Sedentary behavior and joint mobility in university students: a sex comparison

Comportamiento sedentario y movilidad articular en estudiantes universitarios: una comparación por sexo

Authors

Josivaldo de Souza-Lima [1]
Rodrigo Yáñez-Sepúlveda [1, 2]
Catalina Muñoz-Strale [1]
Javiera Alarcón-Aguilar [1]
Maribel Parras-Saldías [3]
Andrés Godoy-Cumillaf [4]
Daniel Duclos-Bastias [5, 6]
Frano Giakoni-Ramirez [1]

[1] Universidad Andrés Bello, Santiago (Chile)
[2] Universidad Espíritu Santo, Samborondón, (Ecuador)
[3] Universidad de Atacama, Copiapó (Chile)
[4] Universidad Autónoma de Chile (Chile)
[5] Pontificia Universidad Católica de Valparaíso (Chile)
[6] Universidad Alfonso X el Sabio (UAX), Madrid (España)

Corresponding author:
Josivaldo de Souza-Lima
josivaldo.desouza@unab.cl

Received: 05-09-25
Accepted: 17-12-25

How to cite in APA

De Souza Lima, J., Yañez-Sepulveda, R., Muñoz Strale, C., Alarcon-Aguilar, J., Parras-Saldias, M., Godoy Cumillaf, A., Duclos-Bastias, D., & Giakoni-Ramirez, F. (2026). Sedentary behavior and joint mobility in university students: a sex comparison. *Retos, 76,* 292-299. https://doi.org/10.47197/retos.v76.11753

Abstract

Background: University students are exposed to high levels of sedentary behavior (SB), which may negatively impact musculoskeletal health, including joint range of motion (ROM). However, evidence in young, healthy populations remains limited.
Objective: To examine the relationship between SB and hip joint ROM in Chilean university students, with particular attention to sex differences.
Methods: A cross-sectional study was conducted with 189 students (89 men, 100 women; mean age: 21.6 ± 2.4 years). SB was assessed using the short-form International Physical Activity Questionnaire, and hip ROM (flexion, extension, abduction) was measured with a digital goniometer under standardized conditions.
Results: Mean SB was 691 ± 42.6 minutes/day, exceedingly commonly accepted sedentary thresholds. No significant correlations were found between SB and hip ROM. Women demonstrated significantly greater hip flexion and abduction ROM than men ($p < 0.05$), while no sex differences were observed in hip extension.
Conclusion: Despite high levels of SB in this university population, no association with hip ROM was found. The observed sex differences in joint mobility align with known anatomical and behavioral variations. These findings highlight the need for longitudinal research using objective measures to better understand SB's impact on joint health in young adults.

Keywords

Joint range of motion; sedentary; behavior; students.

Resumen

Introducción: Los estudiantes universitarios presentan altos niveles de conducta sedentaria (CS), lo que podría afectar negativamente la salud musculoesquelética, incluyendo el rango de movimiento articular (ROM). Sin embargo, la evidencia en poblaciones jóvenes y aparentemente sanas es limitada.
Objetivo: Analizar la relación entre la conducta sedentaria y el ROM de la articulación de la cadera en estudiantes universitarios chilenos, considerando las diferencias según sexo.
Métodos: Se realizó un estudio transversal con 189 estudiantes (89 hombres, 100 mujeres; edad media: 21.6 ± 2.4 años). La CS se evaluó mediante el cuestionario IPAQ corto, y el ROM de cadera (flexión, extensión, abducción) se midió con un goniómetro digital bajo condiciones estandarizadas.
Resultados: El tiempo promedio de CS fue de 691 ± 42.6 minutos/día, superando los umbrales comúnmente utilizados para definir sedentarismo. No se encontraron correlaciones significativas entre CS y ROM. Las mujeres mostraron mayor ROM en flexión y abducción de cadera que los hombres ($p < 0.05$), sin diferencias en extensión.
Conclusión: A pesar del alto nivel de CS en esta población universitaria, no se observó asociación con el ROM de cadera. Las diferencias por sexo coinciden con variaciones anatómicas y conductuales. Se requieren estudios longitudinales con medidas objetivas para evaluar el impacto de la CS en la salud articular.

Palabras clave

Rango de movimiento articular; comportamiento sedentario; estudiantes universitarios.

Introduction

Sedentary behavior (SB), defined as any waking activity characterized by an energy expenditure ≤1.5 metabolic equivalents performed in a sitting, reclining, or lying posture, has emerged as a relevant and independent risk factor for adverse health outcomes across the lifespan (de Rezende et al., 2014). Although the negative cardiometabolic consequences of prolonged sitting are well documented, growing attention has been directed toward its potential implications for musculoskeletal health, particularly joint mobility (Fanchamps et al., 2017). This interest is especially pertinent in young adults, a life stage during which behavioral patterns related to physical activity and sedentarism tend to consolidate and may influence long-term functional capacity.

From a biomechanical perspective, prolonged sitting typically involves sustained hip flexion and reduced variability of joint movement, which may promote adaptive changes in periarticular tissues. Experimental and observational studies have suggested that extended periods in seated postures may contribute to increased passive stiffness, muscle shortening particularly of the hip flexors and alterations in the viscoelastic properties of connective tissue (Oliveira et al., 2023). Over time, these adaptations could theoretically compromise joint range of motion (ROM), especially in movements requiring hip extension, flexion, or abduction. However, empirical evidence supporting these mechanisms remains inconsistent, particularly when considering habitual SB assessed under real-life conditions (Stępień et al., 2025).

University students represent a population at high risk of prolonged sedentary exposure due to academic demands, screen-based learning, and extended study time. Several studies conducted in higher education settings have reported daily sitting times frequently exceeding seven hours, placing students within thresholds commonly used to define prolonged sedentarism (Heneghan et al., 2018). Despite this high exposure, the musculoskeletal consequences of SB in university populations remain underexplored, especially regarding joint mobility outcomes (Curotto-Winder et al., 2022). Most available studies have focused on older adults or clinical populations, limiting the generalizability of their findings to younger, apparently healthy individuals.

An additional layer of complexity arises from sex-related differences in joint mobility. Women consistently exhibit greater ROM than men across multiple joints, including the hip, a phenomenon attributed to a combination of anatomical, hormonal, and neuromuscular factors (Sun et al., 2025). Differences in pelvic morphology, ligament laxity, muscle-tendon compliance, and estrogen-related effects on connective tissue have all been proposed as potential explanations for these disparities. Consequently, sex may act as an important modifier in the relationship between SB and joint ROM, yet few studies have explicitly examined this interaction in young adult populations.

In Latin American contexts, and particularly in Chile, research addressing the interplay between SB and joint mobility in university students is scarce. Existing studies have primarily emphasized physical activity levels, cardiometabolic risk, or self-reported musculoskeletal discomfort, with limited attention to objectively assessed joint ROM (Herreros-Irarrázabal et al., 2024). Moreover, studies simultaneously considering SB, hip joint mobility, and sex differences using standardized measurement protocols are notably lacking.

Therefore, the aim of the present study was to examine the relationship between SB and hip ROM in Chilean university students, with specific attention to sex differences. Based on prior literature, it was hypothesized that: (i) SB would show a weak or no association with hip ROM in this young, apparently healthy population; and (ii) women would exhibit greater hip ROM than men, particularly in movements involving hip flexion and abduction.

Method

Study design and setting

This study employed a cross-sectional observational design conducted at a higher education institution in Chile. The primary aim was to examine the relationship between SB and hip ROM (ROM) in university students, with particular emphasis on sex differences. Participants were recruited using non-

probabilistic convenience sampling and were eligible if they were enrolled during the academic year of data collection and agreed to participate voluntarily.

All assessments were carried out in a controlled environment at the institution's exercise physiology laboratory. Data collection took place over three consecutive days (March 14–16, 2022), between 8:00 a.m. and 12:00 p.m., under stable environmental conditions (temperature: 21–23 °C; relative humidity: 45–55%). Participants wore light sports clothing and were instructed to avoid strenuous physical activity during the 24 hours prior to testing. All procedures complied with the ethical principles of the Declaration of Helsinki and were approved by the Scientific Ethics Committee of the Autonomous University of Chile (approval code: CEC 2320; February 15, 2022).

Participants

A total of 189 university students (89 men and 100 women) participated in the study. Inclusion criteria were: (i) being enrolled at the institution during the 2022 academic year, (ii) age between 18 and 25 years, and (iii) provision of written informed consent. Exclusion criteria included a history of musculoskeletal injury, neurological or medical conditions that could affect joint mobility, recent participation (within the previous three months) in high-intensity sports training, or failure to attend the scheduled assessment session.

Participants were considered apparently healthy, and no stratification was performed according to socioeconomic status or ethnicity. SB was assessed using a self-reported questionnaire, and hip joint ROM was measured under standardized laboratory conditions by a single trained examiner.

Measurement of hip range of motion

Hip joint ROM was assessed using a high-precision digital goniometer (Baseline® 12-1000, Fabrication Enterprises Inc., White Plains, NY, USA), following standardized procedures described by Norkin and White. This instrument has demonstrated excellent intra-rater reliability for lower-limb joint measurements, with intraclass correlation coefficients (ICC) ranging from 0.92 to 0.98 in previous studies. In the present study, intra-rater reliability assessed by test–retest procedures yielded an ICC of 0.95.

All ROM assessments were performed in the exercise physiology laboratory under controlled environmental conditions. Measurements were conducted by a single experienced examiner to minimize inter-rater variability. The evaluation sequence consisted of demographic data collection, SB assessment, and ROM measurements. Hip movements were assessed in the following order: flexion, extension, and abduction.

Participants were positioned in a standardized anatomical posture according to established anatomical landmarks. Each movement was performed three times on both limbs, starting with the dominant side, defined as the leg preferred to kick a ball. The mean value of the three trials was used for statistical analysis.

The goniometer axis and arms were aligned with standard anatomical reference points: for hip measurements, the greater trochanter, lateral midline of the pelvis, and lateral midline of the femur were used. Although knee ROM was assessed as part of the broader evaluation protocol, the present analysis focuses exclusively on hip joint ROM, in line with the objectives of this study.

SB assessment

SB was assessed using the sedentary time item of the short version of the International Physical Activity Questionnaire (IPAQ-short). Participants reported the average time spent sitting on a typical weekday and a typical weekend day, including academic and leisure activities. Responses were provided in hours and minutes.

A weighted mean of daily sedentary time (minutes per day) was calculated using the following formula:

$$\text{Daily sitting time} = \frac{(\text{weekday sitting} \times 5) + (\text{weekend sitting} \times 2)}{7}$$

The IPAQ-short sedentary module has shown acceptable reliability and validity in Chilean young adult populations, with reported test–retest ICC values between 0.76 and 0.88. Standardized written and verbal instructions were provided to ensure participant comprehension.

Sample size estimation

Sample size estimation was conducted based on the study's main objectives of examining associations between SB and ROM and detecting sex differences in hip ROM. For correlational analyses, assuming an expected correlation coefficient of ρ = 0.25 (moderate effect), a significance level of 0.05, and a statistical power of 80%, a minimum sample of 123 participants was required.

For comparisons between men and women, a second estimation was performed assuming a medium effect size (Cohen's d = 0.50), α = 0.05, and power = 0.80, resulting in a minimum of 64 participants per group. The final sample of 189 participants (89 men and 100 women) provided sufficient power to detect moderate-to-large effects, while smaller effects should be interpreted with caution.

Statistical analysis

Statistical analyses were performed using Jamovi software (version 2.4.8). Descriptive statistics are presented as mean ± standard deviation (SD) to facilitate interpretation of hip ROM values and sedentary time. Data normality was assessed using the Shapiro–Wilk test. As most variables did not meet normality assumptions, non-parametric tests were applied.

Sex differences in hip ROM were analyzed using the Mann–Whitney U test. Associations between SB and hip ROM were examined using Spearman's rank correlation coefficient (ρ). Effect sizes were reported as r values for Mann–Whitney and Spearman analyses, alongside 95% confidence intervals where applicable. The level of statistical significance was set at $p < 0.05$ for all analyses.

Results

The study included a total of 189 university students, comprising 89 men and 100 women. Descriptive characteristics of the sample are presented in Table 1. The mean age was 21.9 ± 2.17 years for men and 21.3 ± 2.51 years for women. Mean daily SB was similar between sexes, with values of 691.0 ± 42.9 minutes/day in men and 691.0 ± 42.4 minutes/day in women. These descriptive data provide an overall characterization of the sample and serve as the basis for the analysis of ROM by sex.

Sex differences in hip joint ROM are summarized in Table 2, which reports mean values, mean differences (men - women), and 95% confidence intervals. Women showed higher mean values than men for hip flexion on both sides. Specifically, right hip flexion was 131.7 ± 14.2° in women compared with 115.5 ± 12.3° in men, corresponding to a mean difference of -16.2° (95% CI: -23.37 to -9.04). Similarly, left hip flexion was higher in women (128.9 ± 11.6°) than in men (116.4 ± 13.7°), with a mean difference of -11.34° (95% CI: -17.88 to -4.80).

Greater hip mobility in women was also observed for hip abduction. Right hip abduction averaged 34.8 ± 8.2° in women and 26.3 ± 7.5° in men, yielding a mean difference of -8.70° (95% CI: -13.27 to -4.14). Likewise, left hip abduction was higher in women (32.4 ± 10.3°) than in men (27.6 ± 9.0°), with a mean difference of -8.11° (95% CI: -13.54 to -2.69). In contrast, hip extension values were similar between sexes, as the mean differences for right and left hip extension were small and their confidence intervals included zero (Table 2).

Figure 1 visually illustrates these sex-related patterns in hip ROM. Women consistently exhibited higher mean values for hip flexion and abduction compared with men, whereas hip extension values appeared comparable between sexes. The graphical representation is consistent with the magnitude and direction of the mean differences reported in Table 2 and supports the descriptive interpretation of greater hip mobility in women for movements involving flexion and abduction.

Table 1. Sample characteristics and ROM variables by sex (descriptive statistics).

Variable	Men (n=89), Mean ± SD	Women (n=100), Mean ± SD
Age (years)	21.9 ± 2.17	21.3 ± 2.51
Right hip flexion (°)	115.0 ± 14.1	131.0 ± 13.0

Left hip flexion (°)	115.0 ± 11.8	127.0 ± 13.9
Right hip extension (°)	26.1 ± 8.90	29.7 ± 14.1
Left hip extension (°)	25.8 ± 9.97	27.2 ± 6.61
Right hip abduction (°)	25.5 ± 8.94	34.2 ± 8.34
Left hip abduction (°)	40.1 ± 15.9	44.0 ± 7.59
Sedentary behavior (unit)	691.0 ± 42.9	691.0 ± 42.4

This table presents descriptive statistics (mean ± standard deviation) for demographic variables, SB, and ROM of the hip and knee stratified by sex. No inferential statistics are included in this table, in accordance with the reviewer's recommendation to separate descriptive information from comparative analyses. The values shown are intended to characterize the sample and provide an overview of the distribution of ROM variables and SB in men and women. SB corresponds to self-reported daily sitting time obtained from the IPAQ-short questionnaire.

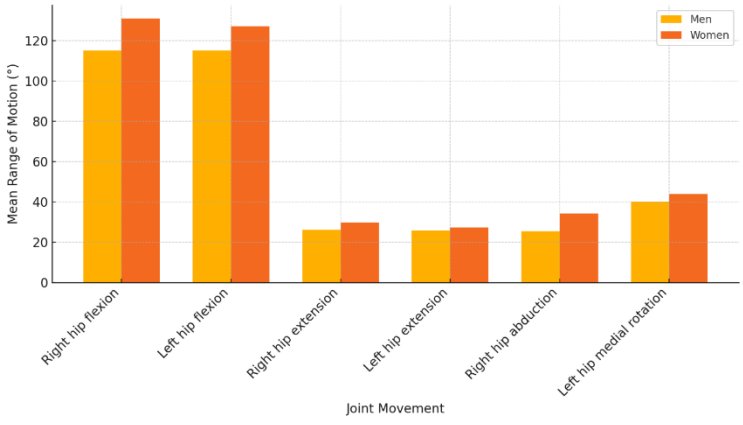
Table 2. Sex differences in hip range of motion (ROM).

Variable	Men Mean ± SD	Women Mean ± SD	Mean difference (Men - Women)	95% CI
Right hip flexion (°)	115.5 ± 12.3	131.7 ± 14.2	-16.20	-23.37 to -9.04
Left hip flexion (°)	116.4 ± 13.7	128.9 ± 11.6	-11.34	-17.88 to -4.80
Right hip extension (°)	26.1 ± 8.9	29.5 ± 10.4	-3.59	-9.27 to 2.08
Left hip extension (°)	25.7 ± 9.1	28.2 ± 9.7	-1.36	-6.06 to 3.33
Right hip abduction (°)	26.3 ± 7.5	34.8 ± 8.2	-8.70	-13.27 to -4.14
Left hip abduction (°)	27.6 ± 9.0	32.4 ± 10.3	-8.11	-13.54 to -2.69

This table summarizes sex differences in hip ROM using mean values, mean differences (men - women), and 95% confidence intervals (CI). Positive values indicate higher ROM in men, whereas negative values indicate higher ROM in women. Inferential test statistics and exact p-values are not reported due to the unavailability of the original individual-level dataset; therefore, effect estimation and confidence intervals are provided to describe the magnitude and direction of the observed differences.

Bars represent mean values ± standard deviation for men and women. Women showed higher mean values for hip flexion and abduction compared with men, whereas hip extension values were similar between sexes. These visual patterns are consistent with the mean differences and 95% confidence intervals reported in Table 2.

Figure 1. Sex differences in hip ROM.



Discussion

The present study examined the relationship between SB and hip ROM in Chilean university students, with a focus on sex-based differences. Consistent with the initial hypothesis, our findings revealed (i) no meaningful correlation between self-reported sedentary time and hip ROM, and (ii) significantly greater hip flexion and abduction in women compared to men, while hip extension remained similar between sexes. These results align with prior literature describing sex-related disparities in joint mobility and

extend the evidence base by addressing a population that has been largely overlooked in mobility-focused research: young, apparently healthy university students.

The SB observed in this student population, with an average of 691 minutes per day, significantly exceeds the levels reported in the literature for this vulnerable demographic. University students tend to exhibit elevated levels of inactivity, leading to their classification as a high-risk group (Castro et al., 2020; Peterson et al., 2018). This extended sitting time is a direct byproduct of academic demands, as the average out-of-class study time reported elsewhere as 4.6 hours daily is significantly associated with back pain (Curotto-Winder et al., 2022). The figure of 691 min/day (approximately 11.5 hours) far exceeds earlier estimates of 437 minutes per day for higher education students (Castro et al., 2020).

The average 691 minutes/day of sedentary time in our study notably surpasses that reported in other student populations, such as in Slovakia, where daily sedentary time averaged 397.1 minutes (Junger et al., 2025). Although our study did not find a correlation between SB and Range of Motion (ROM), prolonged physical inactivity remains concerning due to its established association with musculoskeletal health. Cross-sectional research has shown that accumulating more than 8 hours of sitting per day increases the risk of back pain by 37.2% (Bontrup et al., 2019). This reinforces the ergonomic hypothesis that prolonged static posture is harmful and suggests that musculoskeletal fatigue or pain may be earlier indicators of sedentary harm than overt ROM limitations.

The sex-based differences observed greater hip flexion and abduction ROM in women must be understood considering known gender disparities in physical activity and posture. Literature consistently reports higher sedentary time in female students than males, with averages of 420 min/day vs. 360 min/day in Latin American cohorts (Herreros-Irarrázabal et al., 2024). Women also show higher fatigue and more pronounced lumbar lordosis, as well as a higher trunk extensor/flexor ratio (0.92 ± 0.2), indicating that lumbar extensors are more fatigued while maintaining spinal stability (Marijančić et al., 2025). These structural and neuromuscular characteristics likely contribute to the observed sex differences in ROM.

Methodologically, the quantification of SB using self-reported questionnaires (like the IPAQ), which yielded an average of 691 min/day, must acknowledge potential memory bias that may lead to over- or underestimation of inactivity (Schaller et al., 2016). Still, these results align with trends seen in other student populations; for instance, British cohorts reported a median of 8 hours of sitting on weekdays (Roberts et al., 2024). Combining self-reported SB with objective physical measures (ROM) adds value, especially considering that accelerometer-based assessments in young adult's report even higher SB levels up to 10 hours/day (Peterson et al., 2018).

The high SB levels (691 min/day) are particularly relevant during the transition to university life period during which behavior patterns often solidify into adulthood (van Sluijs et al., 2021). SB prevalence is influenced by academic year: medical students in their first-year report significantly more SB (485 min/day) than those in final years (330 min/day), likely due to increased physical activity during clinical internships (Herreros-Irarrázabal et al., 2024). Thus, academic structure, particularly in programs requiring long seated study hours is a key determinant of inactivity among students.

Given that 691 min/day of SB constitutes an independent health risk, practical implications should focus on interrupting prolonged sitting. Each additional hour of sitting increases the likelihood of back pain by 4.7% (Curotto-Winder et al., 2022). University strategies to reduce sitting time such as screen-time limits or standing desks have shown effectiveness like combined interventions with diet in improving BMI (Liao et al., 2014; Manini et al., 2015). Future research should employ longitudinal designs and objective measures to explore causality and track long-term musculoskeletal consequences (Roberts et al., 2024).

Conclusions

The findings of this study are highly consistent with the existing literature regarding the elevated levels of SB in university students, with 691 minutes per day of sitting, which exceeds the 8-hour threshold often linked to adverse health outcomes. The inconsistency lies in the lack of a correlation between this high level of SB and range of motion (ROM), suggesting that other mediating factors, such as

musculoskeletal fatigue or pain, may play a more significant role in influencing musculoskeletal health than ROM alone.

There remain significant gaps in the research, particularly the need for longitudinal studies that employ objective measures, such as accelerometers, to better understand the causal relationships between the duration and patterns of SB and long-term changes in joint mobility and overall musculoskeletal function. The findings also underscore the importance of designing interventions tailored to university students, especially during the critical transition period, to mitigate the long-term risks associated with SB and maintain musculoskeletal health.

Acknowledgements

None.

Financing

None.

References

Bontrup, C., Taylor, W. R., Fliesser, M., Visscher, R., Green, T., Wippert, P. M., & Zemp, R. (2019, Nov). Low back pain and its relationship with sitting behaviour among sedentary office workers. *Appl Ergon, 81*, 102894. https://doi.org/10.1016/j.apergo.2019.102894

Castro, O., Bennie, J., Vergeer, I., Bosselut, G., & Biddle, S. J. H. (2020, 2020-04-01). How Sedentary Are University Students? A Systematic Review and Meta-Analysis. *Prevention science, 21*(3), 332-343. https://doi.org/10.1007/s11121-020-01093-8

Curotto-Winder, D. A., Becerra- Bravo, G., & Bravo-Cucci, S. (2022). Asociación entre el nivel de actividad física, sedentarismo y dolor de espalda en estudiantes de nutrición y dietética de una universidad de Lima en contexto de Pandemia por COVID-19 (Association between the level of physical activity, sedentary lifestyl. *Retos*, *45*, 1019-1030. https://doi.org/10.47197/retos.v45i0.90979

de Rezende, L. F., Rodrigues Lopes, M., Rey-Lopez, J. P., Matsudo, V. K., & Luiz Odo, C. (2014). Sedentary behavior and health outcomes: an overview of systematic reviews. *PLoS One*, *9*(8), e105620. https://doi.org/10.1371/journal.pone.0105620

Fanchamps, M. H. J., van den Berg-Emons, H. J. G., Stam, H. J., & Bussmann, J. B. J. (2017). Sedentary behavior: Different types of operationalization influence outcome measures. *Gait Posture*, *54*, 188-193. https://doi.org/10.1016/j.gaitpost.2017.02.025

Heneghan, N. R., Baker, G., Thomas, K., Falla, D., & Rushton, A. (2018). What is the effect of prolonged sitting and physical activity on thoracic spine mobility? An observational study of young adults in a UK university setting. *BMJ Open, 8*(5), e019371.

Herreros-Irarrázabal, D., González-López, M. F., Nuche-Salgado, R., de Souza-Lima, J., & Mahecha-Matsudo, S. (2024). Physical activity levels and sedentary behaviour according to sex, age, BMI, academic year, and country among medical students in Latin America. *BMC Public Health, 24*(1), 1699.

Junger, J., Hrobacz, A., Melichar, R., & Salonna, F. (2025, 2025-01-01). PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN THE LIFESTYLE OF UNIVERSITY STUDENTS. *Health Problems of Civilization, 19*(4), 427-439. https://doi.org/10.5114/hpc.2025.146804

Liao, Y., Liao, J., Durand, C. P., & Dunton, G. F. (2014, Mar). Which type of sedentary behaviour intervention is more effective at reducing body mass index in children? A meta-analytic review. *Obes Rev, 15*(3), 159-168. https://doi.org/10.1111/obr.12112

Manini, T. M., Carr, L. J., King, A. C., Marshall, S., Robinson, T. N., & Rejeski, W. J. (2015, Jun). Interventions to reduce sedentary behavior. *Med Sci Sports Exerc, 47*(6), 1306-1310. https://doi.org/10.1249/MSS.0000000000000519

Marijančić, V., Šegulja, S., Vučković, M., Sović, I., Peharec, S., Grubić Kezele, T., & Starčević-Klasan, G. (2025). Gender Differences in the Relationship Between Fatigue, Different Types of Physical Activity, Postural Changes, and Sleep Quality in University Students—Part II Analyses from a Cross-Sectional Study. *Journal of Functional Morphology and Kinesiology, 10*(3), 307.

Oliveira, N., Keating, C. J., Chiu, C. Y., & Stavres, J. (2023). Increased hip flexion gait as an exercise modality for individuals with obesity. *Eur J Appl Physiol*, *123*(10), 2157-2165. https://doi.org/10.1007/s00421-023-05227-y

Peterson, N. E., Sirard, J. R., Kulbok, P. A., DeBoer, M. D., & Erickson, J. M. (2018, Feb). Sedentary behavior and physical activity of young adult university students. *Res Nurs Health, 41*(1), 30-38. https://doi.org/10.1002/nur.21845

Roberts, C. J., Ryan, D. J., Campbell, J., & Hardwicke, J. (2024). Self-reported physical activity and sedentary behaviour amongst UK university students: A cross-sectional case study. *Critical Public Health, 34*(1), 1-17.

Schaller, A., Rudolf, K., Dejonghe, L., Grieben, C., & Froboese, I. (2016). Influencing Factors on the Overestimation of Self-Reported Physical Activity: A Cross-Sectional Analysis of Low Back Pain Patients and Healthy Controls. *Biomed Res Int, 2016*, 1497213. https://doi.org/10.1155/2016/1497213

Stępień, A., Maślanko, K., Kruk-Majtyka, W., & Gargas, G. (2025). Spinal Sagittal Alignment Assessment and Hip Range of Motion in Ambulatory Boys with Duchenne Muscular Dystrophy: Reliability, Diagnosis and Implications for Physiotherapy Management. *Healthcare*, *13*(19), 2392. https://doi.org/10.3390/healthcare13192392

Sun, Y., Wu, H., Zhang, X., Liu, J., Duan, L., Yang, Y., & Gao, Y. (2025). *Sex and Limb Dominance Differences in Postural Control Performance of Young Adults: A Third-Order Polynomial Decay Approach*. MDPI AG.

van Sluijs, E. M., Ekelund, U., Crochemore-Silva, I., Guthold, R., Ha, A., Lubans, D., Oyeyemi, A. L., Ding, D., & Katzmarzyk, P. T. (2021). Physical activity behaviours in adolescence: current evidence and opportunities for intervention. *The Lancet, 398*(10298), 429-442.

Authors' and translators' details:

Josivaldo de Souza-Lima	josivaldo.desouza@unab.cl	Author
Rodrigo Yañez-Sepulveda	rodrigo.yanez.s@unab.cl	Author
Catalina Muñoz Strale	catalina.munoz@unab.cl	Translator/ Author
Javiera Alarcon-Aguilar	javiera.alarcon@unab.cl	Author
Maribel Parras-Saldias,	maribel.parra@uda.cl	Author
Andres Godoy Cumillaf	andres.godoy@uautonoma.cl	Author
Daniel Duclos-Bastias	daniel.duclos@pucv.cl	Author
Frano Giakoni-Ramirez	frano.giakoni@unab.cl	Author