Self-rated health in university students: a systematic review

Abstract – Objective: To determine, through a systematic review, the prevalence of self-rated health (HSE) in university students, as well as the factors associated. **Methods:** The data was collected in the databases PubMed, SciELO, Virtual Health Library, LILACS, Web of Science and Scopus, and through manual searches. This study adopted the PRISMA checklist and recommendations. The selected articles were analyzed according to their methodological characteristics and the critical evaluation guidelines. Studies that estimated HSE in university students were eligible. **Results:** Of the 1.416 articles found, 19 composed this review. Positive results in the HSE varied from 61.8% to 94.5%, and negative HSE varied from 3.4% to 38.2%, in students from different countries. The cross-sectional design was adopted in all studies. The studies used different questions and answers in the HSE. Having inadequate nutrition, leisure-time physical inactivity, severe stress, and health complaints were the factors that were most associated with a negative HSE. **Conclusions:** The prevalence results of negative SRH in university students from different countries and the associated factors indicate the need for health promotion actions in this environment.

KEYWORDS: HEALTH STATUS, STUDENTS, CROSS-SECTIONAL STUDIES.

RESUMO – Objetivo: O objetivo foi determinar, por meio de uma revisão sistemática, as prevalências da autoavaliação de saúde (AAS) em universitários, bem como os fatores a ela associados. **Métodos:** As buscas dos estudos foram realizadas nas bases de dados PubMed, SciELO, Biblioteca Virtual em Saúde, LILACS, Web of Science e Scopus, além de buscas manuais. Este estudo adotou os itens e recomendações do PRISMA e os artigos selecionados foram analisados conforme as características metodológicas e as diretrizes de avaliação crítica. Foram elegíveis estudos que estimaram a AAS em universitários. **Resultados:** Dos 1.416 artigos encontrados nas bases de dados, 19 fizeram parte dessa revisão. Foram observadas prevalências para a AAS positiva de 61,8% a 94,5% e para a AAS negativa foram de 3,4% a 38,2% em universitários de diferentes países. O desenho de pesquisa adotado em todos os estudos foi o transversal. Entre os estudos houve a aplicação de diferentes perguntas e opções de resposta para a AAS. Observou-se que ter alimentação inadequada, inatividade física no lazer, estresse elevado e ter queixas de saúde foram os fatores que mais se associaram a AAS negativa. **Conclusão:** A amplitude na prevalência da AAS negativa em universitários de diferentes países e os fatores associados indicam a necessidade de ações de promoção de saúde no ambiente universitário.

PALAVRAS-CHAVE: NÍVEL DE SAÚDE, ESTUDANTES, ESTUDOS TRANSVERSAIS.

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INTRODUCTION

Health self-evaluations (HSE) are measures used in epidemiological surveys^{1,2} and are quantified using a single question, which has high validity and reliability¹. The World Health Organization (WHO)³ recommends these indicators to estimate the health level in population-based studies and it has been used in studies with children⁴, adolescents⁵, adults⁶ or the elderly⁷.

Evidence suggests that this item is predictive in relation to morbidity and mortality outcomes^{8,9}. These outcomes also suffer influences from attributes that are associated with this measure, such as: sociodemographic variables (women, old age, lower income and educational level)¹⁰ and health-related behaviors (insufficiently active, irregular consumption of fruits and vegetables, excessive drinking and smoking)^{10,11} and multiple biomarker levels (C-reactive protein, HDL cholesterol, glycosylated hemoglobin, 25-hydroxyl-vitamin-D, zeaxanthin, apolipoprotein-B, cell-free DNA and protein carbonyls)¹².

Among the general population, university students are more susceptible to the impact of academic life on their health status, due to being subject to stressful situations in the activities required by the academic context¹³, in addition to the adoption of health-risk behaviors during this period¹⁴. Therefore, it is essential to perform investigations about the perception of health in this specific public. Especially due to the process of transition from adolescence to adulthood and the possible adoption of negative health behaviors^{15,16}, which can be decisive on the results of perceived health.

The studies on HSE in university students, it was observed that being a woman, having a longer time of exposure to the university environment, having lower income¹⁷⁻¹⁹,

being inactive during leisure time, having inadequate nutrition, experiencing negative stress in life, and consuming alcoholic beverages¹⁹⁻²¹ are factors that are associated with negative HSE. However, considering the relevance of assessing the HSE in this group, a scarcity or lack of review studies was noticed in the indexed databases.

It is expected that, with the knowledge of the health status, as well as the evidence about the factors that are associated with HSE in university students, it will be possible to contribute to the characterization of the components that need to be strengthened and monitored over time. In addition, the information in this review may support targeted projects or programs focusing on the health of this group. This study aimed to determine, through a systematic review, the prevalences found by HSEs in university students, as well as the associated factors.

METHODS

This is a systematic review, which adopted the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA)²² methodology. The proposal for this review was registered in the International Prospective Register of Systematic Reviews (PROSPERO - CRD 42019128446), under the title "Self-evaluation of health in university studies: a systematic review".

Search

The advanced search for articles on the topic was carried out in the English language, in the electronic databases: National Library of Medicine (PubMed), Scientific Electronic Library Online (SciELO), Virtual Health Library (VHL), LILACS (Latin American Literature in Sciences of the Health), Web of Science (Web of Knowledge), and Scopus, in

April 2019. The search strategy included the keywords: “health self-assessment”, “perceived health”, “self-perception of health”, “self-reported health”, “self-evaluation of health”, “health status”, “self-rated health”, and also “undergraduate”, “college students”, “academics”, “university student”, “university”, “cross-sectional study” and “longitudinal study”. The Boolean operators “AND” and “OR” were used for combinations between groups of key words, and the symbol (“ ”) was used for variations of composed terms.

Study selection and appraisal

To be included in this systematic review, the studies needed to meet the following criteria: a) being observational, cross-sectional or longitudinal studies; b) having HSE as a dependent variable; c) being in English, Portuguese or Spanish; d) having as a population university students without age restriction; e) being original studies. There was no limitation on the year of publication.

The initial selection was based on the titles of the articles. After this identification, the abstracts were read. After this stage, the articles chosen were read in full and, subsequently, selected according to the inclusion criteria. Manual searches were performed considering the references of the selected articles in order to find possible studies that met the selection criteria, regardless of the publication database. In addition, a search of publications was carried out in the Google Scholar database, with the following Portuguese keywords: “autoavaliação de saúde”, “percepção de saúde”, “universitários” and “acadêmicos”. These steps were carried out independently and conducted by two reviewers, and a third helped when there were disagreements. The Zotero software was used to store the articles and exclude duplicates, and the Excel software was used to tabulate the extracted data.

The information extracted from the articles that met the inclusion criteria were: a) author; b) year of publication; c) impact factor of the journal; d) study design; e) country where the study was carried out; f) age range of participants; g) gender; h) course or study area; i) sample; j) sample selection criteria; k) question to identify the dependent variable; l) HSE response options; m) prevalence found by the HSE; n) variables associated with the outcome; and o) association test (comparison) used in the main analyses.

Study-quality appraisal

The quality of each article was judged based on the methodological considerations of the Assessing Cardiovascular Risk: Systematic Evidence Review, From the Risk Assessment Work Group²³ for observational cohort research and cross-sectional studies. This instrument has 14 items of quality assessment, which include the objective of the study; its definition, selection, composition and participation of the studied population; the definition and evaluation of exposure and outcome variables; the amount of exposure before the result; monitoring the study and adjusting confounding variables. Each item was given “yes” if the article presented the expected answer and “no” when it did not answer the item’s question. If the question did not fit the article, it would have as answer options: cannot be determined (CD), not reported (NR) and not applicable (NA). The quality analysis of the study (good, regular or poor) was defined according to two reviewers.

RESULTS

The search for studies that identified HSE results in university students resulted in 1,416 articles, 399 of which were duplicates. After excluding studies that did not meet the

initial criteria, 27 studies were read in full. Of these, six articles did not present the prevalences found by the HSE as outcomes, one (1) was not an original article, one (1) was from a language not considered in this review, and in eight publications the instrument assessed health-related quality of life. Thus, 11 arti-

cles^{18,20,21,24-31} met the pre-established inclusion criteria. After this phase, a manual search was performed, where six articles^{17,19,32-35} cited in the references of the 11 selected articles and two articles^{36,37} from another database (Google Scholar) were included in this review, totaling 19 articles (Figure 1).

Figure 1 – Flowchart of the study selection process for this systematic review.

Table 1 shows that among the 19 studies, only a small number of publications met the quality criteria for the outcome assessment methods. It was observed that 36.84% (n = 7) of the articles presented a “good” classification, eight articles were “regular”, and four articles were “bad”.

Table 1. Guidelines used for critical evaluation of publications about self-rated health studies in university students. Evaluation criteria proposed by Assessing Cardiovascular Risk: Systematic Evidence Review from the Risk Assessment Work Group²³.

Criteria	n/N (%)
1. Is the research question or objective clearly stated in this study?	19/19 (100%)
2. Is the study population clearly specified and defined?	16/19 (84.21%)
3. Is the participation rate of eligible people at least 50%?	14/19 (73.68%)
4. Were all participants selected or recruited from the same or similar population (including the same time period)? Were the inclusion and exclusion criteria pre-established and applied uniformly to all participants?	18/19 (94.73%)
5. Were justifications for sample size, description of power or estimates of variation and effect provided?	11/19 (57.89%)
6. For the analyzes in this study, were the exposures of interest measured before the outcomes?	0/19 (0.00%)
7. Was the period of time sufficient for the individual to reasonably be able to see an association between exposure and outcome?	0/19 (0.00%)
8. For exposures that may vary in quantity or level, did the study examine different levels of exposure related to the outcome (for example, categories of exposure, or exposure measured as a continuous variable)?	3/19 (15.78%)
9. Were exposure measures (independent variables) clearly defined, validated, reliable and implemented consistently among all study participants?	19/19 (100%)
10. Have exposures been evaluated more than once over time?	0/19 (0.00%)
11. Were the outcome measures (dependent variables) clearly defined, validated, reliable and implemented consistently among all study participants?	19/19 (100%)
12. Were the outcome evaluators blinded to the participants' exposure condition?	0/19 (0.00%)
13. Was the loss of follow-up after the baseline of 20% or less?	0/19 (0.00%)
14. Were the main potential confounding variables measured and adjusted statistically for their impact on the relationship between exposures and outcomes?	13/19 (68.42%)

Selected Articles	Assessed items														Evaluation
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1.Castrén et al. ²⁶	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	N	REGULAR
2.Mikolajczyk et al. ¹⁸	Y	Y	Y	Y	N	N	N	Y	Y	N	Y	N	N/A	Y	GOOD
3.Sousa ¹⁷	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	N	REGULAR
4.Sousa ³²	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	N	REGULAR
5.Silva ²⁵	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	Y	GOOD
6.Schmidt ²⁴	Y	Y	N	Y	N	N	N	Y	Y	N	Y	N	N/A	Y	POOR
7.Rohrer et al. ²⁷	Y	Y	N	Y	N	N	N	N/A	Y	N	Y	N	N/A	Y	REGULAR
8.Freire et al. ¹⁹	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	Y	GOOD
9.Sousa et al. ²⁰	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	Y	GOOD
10.Pengpid et al. ³³	Y	N	Y	Y	N	N	N	N/A	Y	N	Y	N	N/A	Y	REGULAR
11.El-Ansari e Stock ³⁴	Y	N	N	Y	N	N	N	N/A	Y	N	Y	N	N/A	Y	POOR
12.Mikolajczyk et al. ²¹	Y	Y	Y	Y	N	N	N	N/A	Y	N	Y	N	N/A	Y	GOOD
13.El-Ansari e Stock ³⁵	Y	N	N/R	N	N	N	N	N/A	Y	N	Y	N	N/A	Y	POOR
14.Andrade et al. ³⁷	Y	Y	Y	Y	N	N	N	N/A	Y	N	Y	N	N/A	N	POOR
15.Franco et al. ³⁶	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	Y	GOOD
16.Magalhães et al. ²⁸	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	N	REGULAR
17.Chow et al. ²⁹	Y	Y	Y	Y	Y	N	N	N/A	Y	N	Y	N	N/A	N	REGULAR
18.Hilger-Kolb et al. ³⁰	Y	Y	N	Y	Y	N	N	N/A	Y	N	Y	N	N/A	Y	REGULAR
19.Tran et al. ³¹	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	N	N/A	Y	GOOD

Note: n = articles that met the criteria; N = total articles; % = percentage; Y = yes, attended to the item; N = no, did not attended to the item; N / R = not reported; N / A = not applicable.

The characteristics of the studies included in the systematic review are shown in Table 2. The articles were published between 2008 and 2018, with 12 publications between 2014 and 2018^{19–21,28–31,33–37}. As for their impact factor, 12 articles were published in journals^{18,19,21,24,26,27,29–31,33–35}, with values ranging from 0.513³³ to 2.567¹⁸. The type of study of all selected articles was cross-sectional (100%). The studies were carried out in 12 different countries (Finland²⁶, Germany^{18,21,30}, Bulgaria^{18,21}, Po-

land^{18,21}, Brazil^{17,19,20,25,28,32,36,37}, Sweden²⁴, United States^{27,31}, Egypt³⁴, England³⁵, Wales³⁵, Northern Ireland³⁵ and Hong Kong²⁹) and one (1) study considered a sample of 26 countries from Asia, Africa and America³³. The studies showed a variation in the average age of 18.4 years³⁷ to 24.7 years³⁶ and one (1) study had an amplitude of 23 to 69 years²⁷. Regarding the courses/areas of the studied samples, most belonged to the health field, with a predominance of the Physical Education course^{17,25,32,36,37}.

Table 02. Characteristics of studies on self-rated health in university students.

Author	Year of publication	Impact factor	Design	Study Location	Age	Gender	Courses/Area
1.Castrén et al. ²⁶	2008	2.067	Cross sectional	Finland	19 to 35 years	M/F	N/A
2.Mikolajczyk et al. ¹⁸	2008	2.567	Cross sectional	Germany, Bulgaria and Poland	20.7*	M/F	Natural sciences, Humanities, Social sciences, Law and Economics
3.Sousa ¹⁷	2009	N/A	Cross sectional	Brazil	23.2*	M/F	Physical education
4.Sousa ³²	2010	N/A	Cross sectional	Brazil	23.2*	M/F	Physical education
5.Silva ²⁵	2012	N/A	Cross sectional	Brazil	≤ 20 years >20 years	M/F	Physical education
6.Schmid ²⁴	2012	1.260	Cross sectional	Sweden	23.4 years*	M/F	Business Administration
7.Rohrer et al. ²⁷	2012	1.582	Cross sectional	United States	23-69	M/F	N/A
8.Freire et al. ¹⁹	2014	0.780	Cross sectional	Brazil	≤ 20 years, between 21 and 30 and ≥ 31 years.	M/F	N/A
9.Sousa et al. ²⁰	2014	N/A	Cross sectional	Brazil	23.5*	M/F	Health and other areas
10.Pengpid et al. ³³	2015	0.513	Cross sectional	26 countries across Asia, Africa and America	20.8*	M/F	N/A
11.El-Ansari e Stock ³⁴	2016	1.162	Cross sectional	Egypt	18,9 years*	M/F	Business, Engineering, Education, Arts, Social Work, Science, Physical Education, Computer and Informatics, Veterinary Medicine, Specific Education and Agriculture

12.Mikolajczyk et al. ²¹	2016	2.031	Cross sectional	Germany Bulgaria Poland	< 20 years, 20-22 years and > 22 years	M/F	Social sciences, Natural sciences, Law and Economics
13.El-Ansari e Stock ³⁵	2016	1.260	Cross sectional	England, Wales and Northern Ireland	N/A	M/F	N/A
14.Andrade et al. ³⁷	2017	N/A	Cross sectional	Brazil	18.4*	M/F	Physical education
15.Franco et al. ³⁶	2018	N/A	Cross sectional	Brazil	24.7*	M/F	Physical education Health
16.Magalhães et al. ²⁸	2018	N/A	Cross sectional	Brazil	20*	M/F	(Biomedicine, Nursing, Physiotherapy, Medicine and Occupational Therapy) and other areas (Biological Sciences, Environmental Engineering, History, Letters, Psychology and Social Work)
17.Chow et al. ²⁹	2018	1.220	Cross sectional	Hong Kong	N/A	M/F	Nursing
18.Hilger-Kolb et al. ³⁰	2018	2.025	Cross sectional	Germany	22.69*	M/F	Medicine Other courses
19.Tran et al. ³¹	2018	1.812	Cross sectional	United States	N/A	M/F	N/A

*Average; N / A = Not present; M = Male; F = Female.

As for the characteristics of the studies according to the methodological criteria used (Table 3), the samples ranged from 56²⁸ to 19,811³³ participants. As a sampling criterion, there was a predominance of simple random selection^{20,25,26,28,31,33,34} and of selection by convenience^{18,21,24,29,30,36,37}.

For the outcome assessment, different questions were observed, and the number of response options varied from four to five. The response categories used, although similar, were not exactly the same, with 13 studies using “excellent” as their first option, three studies using “very good” (“muito boa” in

Portuguese) category, one study using “very good” (“muito bom” in Portuguese) and another study using “good” as its first option. For the second response option, six studies used “good” (“boa” in Portuguese), other six studies used “very good”, four studies used “good” (“bom” in Portuguese), one study used “reasonably good”, and one study, “very good”. For the third option, 11 studies used “regular”, six studies “good” (“boa” in Portuguese) and one study, “good” (“bom” in Portuguese). In the fourth option, seven studies used “regular”, nine studies “bad”, one study used “quite bad”, and one study used “not so

good”. Finally, for those who used five response options, nine studies used the response “bad”, and four, “very bad”.

Regarding the prevalence found by the HSE, 11 articles^{17,19–21,25,28,30,32,34–36} provided the prevalence of negative HSE outcomes dichotomously, the values varying from 3.4%

²⁰ to 38.2%²⁸. In two studies^{28,34} the prevalence of negative HSE outcomes was greater than 30%. One study, which did not consider the option “regular” as negative, had the lowest prevalence of negative HSE outcomes, 3.4%²⁰. The prevalence of positive HSE outcomes ranged from 61.8%²⁸ to 94.5%²¹.

Table 03 Description of methodological criteria and prevalence of self-rated health in university students.

Author	Sample	Sampling criteria	Question	Response options	Prevalence
1.Castrén et al. ²⁶	3.153	Simple random	N/A	Good, Fairly Good, Fair, Fairly bad and Bad	Good: M:55%; F=46% Fairly Good: M=31%; F= 39% Regular: M= 11%; F= 14% Fairly bad: M=2%; F=1% Bad: M=0,1%; F=0,2%
2.Mikolajczyk et al. ¹⁸	2.103	Convenience	“How would you rate your overall health?”	Excellent, Very good, Good, Regular and Bad	8.7% excellent, 35.8% very good, 45.6% good, 8.9% regular and 1% poor
3.Sousa ¹⁷	105	Census	“How do you rate your current health status?” Question located at the end of the questionnaire.	Excellent, Good, Regular and Bad	Negative SRH: 14.3%
4.Sousa ³²	105	Census	“How do you rate your current health status?” Question located at the beginning of the questionnaire.	Excellent, Good, Regular and Bad	Negative SRH: 14.3%
5.Silva ²⁵	217	Simple random	“How do you rate your current health status?”	Very Good, Good, Regular, Bad and Very Bad	Negative SRH: 20%
6.Schmid ²⁴	152	Convenience	“In general how would you rate your overall health?”	N/A	N/A
7.Rohrer et al. ²⁷	241	Snowball method	“Rate your overall health?”	Excellent, Very good, Good, Regular and Poor	Excellent, very good or good SRH: 85%

8.Freire et al. ¹⁹	874	Conglomerates	“How do you assess your health status?”	Excellent, Good, Regular and Bad	Negative SRH: 23.2%
9.Sousa et al. ²⁰	1.084	Simple random	“In general how would you rate your current health?”	Very Good, Good, Regular, Bad and Very Bad	Regular SRH: 26.8% Negative SRH: 3.4%
10.Pengpid et al. ³³	19.811	Simple random	“In general, would you say your health is ...”	Excellent, Very good, Good, Regular and Bad	General classification of health status: Average = 3.03
11. El-Ansari e Stock ³⁴	3.167	Simple random	“How would you describe your overall health?”	Excellent, Very good, Good, Regular and Poor	Excellent and very good SRH: 18.5% Good SRH: 47.1% Regular and poor SRH: 34.4%
12.Mikolajczyk et al. ²¹	2.103	Convenience	“How would you rate your overall health?”	Excellent, Very good, Good, Regular and Poor	Positive SRH: Germany: F = 90.5% M = 92.5%; Bulgaria: F = 92.2% M = 95.9%; Poland: F = 83.8% M = 85.9% Negative SRH: Germany: F = 9.5% M = 7.5%; Bulgaria: F = 7.8% M = 4.1%; Poland: F = 16.2% M = 14.1%
13. El-Ansari e Stock ³⁵	3.464	N/A	“How would you describe your overall health?”	Excellent, Very good, Good, Regular and Poor	Excellent and very good SRH: 47.6% Good SRH: 41.6% Regular and poor SRH: 10.8%
14.Andrade et al. ³⁷	84	Convenience	“How do you rate your current health status?”	Excellent, Good, Regular and Bad	Excelent SRH:28.9% Good SRH: 57.8% Regular SRH: 13,3%
15.Franco et al. ³⁶	111	Convenience	N/A	Excellent, Good, Regular and Bad	Negative SRH: 10,1%
16.Magalhães et al. ²⁸	56	Simple random	N/A	Very good to very poor scale	Very goog and good SRH: 61.8% Regular and very poor SRH: 38.2%
17.Chow et al. ²⁹	314	Convenience	N/A	Bad, Not so good, Regular, Good and Excellent	First year students: average = 3.26 Third year students: average = 3.19
18.Hilger-Kolb et al. ³⁰	689	Convenience	“How do you assess your general health?”	Very Good, Good, Regular, Bad and Very Bad	Negative SRH: 13.5%
19.Tran et al. ³¹	1.412	Simple random	“In general, how is your health?”	Poor, Regular, Good, Very Good and Excellent	Poor: 0.57%; Regular: 5.10%; Good: 21.81%; Very good: 43.41% and Excellent: 29.11%

SRH = self-rated health; % = Prevalence; N / A = not present; M = Male; F = Female.

Table 4 shows the factors associated with HSE outcomes in university students. The reviewed studies found an association for negative HSE outcomes and the following characteristics: female gender, longer course time, high stress, overweight, smoking, consuming alcohol and drugs, inadequate diet, sleep problems, inactive in leisure-time, lower economic class, health complaints, and depressive symptoms. The factors associated with a positive HSE outcome were: male gender, high level of physical activity, having high income, better mental health, normal weight,

better quality of life, longer sleep duration and higher educational level of parents.

Among the statistical tests used to estimate the association (comparison) there was a predominance of the chi-square test and of the binary logistic regression. Three studies used the Poisson Regression and three other used the Multiple Linear Regression. Other studies used the Ordinal Logistic Regression, the Multinomial Logistic Regression, the Mann-Whitney test, the Kruskal-Wallis-H test, Spearman's Correlation and Fisher's Exact test.

Table 04. Factors associated with self-rated health status among university students.

Author	Variables associated with the outcome	Analysis test
1.Castrén et al. ²⁶	There was no association between variables.	- Chi-square test.
2.Mikolajczyk et al. ¹⁸	A higher score of psychosomatic complaints,>2 consultations with a doctor in the last six months and insufficient income were associated with worse health status. Men, a higher level of physical activity and a better sense of coherence were associated with better health.	- Multiple Linear Regression
3.Sousa ¹⁷	Older university women and those with a more time in the course were associated with negative self-rated health.	- Chi-square test.
4.Sousa ³²	Self-perception of negative stress and excess body weight were associated with negative self-perception of health.	- Chi-square test. - Fisher's Exact test
5.Silva ²⁵	Inadequate nutrition, problems with sleep, wearing a seat belt, stress and safe sex; inappropriate behavior and introspection problems were associated with negative self-rated health.	- Poisson regression
6.Schmid ²⁴	Male gender, having Swedish as a native language and mothers with high school diploma were associated with better self-rated health.	- Multiple Linear Regression
7.Rohrer et al. ²⁷	Smokers, having 14 or more days of mental suffering and white students were associated with lower chances of reporting a better self-rated health.	- Binary Logistic Regression
8.Freire et al. ¹⁹	Female university students, those of poor economic class, insufficiently active at leisure, who consume meals in restaurants, show symptoms of headache, back pain and insomnia were associated with poor self-rated health (regular and bad). Negative relationships with teachers, inactive at leisure, insufficient consumption of vegetables, consumption of soft drinks on most days and self-rated stress as negative were associated with regular self-rated health.	- Poisson regression
9.Sousa et al. ²⁰	Inactive at leisure, self-rated stress as negative and the obese were associated with negative self-rated health.	- Multinomial Logistic Regression

10. Pengpid et al. ³³	Having medium or high income, having greater personal control, better mental health (having no sleep problems and without or any symptoms of post-traumatic stress disorder - PTSD), having normal weight, presenting inadequate eating practices and a low level of activity physical activity were associated with a better self-assessment of health status.	- Multiple Linear Regression
11. El-Ansari e Stock ³⁴	University students who had a better quality of life and an awareness of their health were associated with greater chances of self-rated health as very good and excellent. College students with higher levels of health symptoms and complaints, who were so sick that they had to stay in bed, had a common cold or consulted a doctor in the past 12 months, and those who felt strongly / very strongly overwhelmed were associated with less chance of self-rated health as very good and excellent.	- Binary Logistic Regression
12. Mikolajczyk et al. ²¹	Students with problems due to alcohol consumption associated with negative self-rated health.	- Binary Logistic Regression
13. El-Ansari e Stock ³⁵	Female university students, better quality of life, greater health awareness and recommended levels of physical activity were associated with self-rated health as very good and excellent. University students with higher levels of health complaints; being sick to the point of staying in bed, taking medication regularly, having seen a doctor in the last 12 months, excessive alcohol consumption in the last 2 weeks and use of drugs have been associated with lower chances of self-rated health as very good and excellent.	- Binary Logistic Regression
14. Andrade et al. ³⁷	College students who had a longer sleep duration and a greater amount of vigorous physical activity were associated with a positive perception of health (excellent).	- Chi-square test. - Kruskal-wallis test
15. Franco et al. ³⁶	Consumption of vegetables / salads at an irregular frequency per week, overweight and negative stress were associated with negative self-rated health.	- Poisson regression
16. Magalhães et al. ²⁸	University students with a good to need to improve lifestyle, who showed occupational behaviors of habits and involvement with the environment that need to improve, were associated with the perception of regular health to very bad. University students who have an excellent and very good lifestyle have associated themselves with a perception of good and very good health.	- Mann-Whitney test
17. Chow et al. ²⁹	Higher scores in health management and those who had no family conflicts in the recent month were associated with positive self-rated health.	- Ordinal Logistic Regression
18. Hilger-Kolb et al. ³⁰	The high ratio ERI (Academic Stress), high effort, low reward, and a high commitment excess were associated with poor self-rated health.	- Binary Logistic Regression
19. Tran et al. ³¹	Student loan debt stress and depressive symptoms were associated with negative self-rated health. Higher family income and a higher educational level for parents were associated with positive self-rated health.	- Spearman correlation

ERI: effort, reward, and over-commitment; BMI: body mass index.

DISCUSSION

The present study showed that research using HSE among university students are recent, with the first selected articles published about 11 years ago^{18,26}. There was a predominance of studies published in 2018^{28-31,36}

and most studies were conducted in Brazil^{17,19,20,25,26,32,36,37}. The design of all selected articles was cross-sectional, and among the studies, differences regarding the question and answer options of HSE stood out. Inadequate nutrition, physical inactivity during leisure, high stress levels and health com-

plaints were the factors that were most associated with negative HSE outcomes.

As for the critical assessment of the quality of the articles included in this review, there was a greater number of papers that were classified as regular. Most publications had limitations regarding the sampling aspects, with some studies with a participation rate of less than 50%, while others did not justify their sample size. Factors like these increase the risk of bias, as they may not adequately represent the target population, thus leading to the question of whether there were enough participants to detect associations³⁸. It is important to highlight that, from the 19 studies, 12 were published in journals with an impact factor from 0.513 to 2.567, numbers considered as representative in the science field. But this can point to the fact that elements inherent to methodological procedures may not have been judged by the evaluators as limiting factors in publications.

Regarding HSE, since it is a self-reported measure, the use of questionnaires is the only way to obtain information. The questionnaire has been one of the most used information extraction instruments due to its practicality and low application cost³⁹. However, in this study, the characteristics of the question, answer options, and the categorization of the variables were not standardized, which makes it difficult to compare the surveys. Thus, the variation in the prevalence of negative HSE, that range from 3.4%²⁰ to 38.2 %²⁸, mainly due to the classification criteria. In certain studies, the options “regular” and “bad” were considered as a negative HSE, while in others, the options “regular”, “bad” and “very bad” or

“bad” and “very bad” were considered as negative.

This review found that articles consistently included the “regular” option as a negative assessment. This was also observed in a systematic review of HSE in the elderly, which showed a prevalence of negative assessments greater than 30% in the surveys that included the responses “regular” or “reasonable”⁴⁰. In this context, the study of Sousa *et al.*²⁰, included in this review, did not consider “regular” as negative response, and observed a lower prevalence of negative HSE (3.4%). This result is close to the data of the VIGITEL study with adults from Brazilian capitals performed in 2018, where a negative assessment of their health status (as bad or very bad) was of 4.6%⁴¹. However, there are specific observations of regular HSE in university students²⁰, since it was noted that health behaviors were more associated with this option. It is possible to suggest that research analyze the intermediate categories grouped with the categories that estimate the negative health level, since there is a mortality risk consideration for people who perceive health as regular⁴².

Among the factors associated with HSE, there was a greater number of publications in this review that showed the relationship between stress and health complaints with negative HSE. The association of these attributes was observed in studies with adolescents, which showed the association of negative stress with negative HSE⁴³. In research with adult industry workers, it was observed that patients with limiting diseases and who needed longer short-term leave had higher chances of negatively assessing health⁴⁴. These two cha-

racteristics (stress and health complaints) can be related to each other, as shown in a study with university students from the United Kingdom and Egypt⁴⁵ and adolescents from Canada that revealed the negatively physical and mental status were associated with quality of life, on the other hand global quality of life was more determined by the mental health status⁴⁶. However, in this review, the studies did not investigate these characteristics simultaneously.

The causes of stress and health complaints need to be better clarified through investigations regarding time spent at university, environment, emotional challenges, and decreased family relationships. This would allow to better understand the coping mechanisms of psychosocial risks among university students.

In addition, it was observed that inadequate diet and being overweight were directly associated with negative HSE outcomes in university students. The association of these variables was also verified in a systematic review with adolescents⁴⁷. College students who adopt unhealthy eating habits are more susceptible to the development of chronic non-communicable diseases, such as obesity. Thus, the recognition of the negative role of these behaviors can increase the likelihood of a negative self-evaluation.

Physical activity is a behavior that, in this study, was sometimes associated with the HSE outcomes in a negative way, and sometimes, in a positive one. In studies in which university students reached the recommended levels of physical activity³⁵ and in those in which they reached a higher level of physical activity^{18,37} there was an association with positive HSE outcomes. However, in studies with university students that did

not reach the recommended level of physical activity at leisure¹⁹ or were physically inactive at leisure²⁰, an association with negative HSE outcomes was observed. This corroborates the review conducted by Vancœa et al.⁴⁸ with the adolescent population, which showed that, among selected studies, there was evidence of a direct association between the practice of physical activities and a positive perception of health. In the review conduct by Silva et al.⁴⁷, among the factors associated with negative HSE outcomes in adolescents, low levels of physical activity were also presented as a strong indicator. This aspect can be explained by the physiological and psychosocial effects that physical activity generates in HSE.

In this review, the study of Andrade et al.³⁷ only showed an association of greater amounts of physical activity at vigorous intensity with positive HSE, whereas when it comes to moderate intensity this association was not observed. This result may have been influenced by the study sample (86 university students), and since there was no justification for this number, the power of the sample for estimating results may have been neglected, since small samples may be associated with larger errors³⁸. Another aspect of this publication was the lack of adjustment for potential confounding variables, which adds possible biases to the results. On the other hand, it was found that, out of the 19 studies, 13 performed robust analyzes through regressions, which allow inferences based on control models for confounding factors⁴⁹, and thus makes it possible to estimate the determinants of HSE in university students.

In relation to the analysis of socioeconomic factors, higher family income was

shown to be associated with positive HSE. Review studies focusing on adolescents⁴⁷ and elderly⁴⁰ demonstrated the same result. The level of income reflects the possibility of acquiring good food, greater access to leisure activities, education, housing, and health services. However, these results must be analyzed carefully. A systematic review with longitudinal studies on the relationship between income and health showed that the association of positive HSE with higher income is very small and probably insignificant when the result is adjusted for confounding factors, such as employment status, social support, and family structure⁴⁵.

There was a lack of longitudinal studies on this subject in university students. Longitudinal data are considered to have greater explanatory power. A cross-sectional study has the impossibility to establish cause and effect relationships⁵⁰. Another aspect verified in this review was that most of the studies were carried out with samples of students from a specific course^{17,24,25,29,32,36,37}. This can lead to bias in relation to the generalization of information for the general population of university students.

In this review, the limitations refer to the non-inclusion of publications such as theses and dissertations, which could expand the information regarding the theme. As a strength of this study, the main databases were used to expand the search strategy and studies from different countries and years of publication were included, which allows characterizing HSE in university students.

In view of the findings of this systematic review, due to the wide amplitude of prevalence, other research is suggested that incorporate the validation of a question and a standardized scale to be used to estimate

HSE, especially considering the balance between the negative and positive poles, and the intermediate option. This review is one of the first to systematize studies on HSE in the university population.

CONCLUSION

This review showed a high amplitude in the prevalence of negative HSE in university students from different countries. As for the methodological aspects, the lower quality of the studies was related to their sampling aspects. In addition, it was found that the options for answering the question about HSE are not standardized, which makes it difficult to compare results. There are a wide range of variable that can determine HSE, like socio-demographic, psychosocial, behavioral, lifestyle, and quality of life factors. Thus, it is important to monitor indicators in university spaces, helping in decision making regarding health policies for university students.

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