INTERNAL CONSISTENCY OF THE INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (SHORT VERSION) FOR USE IN RESEARCH WITH BRAZILIAN UNIVERSITY STUDENTS

CONSISTENCIA INTERNA DEL CUESTIONARIO INTERNACIONAL DE ACTIVIDAD FÍSICA (VERSIÓN CORTA) PARA USO EN INVESTIGACIONES CON ESTUDIANTES UNIVERSITARIOS BRASILEÑOS

CONSISTÊNCIA INTERNA DO *INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE* (VERSÃO CURTA) PARA USO EM PESQUISAS COM UNIVERSITÁRIOS BRASILEIROS

Thiago Ferreira de Sousa [1]
Gildeene Silva Farias [2]
Aline de Jesus Santos [3]

Abstract
The objective of this study was to analyze the psychometric quality regarding the level of internal consistency of the International Physical Activity Questionnaire (IPAQ), short version, in Brazilian university students. This is a cross-sectional study whose data collection was carried out via questionnaire at a public university in the state of Minas Gerais, Brazil. Physical activities were analyzed, considering the minutes spent walking, moderate and vigorous intensity. Descriptive analyses, Pearson correlation and internal consistency were used using the MacDonald's Omega test (MO) and Conbrach's alpha (α). All analyzes were carried out stratified by sex using SPSS software, version 25.0. 309 men and 565 women participated in the study. The internal consistency levels among men were MO of 0.670 and α of 0.469, among women they were OM of 0.580 and α of 0.480. There were significant correlations between physical activity variables, with the exception of walking time and vigorous intensity among men. It is concluded that the IPAQ, short version, analyzed in three variables (walking, moderate and vigorous) relating to minutes of practice, showed low internal consistency in Brazilian university students.

Keywords: Students; Motor Activity; Reliability and Validity.

[1] Doctorate in Physical Education at the Federal University of Santa Catarina. Teacher in the Post-Graduation Program in Physical Education at the State University of Santa Cruz.
ORCID: https://orcid.org/0000-0002-9846-9661 Contact: tfsousa_thiago@yahoo.com.br
[2] Doctorate student in Physical Education at the São Judas Tadeu University. Master in Physical Education from the Federal University of Triângulo Mineiro. Professor at the Federal University of Piauí and at the College Estacio de Sá.
ORCID: https://orcid.org/0000-0003-2810-2925 Contact: gilfarias28@hotmail.com
[3] Master student in Physical Education at the State University of Santa Cruz. Graduate in Physical Education from the Federal University Reconcave of Bahia.
ORCID: https://orcid.org/0000-0002-8195-2008 Contact: alinnetrindade0@gmail.com

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

1

Resumen
El objetivo de este estudio fue analizar la calidad psicométrica en cuanto al nivel de consistencia interna del Cuestionario Internacional de Actividad Física (IPAQ), versión corta, en estudiantes universitarios brasileños. Se trata de un estudio transversal cuya recolección de datos se realizó mediante cuestionario en una universidad pública del estado de Minas Gerais, Brasil. Se analizaron las actividades físicas, considerando los minutos de caminata, intensidad moderada y vigorosa. Se utilizaron análisis descriptivos, correlación de Pearson y consistencia interna mediante la prueba Omega de MacDonald (OM) y alfa de Conbrach (α). Todos los análisis se realizaron estratificados por sexo mediante el software SPSS versión 25.0. Participaron en el estudio 309 hombres y 565 mujeres. Los niveles de consistencia interna entre los hombres fueron OM 0,670 y α 0,469, entre las mujeres fueron OM 0,580 y α 0,480. Hubo correlaciones significativas entre las variables de actividad física, con excepción del tiempo de caminata y la intensidad vigorosa entre los hombres. Se concluye que el IPAQ, versión corta, analizado en tres variables (caminata, moderada y vigorosa) relacionadas con los minutos de práctica, mostró baja consistencia interna en estudiantes universitarios brasileños.

Palabras clave: Estudiantes; Actividad motora; Fiabilidad y Validez.

Resumo
O objetivo deste estudo foi analisar a qualidade psicométrica referente ao nível de consistência interna do *International Physical Activity Questionnaire* (IPAQ), versão curta, em universitários brasileiros. Trata-se de um estudo transversal cuja coleta de dados foi realizada via questionário em uma universidade pública do estado de Minas Gerais, Brasil. Foram analisadas as atividades físicas, considerando os minutos em caminhada, intensidade moderada e vigorosa. Empregou-se análises descritivas, correlação de Pearson e a consistência interna por meio do teste de Ômega de MacDonald's (OM) e alfa de Conbrach's (α). Todas as análises foram realizadas estratificadas por sexo via software SPSS, versão 25.0. Participaram do estudo 309 homens e 565 mulheres. Os níveis de consistência interna entre os homens foram de OM de 0,670 e α de 0,469, entre as mulheres foram de OM de 0,580 e α de 0,480. Houve correlações significativas entre as variáveis da atividade física, com exceção entre o tempo de caminhada e intensidade vigorosa entre os homens. Conclui-se que o IPAQ, versão curta, analisado em três variáveis (caminhada, moderada e vigorosa) relativas aos minutos de prática, apresentou consistência interna baixa em universitários brasileiros.

Palavras-chave: Estudantes; Atividade motora; Confiabilidade e Validade.

Introduction

Physical activity comprises an important health-related behavior for adoption at different stages of life (Shinn; Salgado; Rodrigues, 2020). When not carried out regularly, it leads to greater risks of the emergence of chronic non-communicable diseases, which can range from high blood pressure (1.6%) to dementia (8.1%), in different countries from low to high socioeconomic levels (Katzmarzyk et al., 2022).

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

2

Due to this relevance, monitoring of this behavior in different studies has been conducted (Li et al., 2022; WU et al., 2022), which allows expanding the evidence framework at a global level. Therefore, one of the main ways of measuring physical activity in epidemiological surveys is the questionnaire, such as the International Physical Activity Questionnaire (IPAQ), validated for use in adolescents (Guedes; Lopes; Guedes, 2005), adults (Guo et al., 2021) and elderly people (Cleland et al., 2018). In the context of university communities, such as university students, it is observed that the IPAQ has also been used in research (Sousa, 2011).

Therefore, it is essential in relation to this public, to better understand the psychometric capabilities of the physical activity investigation model proposed in the use of the IPAQ and thus estimate the quality of the information measured, considering that the short version of this instrument is divided into walking and practice at two intensities, moderate and vigorous, based on the report regarding the practice of physical activity in four domains, namely: leisure, commuting, occupational and domestic (IPAQ, 2022; CRAIG et al., 2003). The separate times for each of these physical activity items are later added to the total score in minutes (Hallal et al., 2003), or later transformed into metabolic equivalents (IPAQ, 2022). On the other hand, studies also analyze these three characteristics separately, as in research that estimated the prediction of practice in relation to health-related outcomes (Pitanga et al., 2012, 2010) and the interaction between these actions (Moreno-Llamas; García-Mayor; De La Cruz-Sánchez, 2022).

Regarding the psychometric qualities in relation to the level of internal consistency of the IPAQ, it is known that the long version, which estimates in detail the practice of physical activity in the domains, demonstrated in research with workers at a university in Iran, a level of reliability using Cronbach's alpha test (α) of 0.700 (Moghaddam et al., 2012). The short version of the IPAQ showed a satisfactory level of internal consistency with an α of 0.700 in adults in Greece (Theodoropoulou; Stavrou; Karteroliotis, 2022) and 0.647 in adults in Hungary (Ács et al., 2021).

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

3

In relation to Brazilian university students, due to cultural peculiarities and academic requirements, as well as the differences inherent in the adoption of this behavior between university men and women (Sousa, 2011), it is understood that it is essential to better understand the characteristics of this instrument in obtaining this information. Therefore, understanding the structure and psychometric capabilities of the IPAQ, short version, will make it possible to reflect on prevalence estimates in research focusing on university students. Although there are results in the literature that characterize the levels of reproducibility and convergent validity of the IPAQ (Khalil et al., 2021), there is little evidence that contributes to additional elements that can support the use of this questionnaire in research among this public in Brazil. Therefore, the objective of this study was to analyze the psychometric quality regarding the level of internal consistency of the IPAQ, short version, in Brazilian university students.

Methods

This cross-sectional study comes from the research "Lifestyle and quality of life of students at the Federal University of Triângulo Mineiro (FUTM)", which was approved by the Research Ethics Committee, via opinion number 2,402,734. The target population comprised students taking on-site courses at FUTM, enrolled in the first academic semester of 2018, on the campus in the city of Uberaba, Minas Gerais.

The sample size was calculated for a target population of 5,952 university students, considering 50% prevalence, aiming to guarantee greater sampling amplitude, a confidence level of 95% and an acceptable sampling error of three percentage points, subsequently, another 20% was added for possible losses and then another 10% for association studies with adjusted analyses. The estimated final sample was 1,195 university students. Considering that analysis was planned for three variables (items), the minimum sample for the present study was 60 university students (30 for each sex), considering the need for 10 participants for each item (Tabachnick; Fidell, 2001).

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

4

The form of participation in the study was for convenience, however, the number of university students required per course was estimated using a stratification procedure, considering the proportionality of each course in the total of FUTM's 25 in-person undergraduate courses. University students aged 18 or over were included, regardless of physical conditions and gender. Students were excluded from distance learning courses and technical courses, due to the different academic characteristics of these courses compared to those offered in person. Furthermore, students who were enrolled at the institution because they had a higher education diploma and thus, they have already experienced the University period, and university students who were enrolled in courses at the Iturama campus (Agronomy, Degrees in Biological Sciences and Chemistry), as it had been opened in February 2015, and is still in the implementation phase and structuring. To apply the exclusion criteria, questions were inserted in the data collection instrument for this screening during the tabulation of information.

In March 2018, the team responsible for data collection was trained, made up of university students and postgraduate students in Physical Education from FUTM. Data collection took place between the months of April and July of the same year, in the institution's classrooms individually or in small groups of up to 30 university students.

Information for data collection was obtained through a questionnaire, self-completed under the supervision of the applicators. This instrument was composed of questions from the Health Indicators and Quality of Life of Academics (ISAQ-A) questionnaire, previously tested for face validity, content and reproducibility for application to university students (Sousa et al., 2013) and the IPAQ, short version, validated for young Brazilian adults (Matsudo et al., 2001).

In this study, the IPAQ instrument was analyzed and those evaluated responded to the number of days of practice and the total time (hours and/or minutes) referring to the conduct carried out in the domains of leisure, commuting, occupational and home activities, considering the carrying out walking and practices at moderate and vigorous intensities. The following variables were investigated: minutes of walking per week, minutes of moderate-intensity physical activity per week and minutes of vigorous-intensity physical activity per week. The time in hours was transformed in minutes.

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

5

The collected data were tabulated in Excel software, and later transferred to Statistical Package for the Social Sciences (SPSS), version 25.0. Initially, the cases furthest from the center (Mahalanobis distance) were analyzed, which represented possible outliers, and exclusion was carried out. Descriptive analyzes of mean, standard deviation (SD), median were applied, complemented by information on asymmetry and kurtosis to observe the distribution of data for each variable of physical activity, with values between -2 and 2 being considered satisfactory. Pearson's correlation was used between the variables, with significant values up to ±0.79 being considered adequate (Santos, 2010). For internal consistency analyzes of physical activity variables, two tests were used, Macdonald's Omega (OM), which considers the divergence of the weights of each variable, with acceptable values between 0.70 and 0.90 (Campo-Arias; Oviedo, 2008) and α, which presupposes a single factor, but that the factorial weights of the variables are considered equal to each other, with the following classification being used: >0.9, excellent; 0.8 to 0.9, good; 0.7 to <0.8, reasonable; 0.6 to <0.7, weak; <0.6, unacceptable (Hill; Hill, 2012). All analyzes were carried out separately by sex. The significance level adopted was 5%.

Results

Participated 1,110 university students. After analysis for potential outliers, the final sample of this study was 309 men and 565 women. Table 1 presents descriptive information on minutes of physical activity separated by gender. In men, average times of practicing physical activities such as walking and moderate intensity were observed, exceeding 100 minutes per week. On the other hand, for women, only walking showed high values.

Information on the correlations between the physical activity variables of the IPAQ questionnaire, according to gender, is presented in Table 2. In men, a correlation was observed between walking time and practice at moderate intensity, and between practice at moderate intensity and practice at vigorous intensity. Among women, there was a correlation between the time allocated to walking and physical activity at moderate and vigorous intensities, and between moderate and vigorous intensity.

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

6

Table 1 – Descriptive analyzes and reliability level of the International Physical Activity Questionnaire (IPAQ), short version, in Brazilian university students. Uberaba, 2018.

Variables	n	Mean	SD	Median	Asymmetry	Kurtosis
Men						
Minutes of physical activity per week						
Walk	309	130.18	118.91	100	0.864	-0.034
Moderate intensity	309	112.41	149.13	30	1.226	0.357
Vigorous intensity	309	83.24	114.01	0	1.133	-0.037
Women						
Minutes of physical activity per week						
Walk	565	114.51	105.37	100	1.087	0.889
Moderate intensity	565	95.38	130.72	30	1.418	1.223
Vigorous intensity	565	55.15	98.92	0	1.683	1.578

SD = Standard deviation. **Source**: Own authorship.

Table 2 - Correlation analysis* between the physical activity variables of the International Physical Activity Questionnaire (IPAQ), short version, according to gender, in Brazilian university students. Uberaba, 2018.

Variables	Walk	Moderate intensity	Vigorous intensity
Men			
Walk	1.00	0.240 p: <0.001	0.023 p: 0.681
Moderate intensity	-	1.00	0.391 p:<0.001
Vigorous intensity	-	-	1.00
Women			
Walk	1.00	0.179 p: <0.001	0.109 p: 0.010
Moderate intensity	-	1.00	0.412 p: <0.001
Vigorous intensity	-	-	1.00

*Pearson correlation. **Source**: Own authorship.

Table 3 presented the internal consistency levels of the physical activity variables of the IPAQ, short version. The results of the MO test were 0.670 and 0.580, in men and women, respectively. The internal consistency values, estimated via α, were lower than the MO.

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

7

Table 3 – Internal consistency level of *International Physical Activity Questionnaire* (IPAQ), short version, according to gender, in Brazilian university students. Uberaba, 2018.

Variables	MO	α
Men		
Minutes of physical activity per week		
Walk		
Moderate intensity	0.670	0.469
Vigorous intensity		
Women		
Minutes of physical activity per week		
Walk		
Moderate intensity	0.580	0.480
Vigorous intensity		

MO = Macdonald's Ômega; α: Conbrach's apha. **Source:** Own authorship.

Discussion

This study showed, in both, men and women students at a Brazilian public university, the occurrence of low internal consistency levels of the IPAQ, short version. These results corroborated the two tests used to estimate internal consistency. The occurrence of significant correlations between the physical activity variables in the questionnaire was noted, however, they were acceptable.

Internal consistency using the α test, in men and women, showed results below 0.60, which can be classified as unacceptable (Hill; Hill, 2012). In other studies, that used the α test to estimate the internal consistency of the short version of the IPAQ, values of 0.647 (weak level) (Ács et al., 2021) and 0.700 (good level) (Theodoropoulou; Stavrou; Karteroliotis, 2022). However, it is important to note that these studies analyzed the physical activity variables differently when compared to our study, as they included the

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

8

sum of the total practice time in the investigation of internal consistency (Theodoropoulou; Stavrou; Karteroliotis, 2022), as well as consideration of the sitting time questions of the aforementioned instrument (Ács et al., 2021), which do not comprise the same construct as physical activity (IPAQ, 2022).

Furthermore, internal consistency results were observed in relation to the MO test that were lower than the levels considered satisfactory, but better than the values observed for α. The MO test seems to be more appropriate, given the differences in the weights that each physical activity variable can contribute to the characteristic it represents. Furthermore, despite lower correlation values between the physical activity variables, significant relationships were observed, which could make the internal consistency result, via α, biased, prompting caution (Hill; Hill, 2012). On the other hand, we chose to use α, for purposes of comparison with other studies that used the aforementioned test.

It is important to highlight that in this study we chose to analyze the minutes referring to walking practices and actions performed at moderate and vigorous intensities, and not how they are measured (days and time, in hours and/or minutes of walking practice and behaviors in the intensities), based on the domains of leisure-time, commuting, occupational and home (IPAQ, 2022). This format was considered because research has investigated this information separately, such as in studies on the predictive capacity of physical activity under different health outcomes (Pitanga et al., 2012, 2010) and analysis of the interaction of these behaviors measured by the IPAQ (Moreno-Llamas; García-Mayor; De La Cruz-Sánchez, 2022), however, it is common to use different methodologies, with the analysis mainly of a single variable with the time score in total, aiming the identification of levels of practice in this audience (Sousa, 2011) and the scope of recommendations (WHO, 2020), which is beyond the scope of this investigation.

Obtaining information about physical activity through three items may not robustly reflect this practice behavior, which could be better explored when using the long version of the IPAQ instrument in this group (Helou et al., 2017), according to observed in research with workers at a university in Iran with internal consistency values at a good level (α: 0.700) (Moghaddam et al., 2012). Despite the limitations related to

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

9

the IPAQ (Farshbaf-Khalili et al., 2021), the possibility of extracting information about the physical activity of Brazilian university students, through this instrument, seems satisfactory to us due to the minimum quality standard demonstrated by the short version, which is expected in questionnaires (Craig et al., 2003; Matsudo et al., 2001) and advantages, which are centered on easy application and low cost (Guimarães; Silva; Basile, 2020), and absence of collinearity between the variables analyzed, as observed in this study.

Some limitations of this study are mentioned, such as the selection method of university students, which occurred for convenience, which can contribute to the participation of university students with better lifestyle profiles, such as those in the area of Health Sciences, however, to minimize this bias, the number of university students per course was estimated, considering proportionality, thus minimizing the mass enrollment of university students in certain courses. Furthermore, prior analysis was used to exclude outliers, as well as the correction of discrepant results (Gress; Denvir; Shapiro, 2018), which are possible when interpreting when self-filling the IPAQ (IPAQ, 2022), due to the bias memory and overestimation of positive behaviors (Silva et al., 2023).

It is concluded that the IPAQ, short version, considering three variables (walking and intensities, moderate and vigorous), presented internal consistency at a low level in terms of reliability in estimating physical activity. It is expected that this information can contribute to the understanding of this questionnaire, which has been used in different countries and which provides the opportunity to measure physical activity behavior in different population groups in research with large samples.

References

ÁCS, P.; VERESS, R.; ROCHA, P.; DÓCZI, T.; RAPOSA, B. L.; BAUMANN, P.; OSTOJIC, S.; PÉRMUSZ, V.; MAKAI, A. Criterion validity and reliability of the International Physical Activity Questionnaire – Hungarian short form against the RM42 accelerometer. **BMC Public Health,** v.21, n.1, p.381, 2021.

CAMPO-ARIAS, A.; OVIEDO, H. C. Propiedades Psicométricas de una Escala: la Consistencia Interna. **Revista de Salud Pública**, v.10, p.831-839, 2008.

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

10

CLELAND, C.; FERGUSON, S.; ELLIS, G.; HUNTERM, R. F. Validity of the International Physical Activity Questionnaire (IPAQ) for assessing moderate-to-vigorous physical activity and sedentary behaviour of older adults in the United Kingdom. **BMC medical research methodology**, v.18, n.1, p.176, 2018.

CRAIG, C. L.; MARSHAL, A. L.; SJÖSTRÖM, M.; BAUMAN, A.; BOOTH, M. L.; AINSWORTH, B. E.; PRATT, M.; EKELUND, U.; YNGVE, A.; SALLIS, J. F.; OJA, P. International physical activity questionnaire: 12-country reliability and validity. **Medicine and Science in Sports and Exercise**, v.35, n.8, p.1381–1395, 2003.

FARSHBAF-KHALILI, A.; MONSHIKARIMI, A.; SHAKOURI, S. K.; JAFARILAR-AGHDAM, N.; GHASSAB-ABDOLLAHI, N. Objective and Subjective Investigation of Physical Activity Levels and Its Relation with Socio-Demographic Characteristics among Medical Students. **Journal of Lifestyle Medicine**, v.11, n.1, p.23–32, 2021.

GRESS, T. W.; DENVIR, J.; SHAPIRO, J. I. Effect of removing outliers on statistical inference: implications to interpretation of experimental data in medical research. **Marshall Journal of Medicine**, v.4, n.2, p.9, 2018.

GUEDES, D. P.; LOPES, C. C.; GUEDES, J. E. R. P. Reprodutibilidade e validade do Questionário Internacional de Atividade Física em adolescentes. **Revista Brasileira de Medicina do Esporte**, v.11, p.151–158, 2005.

GUIMARÃES, E. V.; SILVA, H. P. DA R.; BASILE, R. Avaliação da qualidade de vida e relação com o nível de atividade física em idosos utilizando os questionários WHOQOL-bref e IPAQ. **Cadernos UniFOA**, v.15, n.43, 2020.

GUO, X.; MAO, h.; LIU, T.; ZHANG, Y.; SHEN, P.; XIE, D.; ZHANG, X.; ZHUO, Q. [Validity of the international physical activity questionnaire and bouchard diary in Chinese adults]. **Wei Sheng Yan Jiu = Journal of Hygiene Research**, v.50, n.3, p.435–441, 2021.

HALLAL, P. C.; VICTORA, C. G.; WELLS, J. C. K.; LIMA, R. C. Physical inactivity: prevalence and associated variables in Brazilian adults. **Medicine and Science in Sports and Exercise**, v.35, n.11, p.1894–1900, 2003.

HILL, M.M.; HILL, A. **Investigação por questionário**. 2ª ed. Lisboa: Silabo. 2012.

HELOU, K.; HELOU, N. E.; MAHFOUZ, M.; MAHFOUZ, Y.; SALAMEH, P.; HARMOUCHE-KARAKI, M. Validity and reliability of an adapted arabic version of the long international physical activity questionnaire. **BMC public health**, v.18, n.1, p.49, 2017.

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ). **Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ)**: short and long forms. 2005. Disponível em: https://sites.google.com/view/ipaq/score. Acesso em: 22 de dezembro de 2023.

KATZMARZYK, P. T.; FRIEDENREICH, C.; SHIROMA, E. J.; LEE, I. Physical inactivity and non-communicable disease burden in low-income, middle-income and high-income countries. **British Journal of Sports Medicine**, v.56, n.2, p.101–106, 2022.

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

11

KHALIL, H.; ABURUB, A.; KANAAN, S. F.; ALSHARMAN, A.; KHAZAALEH, S.; QAWASMEH, M. A.; EL-SALEM, K. Convergent and criterion-related validity of the short form of the International Physical Activity and the Incidental and Planned Physical Activity Questionnaires in people with multiple sclerosis. **NeuroRehabilitation**, v.49, n.4, p.597–606, 2021.

LI, S.; LEAR, S. A.; RANGARAJAN, S.; HU, B.; YIN, L.; BANGDIWALA, S. I.; ALHABIB, K. F.; ROSENGREN, A.; GUPTA, R.; MONY, P. K.; WIELGOSZ, A.; RAHMAN, O.; MAZAPUSPAVINA, M. I.; AVEZUM, A.; OGUZ, A.; YEATES, K.; LANAS, F.; DANS, A.; ABAT, M. E. M.; YUSUFALI, A.; DIAZ, R.; LOPEZ-JARAMILLO, P.; LEACH, L.; LAKSHMI, P. V. M.; BASIAK-RASALA, A.; IQBAL, R.; KELISHADI, R.; CHIFAMBA, J.; KHATIB, R.; LI, W.; YUSUF, S. Association of Sitting Time With Mortality and Cardiovascular Events in High-Income, Middle-Income, and Low-Income Countries. **JAMA cardiology**, v.7, n.8, p.796–807, 2022.

MATSUDO, S.; ARAÚJO, T. L.; MATSUDO, V. K. R.; ANDRADE, D. R.; ANDRADE, E. L.; OLIVEIRA, L. C. questionário internacional de atividade física(IPAQ): estudo de validade e reprodutibilidade no Brasil. **Revista Brasileira de Atividade Física e Saúde**, v.6, n.2, p.5–18, 2001.

MOGHADDAM, M. H. B.; AGHDAM, F. B.; JAFARABADI, M. A.; ALLAHVERDIPOUR, H. The Iranian Version of International Physical Activity Questionnaire (IPAQ) in Iran: Content and Construct Validity, Factor Structure, Internal Consistency and Stability. **World Applied Sciences Journal**, v.18, p.1073–1080, 2012.

MORENO-LLAMAS, A.; GARCÍA-MAYOR, J.; DE LA CRUZ-SÁNCHEZ, E. How Europeans move: a moderate-to-vigorous physical activity and sitting time paradox in the European Union. **Public Health**, v.203, p.1-8, 2022.

PITANGA, C. P. S.; PITANGA, F. J. G.; BECK, C. C.; GABRIEL, R. E. C. D.; MOREIRA, M, H. R. Nível de atividade física para prevenção do excesso de gordura visceral em mulheres pós-menopáusicas: quanto é necessário? **Arquivos Brasileiros de Endocrinologia & Metabologia**, v.56, p.358–363, 2012.

PITANGA, F. J. G.; LESSA, I.; BARBOSA, P. J. B.; BARBOSA, S. J. O.; COSTA, M. C.; LOPES, A. S. Atividade física na prevenção de diabetes em etnia negra: quanto é necessário? **Revista da Associação Médica Brasileira**, v.56, n.6, p.697-704, 2010.

SHINN, C.; SALGADO, R.; RODRIGUES, D. Programa Nacional para a Promoção da Atividade Física: o caso de Portugal. **Ciência & Saúde Coletiva**, v.25, p.1339–1348, 2020.

SANTOS, C. **Estatística Descritiva: Manual de Autoaprendizagem**. 2ª ed. Lisboa: Silabado, 2010.

SILVA, R. R.; SANTOS, R. H. C. S.; ALMEIDA, M. O.; SILVA, M. L.; SANTOS, L.; SANTOS, D. A. T.; SANTOS, R. G. Correlação entre a força muscular, atividade física e seus domínios em idosas participantes de um programa comunitário. **RBPFEX - Revista Brasileira de Prescrição e Fisiologia do Exercício**, v.17, n.108, p.138-147, 2023.

SOUSA, T. F. Inatividade física em universitários brasileiros: uma revisão sistemática. **Revista de Atenção à Saúde**, v. 9, n. 29, 2011.

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

12

SOUSA, T. F.; FONSECA, S. A.; JOSÉ, H. P. M.; NAHAS, M. V. Validade e reprodutibilidade do questionário Indicadores de Saúde e Qualidade de Vida de Acadêmicos (Isaq-A). **Arquivos de Ciências do Esporte**, v.1, n.1, 2013.

TABACHNICK, B. G.; FIDELL, L. S. **Using Multivariate Statistics**. 4th ed. New York: Harper & Row, 2001.

THEODOROPOULOU, E.; STAVROU, N.; KARTEROLIOTIS, K. Criterion, construct and factorial validity of the Greek version of the international physical activity questionnaire-short form (IPAQ-SF). **European Journal of Physical Education and Sport Science**, v.8, p.1-13, 2022.

WORLD HEALTH ORGANIZATION (WHO). WHO Guidelines on Physical Activity and Sedentary Behaviour: at a glance. Geneva: WHO, 2020.

WU, J.; ZHANG, H.; YANG, L.; SHAO, J.; CHEN, D.; CUI, N.; TANG, L.; FU, Y.; XUE, E.; LAI, C.; YE, Z. Sedentary time and the risk of metabolic syndrome: A systematic review and dose-response meta-analysis. **Obesity Reviews: An Official Journal of the International Association for the Study of**

Cenas Educacionais, Caetité - Bahia - Brasil, v.7, n.e19533, p.1-13, 2024.

13