 | .55 ± .59 | .55 | 3.282 | 119 | .001\*\* | .560 |
| Cigarettes/day | 1.06 ± 1.90 | .53 ± 1.53 | .54 | 1.668 | 94.033 | .099 | .285 |
| Values are Mean ± SD. p<.05\* p<.01\*\*. | | | | | | | |

**4. DISCUSSION**

Polish females had more favourable profiles than Spanish females for body composition and physical fitness, and consumed more vegetables, more fruits and more liquids. However, Spanish females did more physical activity, consumed more seafood, more dairy products, less sweets, chips, fast food, less sugary drinks, less alcohol and less tobacco.

The fact that Polish females had better body composition and physical fitness, even when they did less physical activity and had a worse lifestyle may be explained by the different university curricula (more practical lessons in Poland). Other aspect to consider is the contribution of genetic factors in physical fitness [17], which could explain why Polish students have a better body composition with worse nutrition and physical activity habits. Arriscado, Muros, Zabala and Dalmau [18] found inverse relationships between the percentage of body fat and maximal oxygen uptake (r =-0.524), lower-body explosive strength (r = -0.400) and speed performance (r = 0.385), similarly we found Polish students, who have less body fat, to have better physical fitness than Spanish students with more body fat. Other studies carried out in China have found similar findings [19].

For a better understanding of these results, they can be compared with the results of other studies that analyzed the same parameters in university students of other regions. Regarding body weight, differences were minimal in the present study females from Gdansk 60.41 ± 9.01 kg and females from Murcia 62.43 ± 11.86 kg. These results are similar to the weight of female students of Medicine from Córdoba (Spain), 59.8 ± 10.9 kg [20], and of female students of Physical Education from Temuco (Chile), 62.7 ± 8.1 kg [21]. There was a higher difference in the height of females from Gdansk (1.67 ± 0.06 m), in comparison with the females from Murcia (1.64 ± 0.06 m), and other regions: female students from Madrid (Spain) 1.62 ± 0.1 m [3], female students of Medicine from Córdoba (Spain) 1.63 ± 0.1 m [20], and female students of Physical Education from Temuco (Chile) 1.63 ± 0.1 m [21]. These differences may be explained by genetic factors [17].

Polish females had better values of BMI (21.59 ± 2.81) than females from Murcia (22.86 ± 2.74), these values are also favourable when compared to other regions: female students from Madrid (Spain) 22.1 ± 2.8 [3], female students of Medicine from Córdoba (Spain) 22.43 ± 3.4 [20], female students of PE from Temuco (Chile) 23.5 ± 2.6 [17], and female students of Nursing from Antioquia (Colombia) 22.7 ± 2.9 [22]. Moreover, Polish females had less % FM (25.10 ± 6.46) than females from Murcia (26.77 ± 4.77) and other regions: female students from Madrid (Spain) 27.2 ± 3.9 [3], female students of PE from Valparaíso (Chile) 28.5 ± 7.7 [23], female students from Valencia (Spain) 30.67 ± 6.01 [24], and female students of Medicine from Córdoba (Spain) 32.85 ± 3.69 [20].

Regarding cardiovascular endurance, the VO2max of females from Gdansk was 40.98 ± 5.01 and of females from Murcia 39.92 ± 5.20, while in female students of Physical Education from Granada (Spain) was 46.03 ± 7.22 [25]. These differences may be due to the differences in the metres above sea level (Gdansk 7 m, San Javier-Murcia 4 m, Granada 738 m) and its influence on VO2max [26]. In the case of the PACER stage, it was 7.21 ± 1.63 for females from Gdansk and 6.62 ± 1.70 for females from Murcia, while in female students of Physical Education from Temuco (Chile) it was 5.4 ± 1.8 [21].

Despite having favourable body composition and physical fitness, female students from Gdansk did less MPA (180.96 ± 141.43 min/week) and less VPA (198.61 ± 128.85 min/week) than females from Murcia, who did 373.00 ± 433.18 min/week of MPA and 257.43 ± 207.47 min/week of VPA. In the case of students of Sports Sciences from Aragón (Spain), they did a total of 480 min/week of physical activity [6]. A possible explanation for the different levels of physical activity found could be differences in the physical environment, social and political context of the countries studied. It is also noteworthy that participants in this study were more active than university students of degrees other than sport sciences. For example, in a systematic review [4] analyzing university students' participation in physical activity at the recommended level to acquire optimal health benefits (n= 35,747 students from 27 countries), it was found that more than one-half of university students were not active enough to gain health benefits, while in the present study both Polish and Spanish students of Sport Sciences did enough physical activity, according to the international recommendations [15].

With regard to tobacco, female students from Gdansk smoked 1.06 ± 1.90 cigarettes/day (30.9 % were smokers), and females from Murcia 0.53 ± 1.53 cigarettes/day (12.5 % were smokers), while students of Sports Sciences from Aragón (Spain) smoked 5 ± 3 cigarettes/week [6]. These results can be compared with the study of Steptoe et al. [5], who analyzed in the year 2000 the prevalence of smoking in European university students from 13 countries: Poland 26.3%, Spain 36.3%. The smoking prevalence in the other countries varied from 23.4% in Hungary to 47.4% in Portugal [5]. These differences in lifestyle may be due to different cultures, traditions and weather in Northern and Southern Europe, but also to the implementation of efficient health policies since the year 2000.

The main strengths of the present study were the international samples comparing two different countries, the study of a high number of variables, and the validated tests used to evaluate body composition and physical fitness. The main limitation was that the questionnaire used to evaluate the lifestyle was self-reported and not validated. Moreover, a convenience sample was used. The present study was also limited to 3rd year students of Gdansk (Poland) and Murcia (Spain). Therefore, our study was only representative of female 3rd year students, and our results can only be generalised to this group. The sample size of Gdansk was higher, as in Gdansk there are more female students than in Murcia. Future research should analyze also students from other years and use other international samples, to have the opportunity to replicate this study with other nationalities, or even replicate it on different regions of Poland and Spain.

**5. CONCLUSIONS**

Polish female students had better values of body composition and physical fitness, while Spanish female students had healthier lifestyle. In order to avoid future risk of diseases such as obesity or diabetes, Polish curricula of Physical Activity and Sports Sciences should include more lessons that promote an active and healthy lifestyle, while Spanish curricula of Physical Activity and Sports Sciences should include more active practical lessons in which students could improve their body composition and physical fitness through physical exercise.

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