

# Anthropometric profile, physical activity level, degree of anxiety, and posture in college students

*Perfil antropométrico, nível de atividade física, grau de ansiedade e postura em universitários*

*Perfil antropométrico, nivel de actividad física, grado de ansiedad y postura en estudiantes universitarios*

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**ABSTRACT** | The objective of this study was to evaluate the anthropometric profile, level of physical activity, anxiety level, and posture of graduate students in the health field. This is a cross-sectional study involving 100 college students from health courses at a university in the western state of São Paulo. Weight, height, waist circumference, and body mass index data were collected. We also applied the International Physical Activity Questionnaire for physical activity; the State-Trait Anxiety Inventory for anxiety; and the Postural Assessment Instrument for postural defects. The results of this study show that 67% of students have an average BMI of  $22.12 \pm 4.84 \text{ kg/m}^2$ , and 38% are regularly active. Regarding anxiety levels, the sample obtained (mean STAI E 40.6 points and STAI T 40.05) can be classified as moderate. In addition, 50% of the sample have lumbar concavity. Therefore, most health care university students displayed normal anthropometric values, were regularly active, had a moderate level of anxiety and had no postural defects.

**Keywords** | Anxiety; Posture; Physical Fitness.

**RESUMO** | O objetivo deste estudo é avaliar o perfil antropométrico, o nível de atividade física e a postura em universitários da área da saúde. Este é um estudo transversal envolvendo 100 estudantes de uma universidade na Zona

Oeste de São Paulo. Peso, altura, circunferência da cintura e índice de massa corporal foram coletados. Também foram aplicados o Questionário Internacional de Atividade Física, o Inventário de Ansiedade Traço-Estado e o Instrumento de Avaliação Postural. Os resultados deste estudo mostram que 67% dos estudantes têm IMC médio de  $22,12 \pm 4,84 \text{ kg/m}^2$  e 38% são regularmente ativos. Acerca dos níveis de ansiedade, a amostra obtida (média IDATE E 40,6 pontos e IDATE T 40,05) pode ser classificada como moderada. Além disso, 50% da amostra tem concavidade lombar. Portanto, a maioria dos estudantes demonstrou valores antropométricos normais, eram regularmente ativos, tinham nível moderado de ansiedade e nenhum defeito na postura corporal.

**Descritores** | Ansiedade; Postura; Condicionamento Físico.

**RESUMEN** | El objetivo de este estudio fue evaluar perfil antropométrico, nivel de actividad física, grado de ansiedad y postura de estudiantes universitarios de la salud. Este es un estudio transversal de observación envolviendo 100 estudiantes universitarios de cursos de la salud en una universidad del Oeste del estado de São Paulo, Brasil. Datos como peso, altura, circunferencia de la cintura y índice de masa corporal (IMC) fueron recogidos. Nosotros también

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aplicamos el Cuestionario Internacional de Actividad Física para actividad física; el Inventario de Ansiedad Trazo-Estado (Idate) para ansiedad; y el Instrumento de Evaluación Postural para defectos de postura. Los resultados de este estudio mostraron que 67% de los estudiantes tienen IMC medio de  $22.12 \pm 4.84 \text{ kg/m}^2$  y 38% son regularmente activos. Considerándose los grados de ansiedad, el ejemplo obtenido (Idate-E de 40,6 puntos y Idate-T

de 40,05) puede ser clasificado como moderado. Además, 50% de los estudiantes del ejemplo presenta concavidad lumbar. Por lo tanto, la mayoría de los estudiantes de la salud analizados presentan valores antropométricos normales, son regularmente activos, tienen grado moderado de ansiedad y no presentan defectos posturales.

**Palabras clave** | Ansiedad; Postura; Aptitud Física.

## INTRODUCTION

New challenges arise when one starts college. It is a time of transition, which requires adaptation to this new lifestyle. This new phase may arouse fears, insecurities, uncertainties, and anxiety<sup>1</sup>.

Anxiety is an emotional state experienced by many people and can be triggered by tension caused by a stressful and physically exhausting experience; this is often the case when starting university life as the student does not know how they will adapt to this new lifestyle and have to take responsibility for themselves. However, that can be relieved by the practice of physical activity<sup>2,3</sup>.

Anxiety combined with inadequate physical activity tends to worsen the painful condition, which can trigger a vicious cycle of adversely affected posture in university students<sup>4</sup>.

When the individual starts this cycle, the state of stress excessively increases muscle contraction; the muscle cannot generate adequate relaxation, causing fatigue. Fatigue is a power outage caused by maintenance or strength failure during repeated muscle contractions. This makes it difficult to maintain a stance<sup>5</sup>. This position can be defined as body position and attitude, the relative arrangement of various body parts in order to maintain balance and harmony<sup>6</sup>.

Therefore, this study is justified because it seeks to demonstrate the level of anxiety, bad postural habits, and level of physical activity in college students attending undergraduate courses in the health area and consider if these conditions are related. This relationship could be important to clarify if physical activity can positively modify bad postural habits and anxiety levels<sup>7,8</sup>.

The objective of this research was to evaluate the anthropometric profile, level of physical activity, anxiety level, and posture of undergraduate students in the health field.

## METHODOLOGY

This is a cross-sectional study involving 100 college students with an average age of  $19.38 \pm 1.71$  years, enrolled in courses in the health field at a university in the western state of São Paulo. The study was approved by the Research Ethics Committee with the number CAAE: 32315314.0.0000.5515.

The proposal was presented to the coordinators of the courses in order to seek support and dissemination throughout the healthcare department; the chosen courses were Dentistry, Physical therapy, Medicine, Biomedicine, Pharmacy, and Nutrition, which are all full-time courses. Consequently, following the dissemination of information, students interested in participating were asked to enroll in the Physical Therapy Clinic for one week, being selected in the order. Enrolled students were included in the study once they agreed to sign the informed consent form. Subjects diagnosed previously with postural changes or other pathological disorders of the musculoskeletal system were excluded.

Data collection began with the identification of the individuals (name, sex, age) and anthropometric data (weight, height, waist circumference, and body mass index (BMI)<sup>9</sup>. Weight was obtained using a Plena<sup>®</sup> digital scale with a maximum capacity of 160 kg and a resolution of 100 g. Each student was dressed in gym clothes (shorts and shirt) and positioned standing in the center of the scale platform, barefoot, and with arms positioned straight along the body.

Height was measured in meters (m) using a tape with a resolution of 0.1 m, which was fixed on a smooth wall. The individual was placed in orthostatic position, barefoot, and feet together with the occiput, shoulder girdle, pelvic girdle, and the back of the heel region in contact with the wall and the head remaining in the Frankfurt horizontal plane.

The abdominal circumference (AC) was measured in centimeters (cm), using a tape measure with a resolution of 0.1 cm, positioned on the umbilicus of the individual and parallel to the ground and, for this analysis, the individual was placed in the standing position, with feet together and a relaxed abdomen and arms along the body<sup>10</sup>.

The abdominal circumference is considered obese when measuring  $\geq 94$  cm in men and  $\geq 80$  cm in women, increasing the risk of metabolic complications. Already at risk of metabolic complications increased substantially  $\geq 102$  for men and  $\geq 88$  for women. BMI was classified as  $< 18.5$  – underweight; 18.5 to 24.9 – normal weight; 25.0 to 29.9 – overweight; 30.0 to 34.9 – obesity I; 35.0 to 39.9 – obesity II;  $\geq 40.0$  – obesity III<sup>11</sup>.

To assess the level of physical activity, the International Physical Activity Questionnaire – the 8-question short version (IPAQ) proposed by the World Health Organization (1998) – was applied<sup>12</sup>. The IPAQ consists of three levels:

- Very active: one who fulfills the criteria of vigorous activity  $\geq 5$  days/week and  $\geq 30$  minutes per session, or vigorous activity  $\geq 3$  days/week and  $\geq 20$  minutes per session + moderate exercise or walking  $\geq 5$  days/week and  $\geq 30$  minutes per session;
- Active: one who fulfills the criteria of vigorous activity  $\geq 3$  days/week and  $\geq 20$  minutes per session; or moderate exercise or walking  $\geq 5$  days/week and  $\geq 30$  minutes per session; or any added activity  $\geq 5$  days/week and  $\geq 150$  minutes/week (walk + moderate + vigorous);
- Irregularly active: one who performs physical activity insufficiently to be classified as active as the activity does not meet the recommendations regarding frequency or duration. The accomplishment of this rating adds to the frequency and duration of different types of activities (walking + moderate + vigorous);
- Sedentary: one who does not carry out any physical activity for at least 10 continuous minutes during the week.

This Questionnaire was self-administered.

Anxiety was assessed by the State-Trait Anxiety Inventory (STAI)<sup>13,14</sup>, developed by Spielberg, Gorsuch, and Lushene and translated and validated in Brazil by Biaggio and Natalicio. IDATE is a

self-assessment questionnaire and consists of two parts; each has 20 questions. The first part was evaluated as follows: exceedingly anxious (4), a lot anxious (3), a bit anxious (2), and not at all anxious (1). The second part was evaluated as follows: always (4), often (3) sometimes (2) and rarely (1). Anxiety levels were scored as follows: low anxiety (20-34 points), moderate (35-49 points), high (50-64 points) and very high (65-80 points)<sup>15,16</sup>.

For an analysis of posture, the *Instrumento de Avaliação Postural* (IAP) by Liposcki<sup>16</sup> was used, and this study used only those items pertaining to the alignment of head, shoulders and trunk<sup>16</sup>, relating to the posture symmetry impairment and affected by anxiety and stress<sup>17</sup>.

For statistical analysis, continuous data is presented as mean and standard deviation and, for categorical data, the results are presented in frequency and percentage. SPSS 15.0 was used, and the distribution of the data was assessed by the Shapiro-Wilk test. To analyze the association between the categorical data, we used the chi-square test. To evaluate the relationship between categorical and numerical data, the Spearman correlation test was used; for the relationship between numerical data, we used the Pearson test for parametric data and Spearman test for nonparametric data. The correlation magnitude parameters were recorded using those given by Portney and Watkins: from 0.00 to 0.25, little or no correlation;  $> 0.25$  to 0.50, reasonable correlation;  $> 0.50$  to 0.75, moderate correlation to good;  $> 0.75$ , good correlation to excellent; and 1.00, perfect correlation. The significance level for all tests was 5%.

## RESULTS

Table 1 shows the evaluation findings that characterize the sample of individuals. The anthropometric profile of the students is represented as mean and standard deviation, and the measurement of body weight was  $62.05 \pm 12.91$  kg, the height was  $1.65 \pm 0.08$  cm, CA was  $77 \pm 9.45$  cm, and BMI was  $22.12 \pm 4.84$  kg/m<sup>2</sup>. According to the BMI classification, 9% of the sample had low weight, 67% normal weight, 20% overweight, 2% obesity I, 1% obesity II, and 1% obesity III. Regarding the results of the IPAQ, 20% of subjects were classified as sedentary, 38% as irregularly active, 17% as active and 25% as very active.

Table 1. General characteristics of health care students

General characteristics	N (%)	p-value
<b>Sex</b>		<0.0001
Female	82 (82)	
Male	18 (18)	
<b>Body mass index (BMI)</b>		<0.0001
Under weight	9 (9)	
Normal weight	67 (67)	
Overweight	20 (20)	
Obesity I	2 (2)	
Obesity II	1 (1)	
Obesity III	1 (1)	
<b>IPAQ (classification)</b>		0.016
Sedentary	20 (20)	
Irregularly active	38 (38)	
Active	17 (17)	
Very active	25 (25)	
<b>IDATE trait (classification)</b>		<0.0001
Low	30 (30)	
Moderate	55 (55)	
High	15 (15)	
<b>IDATE state (classification)</b>		<0.0001
Low	23 (23)	
Moderate	63 (63)	
High	12 (12)	
Very high	2 (2)	
<b>IPA (classification)</b>		<0.0001
Without changes	46 (46)	
Lumbar concavity	50 (50)	
Lumbar rectification	4 (4)	

Chi-square univariate test

Regarding the STAI findings, the sample mean score reached by IDATE 40.6 points and IDATE T 40.05 and is classified as moderate anxiety. When considering the association between the BMI classification and the evaluation of the IAP, it was observed that there was little difference compared with normal weight individuals with concavity (32%) and no change with normal weight (33%). Regarding overweight individuals, 10% of them had concavity, 8% had no change, and 2% had rectified lordosis. As for the classification of obesity (I, II, III) there was a total of 4% of individuals with concavity who were distributed across obesity II and III (2%) and obesity I (2%;  $p=0.641$ ).

By linking the IPAQ test evaluation IAP, a good to excellent correlation ( $r=0.816$ ) was found, which demonstrates that the concavity had a higher incidence in irregularly active individuals.

Table 2. Distribution between IPAQ test and evaluation IAP

	Sedentary	Regular active	Active	Very active	Total
Hiperlordosis	12	18	8	12	50
Rectified	0	1	1	2	46
Without changes	8	19	8	12	4
Total	20	38	12	25	100

When combining IDATE with the IPAQ, the highest rate found was a moderate rating of 63%, of which 23% are irregularly active, 15% active, 13% very active, and 12% inactive. In relation to the lower rate of anxiety, we found 5% to be sedentary, 8% irregularly active, 2% active, and 8% very active; a total of 23%. Of those with a high score in IDATE, 3% were sedentary, 5% were irregularly active, no students were active, and 4% were very active, totaling 12%. For very high ratings of 2%, the same number was regularly active ( $p=0.350$ ).

When the IDATE T was combined with the level of physical activity, it was shown that 55% had a moderate index of anxiety, 15% were sedentary, 20% irregularly active, 10% active, and 10% very active. In the low index rating, 4% were sedentary, 10% irregularly active, 4% active, and 12% very active, totaling 30%. In the high anxiety index, 1% of the population was sedentary, 8% irregularly active, 3% active, and 3% very active, totaling 15% ( $p=0.183$ ).

Associating sex and the findings of IAP, 50% of the students showed concavity, with a higher incidence in women ( $p=0.042$ ). One can justify this high incidence of concavity for individuals without change and link this to the fact that the average number of hours they spent sitting during the day was  $8.31\pm 4.33$  hours, because of the full college schedule.

Regarding the profile of anxiety and depression, there was a significant difference between the sexes in respect to STAI traits ( $p=0.001$ ), in which 51 (62.2%) women were moderate when compared with men; only 4 (22, 2%) women had moderate anxiety and depression. In relation to the level of physical activity, no significant difference was found between genders ( $p=0.024$ ), in which 36 (43.9%) women were regularly active and only 6 (33.3%) men were active.

By analyzing the changes in the postural health of students, we observed associations with BMI classification ( $p=0.641$ ), IPAQ ( $p=0.816$ ), IDATE T ( $p=0.347$ ), and STAI E ( $p=0.720$ ). Thus, postural changes were significantly correlated only with time students ( $r=0.211$ ;  $p=0.034$ ), which indicates that the higher the value, the more likely the individual is to present postural changes.

## DISCUSSION

The results of this study demonstrate the anthropometric profile of health care students, with 67% of college students with normal weight and 20% overweight, according to the BMI classification. The results of the IDATE showed a higher prevalence of moderate levels of anxiety in both tests (T and D), according to the classification. The level of physical activity showed that 20% of the subjects were sedentary and 38% were regularly active. The highest prevalence of postural changes (50%) was concavity.

The IPAQ found that the highest prevalence was in irregularly active individuals (38%), perhaps because the health benefits and improved quality of life with regular physical activity are well-known<sup>12</sup>.

However, recent evidence suggests that gender differences exist in correlations of physical activity in adolescents<sup>16</sup>. Ceschini and Júnior<sup>18</sup> compared the level of physical activity according to sex among young people in the metropolitan region of São Paulo. The highest prevalence was regularly active individuals (44.03%); when categorized by sex, 45.1% of women were physically active.

Female adolescents are often described as being physically less active than their male counterparts<sup>19,20</sup>.

As for this study, the IDATE showed that a moderate level of anxiety was found for both ratings (average STAI E 40.6 points and IDATE T 40.05), which resembles the study by Almondes and Araujo<sup>21</sup>, who evaluated anxiety and obtained an average of 37.9 for anxiety state and 38.84 for trait anxiety. The explanations for these findings may be due to the new phase that these students are experiencing and to the imposition of a new lifestyle.

In a study using analysis of computed photogrammetry, concavity was presented in 65.7% of university students<sup>22</sup>, which is similar to the findings of this study in which concavity was the postural change with the highest incidence: 50% of college students with a prevalence in women (45%). This fact is reinforced in the study by Baroni et al.<sup>23</sup>, which also shows a higher prevalence of concavity in female students and active individuals. The justification for this prevalence in women may be explained by the female anatomy and the presence of anteversion, which is associated with the shortening of the quadratus lumborum, psoas ilium, and adductors. All this postural change may result in pressure overload on the lower back, which can develop into other musculoskeletal disorders.

In this study, 20% of students were overweight and 67% were normal weight, which is similar to the study by Miranda et al.<sup>24</sup>, which evaluated 685 college students and found the prevalence of overweight to be 16% and the study of Miranda et al.<sup>25</sup>, which evaluated 535 students and verified 18.3% as overweight and obese and 75.2% as normal weight<sup>24</sup>. Although there is a prevalence in the category of normal weight, what stands out are those with excess weight, as obesity is a risk factor for the development of psychosocial disorders, cardiovascular diseases, endocrine disorders, sleep disorders, and more advanced age obesity<sup>26</sup>.

By associating the level of anxiety with the practice of exercise, it was shown that 63% of students were classified as having a moderate level of anxiety and 51% engaged in some kind of physical activity. The study by Cevada et al.<sup>3</sup> related sport to anxiety, quality of life, and resilience and it acknowledges that athletes and former athletes are less anxious than sedentary people. This fact shows that physical activity contributes to the physical and emotional well-being.

As already discussed, when relating anxiety level to physical exercise, we found that regardless of the level of anxiety, young people respond similarly to exercises of different intensities with a decreased level of anxiety, which affects physical and associated emotional well-being<sup>25</sup>.

When correlated with BMI, IDATE shows that having a lower body mass index can provide a higher level of anxiety. A study by Rocha reported no association between high BMI and a high level of anxiety in an individual<sup>27</sup>. A study by Hainzenreder et al.<sup>28</sup> evaluated this on 136 students of a Physical Education course; their study found AC with an average of  $77.1 \pm 0.62$  cm, which is similar to the average AC found on this study of  $77 \pm 9.45$  cm, with no difference between the sexes.

In relation to time spent sitting, the average time was 6 hours, justifying the lack of time – especially taking into account internships and other activities – for physical activity. In the current study, this means that college students spent  $8.31 \pm 4.33$  hours sitting, which is a figure similar to that found in the work done by Raddi et al.<sup>29</sup> which evaluated 186 third year students at the Faculdade de Ciências Médicas da Santa Casa de São Paulo and their level of physical activity; the accumulation of time sitting averaged  $8.92 \pm 8.72$  hours on weekdays.

As estimated by Farias et al.<sup>30</sup>, this study shows that: 98% of subjects had no side nuds, 94% had no forward or back head projection, 75% had no shoulder elevation,



83% had no protruding shoulder, 64% had symmetrical Tales Triangle (formed between the shoulders, upper limbs and spine), 97% had no trunk rotation, 90% had no cervical abnormalities, 94% had no chest changes, 98% had no changes in the shoulder blade, and 94% did not have scoliosis. Fifty percent had concavity; the higher incidence of concavity was in women, suggesting a weakness of the abdominal muscles, which has a higher prevalence in women and can contribute to this postural change.

These findings are different when compared with studies of teenage dance practitioners, which give a higher percentage of postural changes; 100% of the adolescents had shoulder elevation on the left or right, 50% had anterior shoulders, 50% had normal shoulders, 80% had a higher Tales Triangle to the right and 20% had it higher to the left, 80% had trunk rotation or inclination, with a predominance of rotation to the right compared with the profile of the umbilicus, 50% had asymmetry towards the left, 60% had no cervical abnormalities, 80% had no chest changes, 80% had scoliosis in the cervical, thoracic, or lumbar region, and 80% of adolescents had lumbar concavity<sup>30</sup>.

## CONCLUSION

The anthropometric profiles of university health care students are within normal standards. These students are regularly active and the practice of physical activity softens anxiety symptoms, which are stratified at a moderate level. Alterations are present in this population and lumbar concavity has a higher incidence than the standard, especially in women. There is a need for further studies with research approaches directed at other elements and intervention in the university population, who can be particularly vulnerable to anxiety when not practicing physical activity.

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