

ORIGINAL RESEARCH

Analysis of the levels of physical activity and body mass index of college students: a systematic review

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Received: February 04, 2020.

Accepted: August 30, 2021.

Conflict of interest: none.

Introduction

The quality of life of college students is directly affected at the onset of college life due to the neglect of healthcare and predisposing risks such as obesity. Purpose: The main objective of the present study is to analyze the levels of physical activity and body mass index (BMI) of college students. Methods: The PubMed, Scielo, ScienceDirect, BVS, and Cochrane databases were selected. The search strategy included descriptors in English and Portuguese: “college students”, “academics”, “body mass index”, “level of physical activity”, and “quality of life”. Results: After finding 16 articles, inclusion and exclusion criteria were applied, resulting in 10 articles for deep analysis. It was observed that college students had a good level of physical activity and adequate BMI, diverging from old studies in which the level of physical inactivity and overweight was relatively high. Discussion: From the studies carried out, it is concluded that currently college students are within normal weight and are physically active. Translation to Health Education Practice: Further studies about BMI and physical activity levels, as two important health indicators, should be carried out in college students. Keywords: academics; physical activity level; body mass index; lifestyle; health

Background

Currently, a sedentary lifestyle and poor eating habits contribute to the emergence of diseases such as obesity, occurring alarmingly since childhood. (1) Some authors already characterize it as a pandemic. (2) Changes in

eating and physical activity patterns are due to environmental and social changes, mainly due to the scarcity of support in the development of health, agriculture, transportation, urban planning, environment, processed foods, distribution, marketing, and education. (3)

Thus, at the onset of college life, the student undergoes a series of adaptations, both physical and psychological, for adopting a completely different routine from the usual. (4,5) Students may present overweight and obesity, which end up generating manifestations and development of various health problems. (6) For health verification, one of the most used and least invasive anthropometric assessment methods is the body mass index (BMI), which is considered an indicator of the individual's nutritional status. (7)

Regarding excess fat, rates can reach an alarming 50% of the population in ranges between overweight and obesity, and this increase in weight and body fat can be caused by physical inactivity. (8) The International Physical Activity Questionnaire (IPAQ) is proposed by the World Health Organization (WHO) as a way of measuring and classifying the level of physical activity, in which the individual can be classified as “sedentary”, “irregularly active”, “active”, and “very active”. (9)

Given this problem, what is the level of physical activity and BMI of college students? The aim of this review is to verify results from scientific research regarding the level of physical activity and BMI of college students.

Methods

This study was registered on the PROSPERO platform (ID CRD42020211839). Firstly, a search was performed in the PubMed, Scielo, ScienceDirect, BVS (Virtual Health Library), and Cochrane databases to locate articles on the subject of this research. The first search phase was carried out on September 9, 2020, including only articles published from the year 2016 to the present year. The keywords used were “college students”, “academics”, “body mass index”, and “physical activity level”. The search strategies used in this article are shown in Table 1.

Some resources of the websites were used, immediately after using the search line in the databases:

- in BVS, the filter “interval of year of

- publication” (2016 to 2020) was marked;
- in PubMed, the resource “clinical trial” and “results by year” was selected;
- in ScienceDirect, the filter “Research articles” was marked and the years of publication selected (2016 to 2020);
- in Scielo, no filters were used;
- in Cochrane, the filter “trials” was selected.

Table 1.
Search strategies by database

PubMed; BVS; Cochrane; Scielo
((academics) or (college students) and (physical activity level)) and (body mass index)
ScienceDirect
((academics) or (“college students”) and (“physical activity level”)) and (“body mass index”)

Source: all tables are result of the research

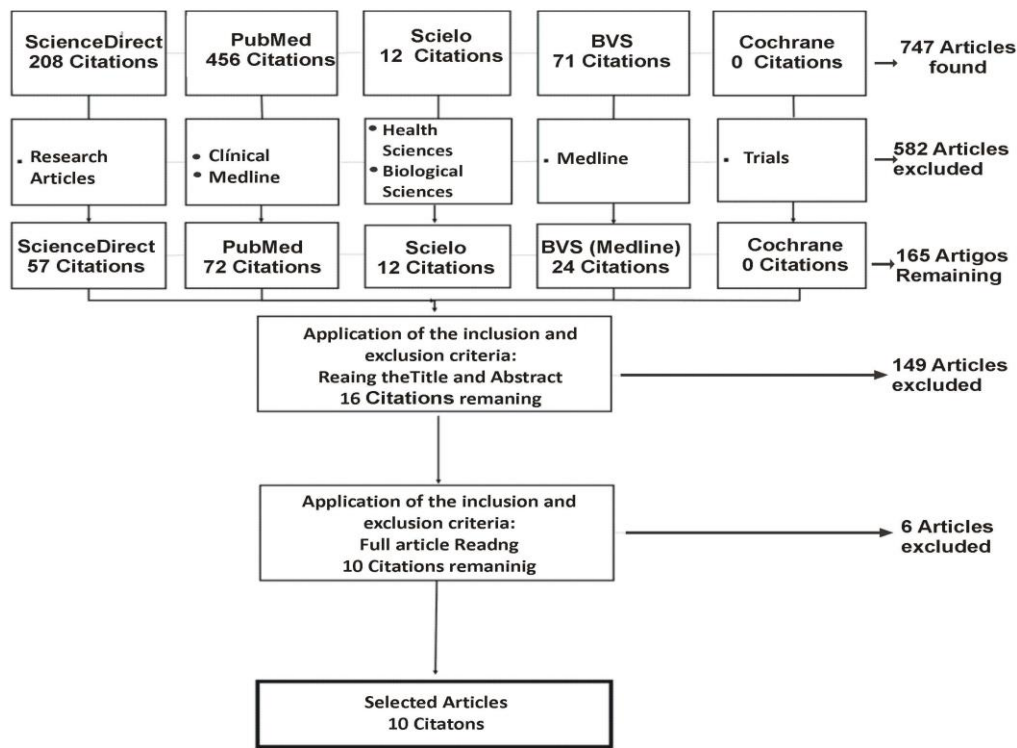
The data of the articles were exported to the program EndNote® with their abstracts. The PRISMA systematization proposed by Liberati et al. (2009) was used. (10)

The first stage of article selection was carried out by reading the titles and abstracts and based on the inclusion and exclusion criteria presented in Table 2. The second stage of selection took place by reading the selected full text of the articles. In these stages, the articles were selected by two researchers independently, and, in cases of disagreement due to the inclusion of any study in this review, the opinion of a third researcher was sought.

Table 2.
Inclusion and exclusion criteria for the study

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Studies with college students only • Studies that used BMI as one of the parameters for evaluation • Studies that used the level of physical activity as one of the parameters for evaluation • Original articles published in a scientific journal 	<ul style="list-style-type: none"> • Articles in which there was a drug intervention • Review articles, position papers, and guidelines • Articles prior to the year 2016

Figure 1. PRISMA flowchart, screen and selection process



From the articles selected after the screening and selection phases, a total of nine parameters were extracted to be reported: author, year of publication, title, objectives, sample characteristics, methods adopted, tests/instruments used, results obtained, and main conclusions of each study.

Results

Figure 1 presents the flowchart of the stages of the screening process according to the PRISMA verification, with 16 citations selected in the first stage and 10 articles in the second. These 10 articles compose this study.

The main characteristics (author, year, title, objective[s], and main conclusions) of the selected articles are shown in Table 3, where it can be seen that the oldest article was published in 2016 and the most recent was published in 2020.

The main methodological characteristics (author, year, sample characteristics, experimental design, and tests) of the selected articles are shown

in Table 4. For the analysis of the results of this systematic review, Table 5 contains data from the test results, presented by the authors of the respective articles.

The main themes reported in the articles were the BMI and physical activity levels (10 articles), together with the following parameters: waist circumference (2 articles); abdominal circumference (1 article); State-Trait Anxiety Inventory (STAI) (1 article); Postural Assessment Instrument (1 article); IPAQ (5 articles); Global Physical Activity Questionnaire (GPAQ) (2 articles); one-repetition maximum (1-RM) test (1 article); self-report test (2 articles); self-verified test (1 article); demographic and extracurricular activities questionnaire and accelerometer (1 article); Nord-Trøndelag Health Study AF Questionnaire - HUNT 2 (1 article); SMT or Body Image Assessment Test (1 article); and self-administered physical activity levels questionnaire (1 article). According to the evaluative variables found in the articles, in conjunction with BMI and

physical activity levels, only those containing the variables of the inclusion and exclusion criteria were considered for the study. Among the selected articles, considering the way of obtaining data within the experimental design, descriptive statistics were presented in 10 articles; evaluation between groups in 10 articles; observational and

cross-sectional study in 6 articles; observational and descriptive study in one article; observational cross-sectional study with non-probabilistic sampling, outlined by convenience, in one article; a study that used a prospective and descriptive design in one article; and a longitudinal study in one article.

Table 3.
Main characteristics of the selected studies

Author, Year	Title	Objective(s)	Main Conclusions
Antoniazzi et al., 2018	[Análisis del Estado Nutricional en Estudiantes Educación Física, Asociado a Hábitos Alimentarios y Nivel de Actividad Física].	To analyze the nutritional status of students of physical education, teachers and their possible association with eating behaviour and physical activity.	Higher prevalence of normal weight, with values that showed an association with predominantly healthy eating habits and high physical activity levels.
Fernani et al., 2017	Anthropometric profile, physical activity level, degree of anxiety, and posture in college students	To evaluate the anthropometric profile, the physical activity level, anxiety and posture of undergraduate health students.	The anthropometric profiles of university healthy students are within the normal range. These students are regularly active and the practice of physical activity alleviates anxiety symptoms (stratified at a moderate level).
Garrett et al., 2019	Tracking physical activity in baccalaureate nursing students in the United States prior to graduation: A longitudinal study.	To assess changes in physical activity in nursing undergraduate students over time before graduation.	Nursing undergraduate students maintain high physical activity levels, which exceed USA recommendations for promoting personal health.
Grasdalsmoen et al., 2019	Physical exercise and body-mass index in young adults: a national survey of Norwegian university students	To investigate the level of physical exercise among college students. To explore the trend of physical exercise and BMI from 2010 to 2018. To examine the association between physical activity and excess of weight at different age groups. To examine the strength of the association between exercise frequency and BMI from 2010 to 2018.	Most young adults do not meet international exercise recommendations and the proportion of overweight is increasing in both sexes and in all age groups.

Kayode and Alabi, 2020	Food consumption patterns, physical activity and overweight and obesity among undergraduates of a private university in Nigeria	To assess the patterns of food consumption and physical activity of undergraduate students, with a focus mainly on weight status.	High prevalence of overweight and obesity and high rate of consumption of snacks.
Peterson et al., 2017	Sedentary behavior and physical activity of Young adult university students	To measure the levels of sedentary behaviour and physical activity of college students aged 18 to 20 To test an open self-report measure on the number and type of self-reported extracurricular activities.	The average daily percentage of time spent in sedentary behaviour and moderate to vigorous physical activity, as well as the number of reported extracurricular sedentary habits, play a role in describing the BMI and waist circumference of young college students.
Towne Jr et al., 2017	Assessing physical activity among young adults attending a university: the role of sex, race/ethnicity, technology use, and sleep	To identify physical activity levels among students in college classes. To examine the relationship between sociodemographic factors (sex, race/ethnicity) and behavioural factors (sleep, use of technology) associated with physical activity.	College students are heavy users of technology, women and minority participants are less likely to be involved in adequate levels of physical activity compared to their peers. The achieving at least seven hours of sleep is associated with recommended physical activity.
Silva; Marôco; Campos, 2019	Tripartite Influence Scale (TIS) applied to university students: validation study and application	To estimate the psychometric indicators of TIS for a sample of Brazilian university students and identify the degree of influence of the media, parents and friends on the students' body appearance considering demographic and anthropometric characteristics.	It showed evidence related to the construct validity and reliability of TIS in Brazilian university students. In addition, different variables were identified that significantly impacted the factors of TIS and may be relevant for the development of more targeted clinical or research protocols.
Silva et al., 2019	Dissatisfaction about body image and associated factors: a study of young undergraduate students	To verify the prevalence of dissatisfaction with body image and its association with sociodemographic, economic, anthropometric variables and physical activity of college students of both sexes.	More than half of the individuals evaluated have body dissatisfaction, associated with nutritional status, indicating that individuals with excess weight and risk for cardiovascular diseases have a higher chance of occurring body dissatisfaction than those with adequate nutritional status. Women have a nutritional status within the standards considered normal, by the indicators used, and dissatisfied with their body image.

Vainshelboim et al., 2019	Sedentary behavior and physiological health determinants in male and female college students	To evaluate the association between sedentary behaviour, muscle strength and body composition in male and female college students.	University students are highly active and most of them met the physical activity guidelines, but was observed a considerable prevalence of sedentary behaviour.
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Table 4.
Methodological characteristics of the selected studies

Author, Year	Sample characteristics	Experimental design	Assessment tools
Antoniazzi et al., 2018	134 Physical Education students from the Provincial Institute of Physical Education (IPEF) and Private Institute San Miguel (ISM).	Evaluation in the period from April to June 2015. The main variables were eating habits and physical activity levels; BMI as a dependent variable.	BMI IPAQ A survey was used based on the recommendations of the dietary guidelines for the Argentine population.
Fernani et al., 2017	100 college students with an average age of 19.3±1.71 years, enrolled in health courses at a university in the western state of São Paulo.	Weight, height, Abdominal circumference and BMI were collected. The IPAQ, the Trait-State Anxiety Inventory and the Postural Assessment Instrument were also applied.	BMI Abdominal circumference IPAQ State-Trait Anxiety Inventory (STAI) Postural Assessment Instrument
Garrett et al., 2019	52 undergraduate nursing students (4 men and 48 women) regularly admitted full-time to the traditional curriculum of the undergraduate nursing program at the University of Colorado, Colorado Springs.	At the beginning and at the end of the semester (weeks 1–2 and 15–16) of the three semesters prior to graduation, students responded to the IPAQ and had BMI calculated. All data were collected over a 2-year period between January 2014 and May 2016.	BMI IPAQ
Grasdalsmoen et al., 2019	SHOT survey in 2010, 2014, 2018, with a number of 6,053, 13,525 and 50,054 full-time students in Norwegian higher education (aged 18 to 35).	An online survey was sent to all students in the years 2010, 2014 and 2018.	Self-report test Nord-Trondelag Health Study - HUNT 2 PA questionnaire.

Kayode and Alabi, 2020	268 undergraduate students, from a stratified random sample from Adeleke University in Ede, Osun State, Nigeria, aged 15 to 26 years.	Pre-tested and structured self-administered questionnaires and anthropometric measurements were obtained from the participants.	Food frequency questionnaire BMI Self-administered questionnaire on physical activity levels
Peterson et al., 2017	101 male and female English-speaking college students, aged 18–20 years, with a final sample of 94 students.	Students monitored by an accelerometer for 7 days.	BMI Waist circumference Accelerometer Demographic and extracurricular activities questionnaire.
Towne Jr et al., 2017	490 college students of both sexes, enrolled in a large Southern State University.	An online survey was sent to all students enrolled in October 2014.	Self-report test Global Physical Activity Questionnaire (GPAQ)
Silva; Marôco; Campos, 2019	791 students, 18 to 40 years old, of both sexes, enrolled in undergraduate courses at the Faculty of Pharmaceutical Sciences and Faculty of Sciences and Letters, Universidade Estadual Paulista (UNESP/Araraquara).	The questions used to characterize the participants were presented to students in the classroom at the usual time for the theoretical classes.	The psychometric indicators of TIS were assessed for each sex using confirmatory factor analysis with self-verified test. IPAQ
Silva et al., 2019	348 college students, of both sexes, who attended the canteen of a public University in the state of Mato Grosso do Sul	Data collection was carried out for 5 consecutive days in November 2015, by a previously trained team and after the execution of a pilot project.	Silhouette Matching Task (SMT) BMI Waist circumference IPAQ ABEP Brazil Economic Classification Criterion
Vainshelboim et al., 2019	94 students (46 men and 48 women) undergraduate and graduate students (18 to 26 years old) enrolled at a university in the Mid-Atlantic region, in the United States.	The study is a continuous prospective assessment of university students, designed to address physiological, clinical and behavioral lifestyle factors and their association with health determinants.	BMI Global Physical Activity Questionnaire (GPAQ) One-repetition maximum (1-RM)

BMI = Body Mass Index; IPAQ = International Physical Activity Questionnaire

Table 5.
Results obtained of the selected articles

Author, Year	Sample	Physical Activity mean±standard deviation	p value	BMI		p value
Antoniazzi et al., 2018	Total =134 Women = 60 Men = 74	High = 97 (72%)	0.0001 0.0001 0.0001	Normal weight <24.99 N% 104 (78%) 48 (80%) 56 (76%)	Overweight <25 N% 30 (22%) 12 (20%) 18 (34%)	0.0001
		Average = 26 (20%)				0.0001
		Low = 11 (8%)				0.0001
		TOTAL 23.57±3.13 23.35±3.08 23.08±3.03				
Author, Year	Sample	Physical Activity mean±standard deviation	p value	BMI		p value
Fernani et al., 2017	Total = 100 Women = 82 Men = 18	Sedentary = 20% Irregularly active = 38% Active = 17% Very active = 25%	0.016 0.016 0.016 0.016	Under weight = 9% Normal weight = 67% Overweight = 20% Obesity I = 2% Obesity II = 1% Obesity III = 1%	<0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001	

Author, Year	BMI and Physical Activity (MET-min/week) during 3 semesters												
		LB	p value	T2	p value	T3	p value	T4	p value	T5	p value	T6	p value
Garrett et al., 2019	BMI (kg/m2)	23.5±2.9	-	23.4±2.9	-	23.4±2.7	-	23.8±3.0	-	23.9±3.1	0,016	23.9±3.2	0,039
	Total	4236.3±2799.6	-	4517.2±2814.0	-	4916.5±2874.7	-	4324.7±2715.3	-	4242.4±2507.2	-	4094.4±2853.5	-
	Walking	1643.9±1517.3	0,002	1872.2±1540.6	0,002	2398.8±1488.7	0,002	1909.9±1408.2	0,015	1808.7±1452.1	0,015	1788.4±1426.8	0,015
	Vigorous	1696.2±1410.8	0,029	1554.6±1284.5	0,029	1252.8±1408.1	0,029	1410.9±1285.1	-	1518.6±1444.5	0,037	1254.4±1175.1	0,037
	Moderate	844.0±867.9	-	1027.8±1172.0	-	1119.2±1122.4	-	1048.8±1100.9	-	909.6±952.9	-	995.0±1121.5	-

Author, Year	População	Physical Activity		p value	BMI (kg/m ²)				p value
Grasdalsmoen et al., 2019	18 to 35 years Divided by sex Shot 2018 Feb-Apr (2018) Participants N = 166.512 Final N = 50.054 Shot 2014 Feb-Mar (2014) Participants N = 47.514 Final N = 13.525 Shot 2010 Oct-Nov (2010) Participants N = 6053 Final N = 779	Men			Continuous Men				
		Never practiced	5.8%	<0,001	2010	23.4	2010	24.0	0.002
		<1x/week	13.8%	<0,001	2014	23.4	2014	24.1	0.002
		1x/week	14.2%	<0.001	2018	23.5	2018	24.6	<0.001
		2-3x/week	39.6%	<0.001					
		Almost every day	26.6%	<0.001	2010	23.7	2010	24.9	0.002
					2014	23.8	2014	25.0	0.002
					2018	24.1	2018	25.7	<0.001
		Women			Continuous Women				
		Never practiced	3.8%	<0.001	2010	22.5	2010	22.6	<0.001
		<1x/week	11.8%	<0.001	2014	22.5	2014	22.9	<0.001
		1x/week	16.6%	<0.001	2018	23.4	2018	24.1	<0.001
		2-3x/week	45.6%	<0.001	2010	22.6	2010	23.5	<0.001
		Almost every day	22.3%	<0.001	2014	22.9	2014	23.4	<0.001
			2018	23.7	2018	24.8	<0.001		

Author, Year	Sample	Physical Activity		p value	BMI		p value
Kayode and Alabi, 2020	Total = 268 Men = 96 Women = 172	Practice	152 (56.7%)	0.710	<18.5kg/m ²	n = 6 (2.2%)	0.710
		Rarely practice	96 (35.8%)	0.710	18.5 – 24.9kg/m ²	n = 154 (57.5%)	0.710
		Do not practice any	20 (7.4%)	0.710	25 – 29.9kg/m ²	n = 83 (31%)	0.710
					>30kg/m ²	n = 25 (9.3%)	0.710

Author, Year	Sample	Physical Activity		p value	BMI		p value
Peterson et al., 2017	Total = 94 Men = 48 Women = 46	Sedentary behaviour (h/day): 10.0 hours		-	Men	n = 23.3 (2.7%)	-
					Women	n = 24.4 (4.2%)	-
					Overweight or obesity		
		Moderate to vigorous: 1.1h		-	Men	n = 13 (13.8%)	-
		Light: 3.35h		-	Women	n = 15 (16.0%)	-

Author, Year	Sample	Physical Activity	p value	BMI	p value
Towne Jr et al., 2017	Total = 490 Men = 339 Women =151	≥150 min/week			
		Men = 303	-	Under weight = 23	-
		Women = 114	-	Normal weight = 292	-
				Overweight = 119	-
		<149 min/week		Obese = 56	-
		Men = 36	-		
		Women = 37	-		
Author, Year	Sample	Physical Activity	p value	BMI	p value
Silva; Marôco; Campos, 2019	Total = 791	Men		Men	
		Low = 22(7.7%)	-	Malnutrition = 9 (3,1%)	-
		Moderate = 72(25.3%)	-	Eutrophy = 195 (66.3%)	-
		High 191 (67.0%)	-	Overweight = 65 (22.1%)	-
				Obesity = 25 (8.5%)	-
		Women		Women	
		Low 50 (11.0%)	-	Malnutrition = 23 (4.7%)	-
		Moderate 158 (34.8%)	-	Eutrophy = 350 (72.2%)	-
		High 246 (54.2%)	-	Overweight = 83 (17.1%)	-
		Obesity = 29 (6.0%)			
Author, Year	Sample	Physical Activity	p value	BMI	p value
Silva et al., 2019	Total = 348 Men =194 Women =154			Men	
				Low weight = 5.1	-
		Men		Eutrophy = 62.4	-
		Practitioner = 64.4%	-	Overweight = 26.3	-
		Sedentary = 35.6%	-	Obesity = 6.2	-
		Women		Women	
		Practitioner = 59.7%	-	Low weight = 15.6	-
		Sedentary = 40.3%	-	Eutrophy = 69.5	-
		Overweight = 11.7	-		
		Obesity = 3.2	-		
Author, Year	Sample	Physical Activity	p value	BMI (kg/m ²)	p value
Vainshelboim et al., 2019	Men = 4 Women = 48			25.5±5.5	-
		Men 183±184.5	0,043	24.7±5.1	-
		Women 119.7±74.7	0,043		
		Sitting time (hours/day)			
Men: 5.5±2.9	0,038				
Women: 6.8±2.8	0,038				

Discussion

A total of 10 articles were obtained involving the BMI and physical activity levels of college students, internationally represented. To answer the guiding questions of this study, the articles will be discussed based on the presentation of descriptive statistics and the main conclusions of the authors regarding data collected involving BMI and physical activity levels.

Among the selected studies, it was noticed that college students are within the basic standards related to BMI and physical activity levels. Antoniazzi et al. (11) present 72% of those evaluated in high physical activity levels and 78% with normal BMI, in agreement with the study by Silva, Marôco, and Campos (12), which also showed positive results in both parameters.

Few surveys have used other assessment methods to obtain information about physical activity levels. Thus, five articles used the IPAQ, two articles applied the GPAQ, one article used the HUNT 2, one article worked with the self-administered questionnaire, and only one article used accelerometers to measure physical activity, along with the demographic and extracurricular activities questionnaire. Despite the presence of research related to the sedentary routine, everyday habits were not explained precisely.

According to Peterson et al., (13) participants reported on average of 4.2 hours of extracurricular activity, 1.7 of which is in sedentary activities and 2.5 in active ones. They reported 10 hours/day spent in a sedentary lifestyle, 1.1 hours in moderate to vigorous physical activity, and 3.35 hours in light activity; it was observed that there was no balance in the routines.

The study by Vainshelboim et al. (14) presented the highest BMI average among the selected surveys and was the only one that related the sitting time in hours/day, lacking a better assessment of the sedentary time in academic workload, as this is an important variable with a strong presence in the college routine. This article also considered the division by sex, with physical activity levels divided by women with an average of 6.8 ± 2.8 and men with 5.5 ± 2.9 . Regarding BMI, this article reported the highest BMI (25.5 ± 5.5) – the presence of overweight and obesity. The probability of illness and mortality was decreased, due to the practice of physical activity.

Kayode and Alabi (15) analyzed some variables of practice of physical activity and BMI of college students, verifying that in relation to physical activity 56.7% were regular practitioners, 35.8% rarely practiced, and 7.4% did not practice; these statistics also showed the prevalence of a high percentage of overweight (31%) when compared to the statistics of other studies selected for this review. However, Silva et al. (16) stratified the sample by sex, finding that males were 64.4% of regular practitioners and 35.6% of those sedentary, whereas women were 59.7% of regular practitioners and 40.3% of those sedentary. Despite a high percentage of sedentary lifestyle among women, most were within the eutrophic classification.

According to the analysis of the data, regardless of gender, college students are mostly active, and an average percentage of sedentary people was found within the parameters of the field research from 2010 to 2020, recorded in the articles. According to Towne et al. (17), 85% of those evaluated met or exceeded the physical activity guidelines of 150 minutes/week, with the majority within the normal BMI classification, followed by those in the overweight range.

Vainshelboim et al. (14) reported that 99% of the sample fulfilled the minimum recommendations for aerobic exercise, 89.5% for muscle strengthening activity, and 88.4% for both components, confirming that most of the articles selected for this review found homogeneous results.

The work of Garrett et al. (18) represented the groups in their training frequency, differing from the other articles. It presented results from an analysis of three semesters before graduation, identifying low levels of physical activity in the last semester. However, the BMI was maintained without significant changes, indicating that extracurricular and academic activities directly influence the quality of life of college students.

In their research, Grasdalsmoen et al. (19) obtained a higher percentage of physical activity levels, reaching the percentage of 39.6% for men and 45.6% for women, among those who practice two to three times/week. But they found that the average BMI increased in 2018, confirming that individuals with normal BMI associated with physical activity classifications “2-3 times/week”, “almost every day”, “practitioners”, “active”,

“very active”, and “moderate” describe an active/very active university population in that research.

In contrast, the study by Fernani et al. (20) showed high results in the “irregularly active” classification with 38% of the sample, despite having a high number of students with normal BMI (67%). Peterson et al. (13) also reported high levels of sedentary lifestyle with 68.9% on average of daily time spent, showing that increases of 1% of sedentary extracurricular activities reflect in a 0.93 point increase of BMI. When the average daily percentage of time spent on moderate/vigorous physical activity increased by 1%, the BMI decreased by 0.30 points.

It is understood that students are unable to establish a fixed routine of five times/week of physical activity. However, studies typically showed results contrary to the argument that BMI and physical activity levels among college students have negative ratings in terms of health. The articles identified a higher percentage of students within normal weight and at a physically active level. (13-15,17,19) It is important to note that this systematic review had limitations in its construction, such as the scarcity of articles on the theme developed, and, in the few selected, there is a non-standardization of tests to verify the level of physical activity.

Conclusions

The present study brings to light the scarcity of research that evaluates physical activity levels and BMI indicators directly related to college students’ routine, and a better stratification of the sample is needed to obtain more accurate and trustworthy results. It was found that part of the selected studies had little changes in the assessment of physical activity levels or BMI. Finally, we suggest to the scientific community that further studies in this area should be carried out to map the condition of college students in relation to BMI and level of physical activity, two important health indicators that provide valuable information for decisions of public health policies for this population.

References

1. Alberti A, Ruiz Reyes MA, De Jesus JA, Rossoni C, Grigollo L, Da Silva BB, et al. Identification of obesity in children and teenagers. *Minerva Pediatr.* 2021. DOI: 10.23736/S0026-4946.20.05731-X
2. Queiroz MGDA, M.L.A.; Brito, A.D.L.; Medeiros, C.C.M.; Simões, M.O. da S.; Teixeira, A.; Carvalho, D.F. Envelhecimento saudável prejudicado pela obesidade: uma revisão integrativa. *Brazilian Journal of health Review.* 2020;3:2309-16. DOI: 10.34119/bjhrv3n2-082
3. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br J Sports Med.* 2020;54(24):1451-62. DOI: 10.1136/bjsports-2020-102955
4. Claumann GS, Maccari FE, Ribovski M, Pinto AdA, Felden ÉPG, Pelegrini A. Qualidade de vida em acadêmicos ingressantes em cursos de educação física. *Journal of Physical Education.* 2017;28. DOI: <https://doi.org/10.4025/jphyseduc.v28i1.2824>
5. Silva ITSA, A.K.Q.; Araújo, R.O.; Munhoz, F.C. O convívio familiar e sua relação com a qualidade de vida de estudantes de Medicina de uma instituição privada do Tocantins. *Revista Brasileira de Educação e Saúde.* 2020;10:65-70. DOI: 10.18378/rebes.v10i2.7749
6. Lima AD, Lustosa, R. P., Daniele, T. M. da C., Uchôa, F. N. M., Foschetti, D. A., dos Santos, A. T., Uchôa, N. M., & dos Santos, R. L. . A associação do índice de massa corpórea com a relação cintura/quadril no comportamento da saúde de policiais militares do Estado do Ceará. *RBPFEEX - Revista Brasileira De Prescrição E Fisiologia Do Exercício.* 2016;10:330-9.
7. Lopes VP, Malina RM, Gomez-Campos R, Cossio-Bolanos M, Arruda M, Hobold E. Body mass index and physical fitness in Brazilian adolescents. *J Pediatr (Rio J).* 2019;95(3):358-65. DOI:10.1016/j.jped.2018.04.003
8. ABESO. Mapa da Obesidade. Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica. 2018.

9. Melo AB, Carvalho, Everton Menegueli, Sá, Felipe Gonçalves dos Santos de, Cordeiro, Jóctan Pimentel, Leopoldo, André Soares, & Lima-Leopoldo, Ana Paula. Nível de atividade física dos estudantes de graduação em educação física da universidade federal do espírito santo. *Journal of Physical Education*. 2018;27. DOI: <http://dx.doi.org/10.4025/jphyseduc.v27i1.2723>
10. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Med*. 2009;6(7):e1000100. DOI: <http://doi.org/10.1371/journal.pmed.1000100>
11. Antoniazzi LD, Aballay, L. R. R., Fernandez, A. R., & Fiol de Cuneo, M. Análisis del estado nutricional en estudiantes educación física, asociada a hábitos alimentarios y nivel de actividad física. *Revista De La Facultad De Ciencias Médicas De Córdoba*. 2018;75:105–10. DOI: <https://doi.org/10.31053/1853.0605.v75.n2.20793>
12. Silva WRM, J.; Campos, J.A.D.B. Escala de Influência dos Três Fatores (TIS) aplicada a estudantes universitários: estudo de validação e aplicação. *Cad Saúde Pública*. 2019;35. DOI: <https://doi.org/10.1590/0102-311x00179318>.
13. Peterson NE, Sirard JR, Kulbok PA, DeBoer MD, Erickson JM. Sedentary behavior and physical activity of young adult university students. *Res Nurs Health*. 2018;41(1):30-8. DOI: 10.1002/nur.21845
14. Vainshelboim B, Brennan GM, LoRusso S, Fitzgerald P, Wisniewski KS. Sedentary behavior and physiological health determinants in male and female college students. *Physiol Behav*. 2019;204:277-82. DOI: 10.1016/j.physbeh.2019.02.041
15. Kayode OO, Alabi QK. Food consumption patterns, physical activity and overweight and obesity among undergraduates of a private university in Nigeria. *Clinical Nutrition Experimental*. 2020;31:28-34. DOI: <https://doi.org/10.1016/j.clnex.2020.01.001>
16. Silva LPRT, A.R. de O.; Rodrigues, E.L.; Ré, P.V.D.; Sanches, P.M.A.; Bresan, D. Dissatisfaction about body image and associated factors: a study of young undergraduate students. *Einstein* 2019;17:1-7. DOI: https://doi.org/10.31744/einstein_journal/2019ao4642
17. Towne SD, Jr., Ory MG, Smith ML, Peres SC, Pickens AW, Mehta RK, et al. Accessing physical activity among young adults attending a university: the role of sex, race/ethnicity, technology use, and sleep. *BMC Public Health*. 2017;17(1):721. DOI: 10.1186/s12889-017-4757-y
18. Garrett SL, Pina-Thomas DM, Peterson KA, Benton MJ. Tracking physical activity in baccalaureate nursing students in the United States prior to graduation: A longitudinal study. *Nurse Educ Today*. 2019;80:28-33. DOI: <http://doi.org/10.1016/j.nedt.2019.05.038>.
19. Grasdalsmoen M, Eriksen HR, Lonning KJ, Sivertsen B. Physical exercise and body-mass index in young adults: a national survey of Norwegian university students. *BMC Public Health*. 2019;19(1):1354. DOI: <https://doi.org/10.1186/s12889-019-7650-z>.
20. Fernani DCGL, Cortez GM, Santos IA, Pacagnelli FL, Massetti T, Silva TDD, et al. Anthropometric profile, physical activity level, degree of anxiety, and posture in college students. *Fisioterapia e Pesquisa*. 2017;24:191-7. DOI: <http://dx.doi.org/10.1590/18092950/17160324022017>

