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Anthropometric Parameters of the Working Population in Latin America: A Systematic Review

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RESUMEN

Problema: La falta de conocimiento respecto a los parámetros antropométricos de los trabajadores latinoamericanos conlleva al diseño de estaciones de trabajo que no cumplen con los requerimientos ergonómicos, representando un riesgo para la salud de las personas y contribuyendo al desarrollo de enfermedades profesionales. Objetivo: Realizar una revisión bibliográfica sistemática de investigaciones previas sobre parámetros antropométricos relacionados con actividades de trabajo sedentario. Metodología: Se realizó una investigación documental exploratoria y descriptiva, basada en investigaciones existentes relacionadas con el tema. Se aplicó el método PRISMA para revisiones sistemáticas, siguiendo este orden cronológico: definición de protocolos de revisión, identificación de fuentes de información, establecimiento de criterios de elegibilidad, evaluación del riesgo de sesgo en estudios individuales, síntesis de resultados, resumen de evidencia, entre otros. Se revisaron artículos relacionados con el tema y publicados en revistas académicas indexadas en Scopus, Science Direct, Google Scholar, PubMed, Scielo, Lilacs y Redalyc. Resultados: Las dimensiones antropométricas con datos disponibles de al menos tres países latinoamericanos incluyen: peso, estatura, altura de los ojos (de pie), altura de los hombros (de pie), altura del codo (de pie), estatura sentada, altura de los ojos (sentado), altura de los hombros (sentado), altura del codo (sentado), ancho de codo a codo (sentado), ancho de cadera (sentado), altura poplítea (sentado), espacio libre entre los muslos y profundidad abdominal (sentado). Con el tiempo, hay una tendencia secular positiva de aumento de las dimensiones corporales, especialmente en estatura, pero aún más en peso e índice de masa corporal. En poblaciones sudamericanas, se ha observado un aumento de 10 a 20 mm en la estatura promedio en los últimos 20 años, junto con aumentos en el peso, ancho de hombros, IMC, altura poplítea, longitud glúteo-poplítea y ancho de cadera. Conclusión: Los hallazgos revelaron 14 dimensiones antropométricas para mujeres de al menos tres países latinoamericanos en edad laboral y 13 dimensiones para hombres. Los países con datos antropométricos disponibles incluyen Argentina, Colombia, Cuba, Chile, México, Perú y Venezuela.

Palabras clave: altura, parámetros antropométricos, peso, población en edad laboral.

ABSTRACT

Problem: The lack of knowledge regarding the anthropometric parameters of Latin American workers leads to the design of workstations that do not meet ergonomic requirements, posing a risk to people's health and contributing to the development of occupational diseases. Objective: To conduct a systematic bibliographic review of prior research on anthropometric parameters related to seated work activities. Methodology: An exploratory and descriptive documentary investigation was carried out, based on existing research related to the topic. The PRISMA method for systematic reviews was applied, following this chronological order: definition of review protocols, identification of information sources, establishment of eligibility criteria, assessment of bias risk in individual studies, synthesis of results, summary of evidence, among others. Articles related to the topic and published in academic journals indexed in Scopus, Science Direct, Google Scholar, PubMed, Scielo, Lilacs, and Redalyc were reviewed. Results: Anthropometric dimensions with available data from at least three Latin American countries include: weight, height, eye height (standing), shoulder height (standing), elbow height (standing), sitting height, eye height (sitting), shoulder height (sitting), elbow height (sitting), elbow to elbow breadth (sitting), hip breadth (sitting), popliteal height (sitting), thigh clearance, and abdominal depth (sitting). Over time, there is a positive secular trend of increasing body dimensions, notably in height, but even more so in weight and body mass index. In South American populations, an increase of 10 to 20 mm in average height over the last 20 years has been observed, along with increases in weight, shoulder breadth, BMI, popliteal height, buttock-popliteal length, and hip breadth. Conclusion: The findings revealed 14 anthropometric dimensions for women from at least three Latin American countries of working age, and 13 dimensions for men. Countries with available anthropometric data include Argentina, Colombia, Cuba, Chile, Mexico, Peru, and Venezuela.

Keywords*: height,anthropometric parameters, weight, working-age population.*

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INTRODUCTION

In recent decades, some researchers have focused on conducting studies related to the anthropometric parameters of workers, aimed at serving as references for the design of workstations (Castellucci et al., 2021; Ballesteros & Franco, 2014; Piñeda-Geraldo, 2007), for the prevention of occupational diseases, or as informational resources that contribute to the advancement and evolution of anthropometry and ergonomics (Rangel-Elizalde, 2015; Madden & Smith, 2016; Castellucci, Viviani, Molenbroek, et al., 2021; Estrada M. et al., 1998).

Indeed, the importance of anthropometry as a tool of ergonomics is based on the need to adapt the workstation so that people are not exposed to ergonomic risks. This can lead to improved job performance and help protect health (Chi, Halaki, & J. Ackermann, 2020). In this regard, knowledge of people's anthropometric parameters becomes relevant, as the design of workstations (machines, chairs, and the work environment in general) must be based on the body measurements of the individuals for whom they are intended.

The ISO standard has published the international standard 7250-1 (2017) titled "Basic human body measurements for technological design," which aims to standardize the measurement of human body dimensions. It describes the anthropometric measures that serve as a basis for developing databases for different population groups. This information enables the geometric design of workplaces and environments. According to the second edition of the standard (2017), there are four groups of measurements: measurements taken while people are standing, measurements taken while sitting, measurements of specific body segments, and functional measurements. The total number of measurements in each group is 12, 16, 20, and 14, respectively, totaling 62 measurements to be considered.

Despite the existence of this regulation, many workstations continue to be designed based on standard dimensions without adjusting to the anthropometric characteristics of the workers. As a result, people often find themselves forced to adopt awkward postures, which is further exacerbated by long work hours (Ballesteros & Franco, 2014). This situation leads to the development of occupational diseases, especially musculoskeletal disorders (MSDs), which are among the main causes of lost workdays in industrialized countries (Eurostat, 2010).

Although there is a limited amount of research in Latin America presenting information about workers' anthropometric dimensions, some studies have been found that include data on variables or dimensions classified by percentiles, body segments with prevalent musculoskeletal pain symptoms (Ballesteros & Franco, 2014), secular changes in adult workers' anthropometry over time (Castellucci, Viviani, Molenbroek, et al., 2021), and data on body postures in workstations (Mistarihi, 2020).

A similar situation is seen in Ecuador. According to the Work Risk Statistics from the Ecuadorian Institute of Social Security (IESS) (2015), musculoskeletal injuries represent the main cause of work absenteeism in the country, particularly lumbar pathologies due to seated activities, which accounted for 40% of cases during that period (Agila et al., 2014).

Given all of the above, it is essential to understand the anthropometric characteristics of Latin American workers by gender, ethnicity, and age. To achieve this, a systematic bibliographic review was carried out of prior research related to anthropometric parameters in work activities. The goal was to assess the validity, relevance, and reliability of the methods and techniques used in similar studies. The presented data serves as a reference to ensure that the design of machines, furniture, personal protective equipment, spaces, and other elements begins with the anthropometric data of the population for which the products or designs are intended. In this way, direct actions can be taken to develop ergonomic furniture that adapts to the anthropometric needs of seated workstations. In the long term, this would be reflected in the reduction of MSDs and, more broadly, in the reduction of occupational diseases particularly lumbar pathologies related to seated activities.

MATERIALS AND METHODS

A qualitative systematic review of 110 scientific articles was carried out in both English and Spanish. These studies were conducted between 1965 and 2021. However, only articles from 1995 to 2017 were selected, specifically those reporting anthropometric data on Latin American populations engaged in various work activities. To search for articles, the following keywords were used: “anthropometry,” “body dimensions,” “characterization,” “population,” and “work activity.” The selected studies were published in journals indexed in the following databases: Scopus (27 articles), Science Direct (25), Google Scholar (25), PubMed (17), SciELO (13), Lilacs (2), and Redalyc (1).

Once the 110 articles were gathered, a filtering process was conducted as shown in

Figure 1. A primary review was performed by three coders, who read the abstracts of the selected articles. This review focused on identifying quantitative information related to anthropometric parameters or body segments of working populations in any country. Articles unrelated to Latin America were excluded in this revision. This led to the elimination of 62 articles: 23 from Science Direct, 22 from Scopus, 12 from PubMed, 4 from Google Scholar, and 1 from Lilacs.

In a second review conducted by the main researcher, additional articles were excluded for having the following characteristics: non-working-age populations (children or elderly), populations with disabilities, athletes, studies focused on only one specific body part, studies with very few measured segments, studies without gender-specific data, or studies lacking statistical values like the mean and standard deviation. A total of 41 more articles were excluded: 19 from Google Scholar, 13 from SciELO, 3 from PubMed, 2 each from Science Direct and Scopus, 1 from Lilacs, and 1 from Redalyc.

As a result, 7 articles remained for the third phase of analysis. These articles presented anthropometric measurements of Latin American working populations by gender. The articles came from the following sources: 3 from Scopus, 2 from Google Scholar, and 2 from PubMed. Each article was assigned to one of the three coders, who reviewed them in full to extract and organize the anthropometric data of body dimensions. Tables were created based on the 14 standardized measurements defined by ISO 7250-1:2017. Length measurements were recorded in centimeters (cm), weight in kilograms (kg), and body mass index (BMI) in kilograms per square meter (kg/m^2). The tables also included information about the participants' country and city, their job type, gender, age range, year of measurement, and the number of individuals observed. In the final phase, the researcher analyzed all 62 anthropometric measurements, grouping them into four categories as specified by ISO 7250-1.

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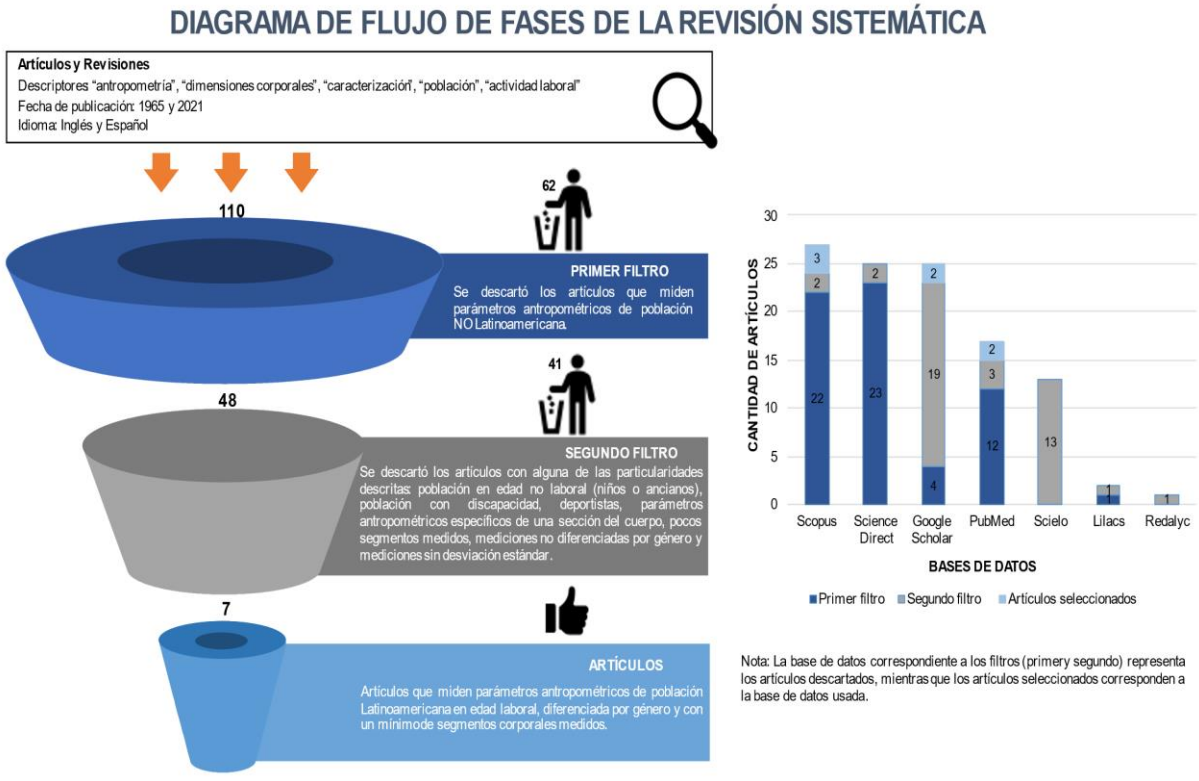
Figure 1. Flowchart of the different phases of the systematic review



RESULTS

The anthropometric dimension data were obtained from the review of scientific articles related to studies involving Latin American populations. Table 1 presents the main characteristics of the articles used, including the geographic location of studies across Latin America.

the sources, countries where the research was conducted, year of the study, participants' occupations, their age and gender. It is worth mentioning that these studies were conducted between 1995 and 2017. Additionally, figure 2 presents a map showing

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Figure 2. Map of countries with published articles on anthropometric dimensions of the Latin American population.

The publications correspond to 7 countries: Mexico, Cuba, Venezuela, Colombia, Peru, Chile, and Argentina. These countries are indicated on the map along with the year of publication and whether the anthropometric dimensions refer to male or female subjects.

In total, 7 articles were used as sources of information. Some of these articles provided more than one dataset, as they included data from different years, for different sexes, or for different countries. This resulted in 15 datasets on anthropometric dimensions, 8 of which correspond to female and 7 to male participants.

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Table 1. Description of countries with published articles on anthropometric dimensions of the Latin American population

Source	#	Country	Year	Occupation	Age	Female	Male
Castellucci et al. (2021)	1	Chile	1995	non-specific	Adults	X	
	2		2016				
	3		1995				X
	4		2016				
Lavender, Marras y Sabol (2002)	5	Mexico	1998	Operators	23.40 ± 5.50	X	
Liu, Sánchez y Parga (1999)	6	Mexico	1999	Maquiladora	24.20 ± 5.10	X	
Rojas, Chacín (2000)	7	Venezuela	2000	Printing Press	18-65	X	
	8						X
Ávila, Prado y González (2007)	9	Cuba	2001	Agricultural, industrial and commercial sector	30-40	X	
	10	Colombia	2001	non-specific	30-39	X	
	11				40-59		X
	12	Mexico	2001	Industrial workers	18-65		X
Bassett, Romaguera (2011)	13	Argentina	2009	non-specific	18-65	X	
	14						X
Salazar, Henrich, Larios (2018)	15	Peru	2017	non-specific	24.20 ± 5.10		X

The anthropometric information for the female working population of Latin America is presented in Table 2 (Appendix 1), and, likewise, for the male working population information is shown in Table 3 (Appendix 2). Based on Table 2, data for 14 anthropometric dimensions were found for women of working age in at least three Latin American countries. The dimensions included weight, height, eye height (standing), shoulder height (standing), elbow height (standing), sitting height, eye height (sitting), shoulder height (sitting), elbow height (sitting), elbow-to-elbow breadth, hip breadth, popliteal height (sitting), thigh clearance, and abdominal depth (sitting).

According to Table 3, 13 anthropometric dimensions were found for men of working age in at least three countries. The dimensions include all those for female—excluding abdominal depth in a seated position. For both genders, the data generally include the mean,

standard deviation, and the 5th, 50th, and 95th percentiles (not in all cases).

The collected data correspond to measurements taken while standing or sitting. Therefore, there was a lack of informative data for many other anthropometric dimensions—particularly those related to specific body segments and functional measurements. In summary, data were found for 13 dimensions (males) and 14 dimensions (females) out of a total of 62 possible measurements defined in ISO 7250-1:2017, representing only 21–22% of the total.

Next, the arithmetic means and standard deviations are presented for those anthropometric dimensions for which data were available from at least five countries, listed from highest to lowest average:

According to the information shown in Table 4, the average weight of women in Cuba is 68 ± 11.6 kg, followed by women in Chile with 66.87 ± 12 kg, in Venezuela with 66 ± 12.63 kg, in Argentina with 65.8 ± 13.3 kg, in Mexico with 62.5 ± 15.3 kg and in Colombia with 59.3 ± 8.57 kg.

Table 4. Weight of the Latin American female population.

Weight	**Cuba**		**Chile**		**Venezuela**		**Argentina**		**Mexico**		**Colombia**	
Unit	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
kg	68	11.60	66.87	12	66	12.63	65.80	13.30	62.50	15.30	59.30	8.57
												

SD = Standard Deviation.

According to the information shown in Table 5, the average weight of men in Chile is 81.4 ± 13.1 kg, followed by the men in Venezuela with 80.7 ± 18.11 kg, Argentina with 77 ± 12.8 kg, Peru with 75.53 ± 12.16 kg, Mexico With 73 ± 12.33 kg y Colombia with 72 ± 10.37 kg.

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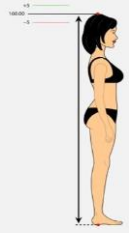
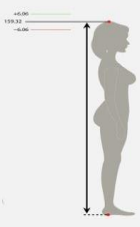
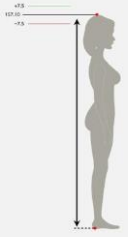
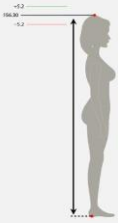
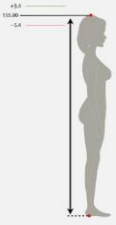
Table 5. Weight of the Latin American male population.

Weight	Chile		Venezuela		Argentina		Perú		México		Colombia	
Unit	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
kg	81.40	13.10	80.70	18.11	77	12.80	75.53	12.16	73	12.33	72	10.37
												

SD = Standard Deviation.

According to the information shown in Table 6, the average height of men in Venezuela is 160.00 ± 5.00 cm, followed by Chile with 159.32 ± 6.06 cm, Argentina with 157.10 ± 7.50 cm, Cuba with 156.70 ± 6.20 cm, Mexico with 156.30 ± 5.20 cm and Colombia with 155.80 ± 5.43 cm. Additionally, the second row shows the average mean arithmetic proportions published by NCD Risk Factor Collaboration (NCD-RisC) in 2018 with no records of the standard deviation available.

Table 6. Height of the Latin American female population.

Height	Venezuela		Chile		Argentina		Cuba		México		Colombia	
Unit	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
cm	160.00	5.00	159.32	6.06	157.10	7.50	156.70	6.20	156.30	5.20	155.80	5.43
												

SD = Standard Devia

According to the information shown in Table 7, the average height of men in Chile is 171.00 ± 6.50 cm, followed by men in Venezuela with 170.00 ± 7.00 cm, in Argentina

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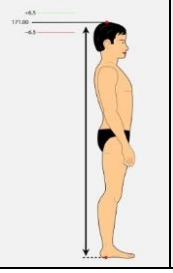
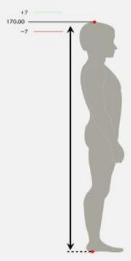
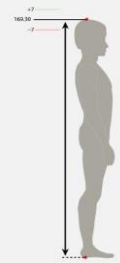
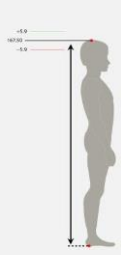
with 169.30 ± 7.00 cm, in Colombia with 167.50 ± 5.93 cm, in Mexico with 167.50 ± 6.28 cm, and in Peru with 166.56 ± 6.42 cm. Additionally, the second row presents the arithmetic mean data published by NCD-RisC in the year 2018, with no records of the standard deviations available.

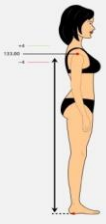
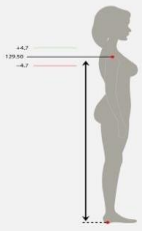
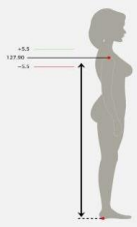
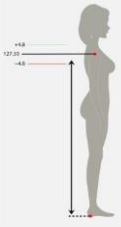
Table 7. Height of the Latin American male population.

Height	Chile		Venezuela		Argentina		Colombia		México		Perú	
Unit	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
cm	171.00	6.50	170.00	7.00	169.30	7.00	167.50	5.93	167.50	6.28	166.56	6.42
												

SD = Standard Deviation.

According to the information shown in Table 8, the average shoulder height (standing) of women in Venezuela is 133.00 ± 4.00 cm, followed by Chile with 131.61 ± 5.58 cm, Mexico with 129.50 ± 4.70 cm, Cuba with 127.90 ± 5.50 cm and Colombia with 127.30 ± 4.85 cm.

Table 8. Shoulder height of Latin American Female Population.

Shoulder Height	Venezuela		Chile		Mexico		Cuba		Colombia	
Unit	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
cm	133.00	4.00	131.61	5.58	129.50	4.70	127.90	5.50	127.30	4.85
										

SD = Standard Deviation

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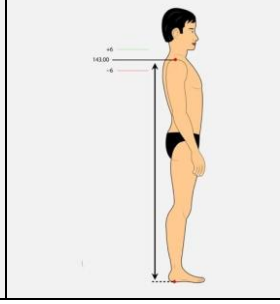
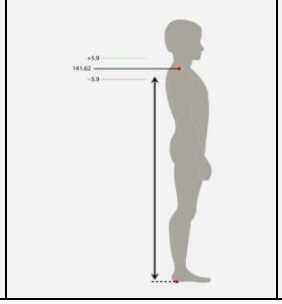
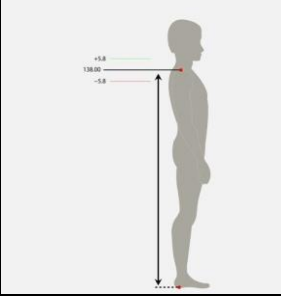
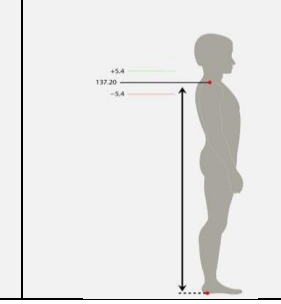
According to the information shown in Table 9, the average shoulder height (standing) of men in Venezuela is 143.00 ± 6.00 cm, followed by Chile with 141.62 ± 5.99 cm, Mexico with 138.00 ± 5.85 cm and Colombia with 137.20 ± 5.46 cm.

Table 9. Shoulder height of Latin American male Population.

Shoulder Height	Venezuela		Chile		Mexico		Colombia	
Unit	Mean	SD	Mean	SD	Mean	SD	Mean	SD
cm	143.00	6.00	141.62	5.99	138.00	5.85	137.20	5.46
								

SD = Standard Deviation.

Regarding hip breadth, according to Table 10, the average for women in Chile is 39.07 ± 3.20 cm, followed by female individuals in Venezuela with 39.00 ± 3.00 cm, in Cuba with 38.30 ± 4.60 cm, in Colombia with 37.40 ± 2.80 cm, and in Mexico with 27.50 ± 4.30 cm.

Table 10. Hip Breadth of Latin American female Population.

Hip Breadth	Chile		Venezuela		Cuba		Colombia		Mexico	
Unit	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
cm	39.07	3.20	39.00	3.00	38.30	4.60	37.40	2.80	27.50	4.30
										

SD= Standard Deviation.

DISCUSSION

The study conducted by Castellucci et al. (2021) shows that, over time, there has been a positive secular trend in the increase of body dimensions. This phenomenon is especially noticeable in height, but even more so in weight and body mass index (BMI). This trend was determined by comparing anthropometric data of the Chilean population from 1995 to that collected in 2016. In South American populations, an increase of 10 to 20 mm in average height has been observed over the past 20 years, along with increases in weight, shoulder breadth, BMI, popliteal height, buttock-popliteal length, and hip breadth (Filozof et al., 2001).

These findings support the claim made by Cole (2003), which states that nutritionists and anthropometric historians acknowledge the existence of a secular trend toward increasing adult height and weight, and the pace of physical development in children, at least since the mid-19th century. This intergenerational increase in height primarily occurs within the first two years of life, due to the growth of leg length. This trend has continued for at least 150 years, or about six generations, showing a steady upward pattern (Tarp et al., 2016).

According to studies on the anthropometry of different populations, human height is considered a partially hereditary trait. However, several environmental and non-genetic factors also play a role, including nutrition and health during pregnancy, childhood, and adolescence. These factors influence the distribution of height across the population. In this sense, global height variation indicates the existence of both genetic differences and disparities in living conditions. According to NCD-RisC, taller stature is associated with greater longevity, as well as higher educational and income levels.

The greatest increases in adult height during the 20th century occurred in South Korean women and Iranian men, who grew by an average of 20.20 cm and 16.50 cm, respectively (Madden & Smith, 2016). In contrast, little to no change in adult height occurred throughout the century in some sub-Saharan African and South Asian countries. Over the past 100 years, the tallest people have been Dutch men born in the last quarter of the 20th century, with an average height exceeding 182.50 cm. Meanwhile, the shortest were Guatemalan women born in 1896, with an average height of 140.30 cm. The height gap

between the tallest and shortest populations was 19–20 cm a century ago and has remained similar for women, though it has increased for men (Grasgruber & Hrazdíra, 2020).

In Latin America, the use of anthropometric data for office furniture design is less common than in developed countries, though it is gaining traction in some sectors. Generally, anthropometric studies in the region are not as advanced, leading to limited availability of precise data. Often, general measurements or estimates are used, resulting in furniture that does not adequately fit users' physical characteristics (Castellucci et al., 2021).

However, some designers and companies are beginning to consider ergonomics and worker comfort in office furniture design. For instance, some companies in Mexico and Chile have started using anthropometric data to design adjustable desks and chairs that match users' physical profiles (Castellucci et al., 2021). Furthermore, certain Latin American universities are conducting research on anthropometry for various applications (Girod, 2009).

It is important to note that, in many cases, the cost of implementing anthropometric-based office design is higher than designs based on general estimates. This may act as a barrier to adoption. However, it is crucial to consider the long-term benefits for workers' health and productivity and to seek creative and accessible solutions for ergonomic implementation in workplaces. Precisely, Lee et al. (2021), through a randomized controlled clinical trial, determined that ergonomic workstations are effective in reducing pain intensity in the neck, shoulders, upper back, and wrist/hand of individuals working in seated positions. However, they were less effective in reducing lower back and elbow pain. Similarly, Van Niekerk et al. (2012) conducted a systematic review of ergonomic interventions involving ergonomic chairs. They found that using such chairs helped reduce musculoskeletal symptoms in workers who sit for prolonged periods.

In conclusion, although anthropometric-based office furniture design is not yet widely practiced in Latin America, it is gaining attention in specific sectors and companies (Hernández-Albrecht, 2016). It is important to continue promoting its use to enhance the health, comfort, and productivity of workers throughout the region.

During the development of this study, several limitations were identified. Notably, the

anthropometric data were collected between the years 1995 and 2017. Similarly, the sample sizes of the observed populations varied, as did some of the age ranges, although in all cases, the ranges were centered around adult ages. Additionally, there is a lack of reliable information regarding the anthropometric data of working-age populations in Ecuador, Bolivia, Paraguay, Guatemala, Uruguay, and other representative countries in the region. Finally, due to these limitations and the fact that previous studies did not present complete data on all measurements for every individual in the population samples, it was not possible to determine the existence of significant differences in anthropometric dimensions between the different countries.

CONCLUSIONS

This study presents data on 14 anthropometric dimensions for women of working age from at least five Latin American countries, and 13 dimensions for men. Considering that the total number of dimensions defined by the ISO 7250-1:2017 standard is 62, this means that reliable data were found for only 22.58% of the dimensions for women of working age and 20.97% for their male counterparts.

The countries from which anthropometric information was obtained include Argentina, Colombia, Cuba, Chile, Mexico, Peru, and Venezuela. When referring to the main body dimensions, in terms of weight, Cuban women had the highest average, while Chilean men had the highest weight among males. Regarding standing height, Venezuelan women showed the greatest average measurement, while in the case of men, it was the Chilean men who were the tallest.

CONFLICT OF INTEREST

The author of this work declares no conflict of interest in the publication of the data from the scientific articles consulted.

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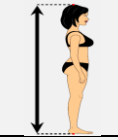
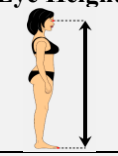
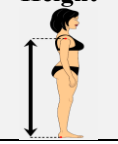
Table 2. Anthropometric Dimensions of the Latin American Female Population

Anthropometric Dimensions	Unit	**Source:** Lavender, Marras y Sabol (2002). **Population**: Mexico, **Year:** 1998. **Age:** 23.4 ± 5.5, **Occupation:** Operators				**Source:** Castellucci et al. (2021). **Population**: Chile, **Age:** Adultas, **Occupation:** Non-specific.				**Source:** Ávila, Prado y González (2007). **Population**: Cuba, **Year:** 2001. **Age:** 30-40, **Occupation:** Agricultural, industrial and commercial sector ***n*** = 583.				**Source:** Liu, Sánchez y Parga (1999). **Population**: Mexico, **Year:** 1999. **Age:** 24.20 ± 5.10, **Occupation:** Maquiladora. ***n*** = 110.					**Source:** Ávila, Prado y González (2007). **Population:** Colombia, **Year:** 2001. **Age:** 30-39, **Occupation:** Non-specific . ***n*** = 256.					**Source:** Bassett, Romaguera (2011). **Population**: Argentina, **Year:** 2009. **Age:** 18-65, **Occupation:** Non-specific ***n*** = 113.		**Source:** Rojas, Chacín (2000). **Population**: Venezuela, **Year:** 2000. **Age:** 18-65, **Occupation:** Printing press. ***n*** = 16.	
						Year: 1995.		**Year:** 2016.																							
		Mean	**SD**	**Percentile**		**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Percentile**		**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Mean**	**SD**		
				5	**95**							**5**	**95**			**5**	**50**	**95**			**5**	**50**	**95**						
Weight 	kg	62.50	15.30	37.30	87.60	60.70	10.10	66.87	12	68	11.60	42.60	80.90	59.30	10.40	43.20	58.40	78	59.30	8.57	46.90	58.90	74.50	65.80	13.30	66	12.63		
Height 	cm	156.30	5.20	147.70	164.9	154.90	6.20	159.32	6.06	156.70	6.20	146.4	166.9	153.50	5.77	144.4	153.2	163.9	155.8	5.43	148.3	155.6	166.1	157.1	7.50	160	5		
Eye Height 	cm	145.10	4.90	137	153.3	146.10	5.79	148.83	6.04	-	-	-	-	142.80	5.88	134.7	142.2	153.4	145.4	5.23	137.9	145	154.9	-	-	149	4		
Shoulder Height 	cm	129.50	4.70	121.70	137.2	128	5.06	131.61	5.58	127.90	5.50	118.8	139.6	-	-	-	-	-	127.3	4.85	120.3	126.8	135.8	-	-	133	4		

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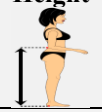
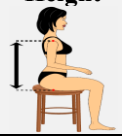
Anthropometric Dimensions	Unit	**Source:** Lavender, Marras y Sabol (2002). **Population**: Mexico, **Year:** 1998. **Age:** 23.4 ± 5.5, **Occupation:** Operators				**Source:** Castellucci et al. (2021). **Population**: Chile, **Age:** Adultas, **Occupation:** Non-specific.				**Source:** Ávila, Prado y González (2007). **Population**: Cuba, **Year:** 2001. **Age:** 30-40, **Occupation:** Agricultural, industrial and commercial sector ***n*** = 583.				**Source:** Liu, Sánchez y Parga (1999). **Population**: Mexico, **Year:** 1999. **Age:** 24.20 ± 5.10, **Occupation:** Maquiladora. ***n*** = 110.					**Source:** Ávila, Prado y González (2007). **Population:** Colombia, **Year:** 2001. **Age:** 30-39, **Occupation:** Non-specific . ***n*** = 256.					**Source:** Bassett, Romaguera (2011). **Population**: Argentina, **Year:** 2009. **Age:** 18-65, **Occupation:** Non-specific ***n*** = 113.		**Source:** Rojas, Chacín (2000). **Population**: Venezuela, **Year:** 2000. **Age:** 18-65, **Occupation:** Printing press. ***n*** = 16.	
						Year: 1995.		**Year:** 2016.																						
		Mean	**SD**	**Percentile**		**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Percentile**		**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Mean**	**SD**		
				5	**95**							**5**	**95**			**5**	**50**	**95**			**5**	**50**	**95**						
Elbow Height 	cm	-	-	-	-	96.60	3.91	97.73	4.63	97.50	4.50	90	104.9	95.60	3.98	89.50	95.50	101.7	-	-	-	-	-	-	-	102	4		
Sitting Height 	cm	-	-	-	-	84.50	3.35	85.99	3.24	82.80	3.20	77.50	88	-	-	-	-	-	83	2.59	79	82.90	87.70	-	-	83	3		
Sitting eye height 	cm	70	2.90	65.20	74.90	75.80	3.56	75.50	3.20	-	-	-	-	-	-	-	-	-	73	2.58	68.70	72.90	77.40	-	-	72	3		
Sitting Shoulder Height 	cm	54.10	3	49.20	59	57.70	3.19	58.28	2.65	54.60	2.60	50.30	58.80	-	-	-	-	-	55	2.21	51.30	55.10	58.50	-	-	-	-		

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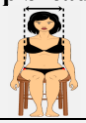
Anthropometric Dimensions	Unit	**Source:** Lavender, Marras y Sabol (2002). **Population**: Mexico, **Year:** 1998. **Age:** 23.4 ± 5.5, **Occupation:** Operators				**Source:** Castellucci et al. (2021). **Population**: Chile, **Age:** Adultas, **Occupation:** Non-specific.				**Source:** Ávila, Prado y González (2007). **Population**: Cuba, **Year:** 2001. **Age:** 30-40, **Occupation:** Agricultural, industrial and commercial sector ***n*** = 583.				**Source:** Liu, Sánchez y Parga (1999). **Population**: Mexico, **Year:** 1999. **Age:** 24.20 ± 5.10, **Occupation:** Maquiladora. ***n*** = 110.					**Source:** Ávila, Prado y González (2007). **Population:** Colombia, **Year:** 2001. **Age:** 30-39, **Occupation:** Non-specific . ***n*** = 256.					**Source:** Bassett, Romaguera (2011). **Population**: Argentina, **Year:** 2009. **Age:** 18-65, **Occupation:** Non-specific ***n*** = 113.		**Source:** Rojas, Chacín (2000). **Population**: Venezuela, **Year:** 2000. **Age:** 18-65, **Occupation:** Printing press. ***n*** = 16.	
						Year: 1995.		**Year:** 2016.																							
		Mean	SD	Percentile		Mean	SD	Mean	SD	Mean	SD	Percentile		Mean	SD	Percentile			Mean	SD	Percentile			Mean	SD	Mean	SD				
				5	95							5	95			5	50	95			5	50	95							
Sitting elbow height 	cm	22.40	3	17.50	27.30	26.60	3.13	24.40	2.48	22.80	2.40	14.70	22	-	-	-	-	-	-	-	-	-	-	-	-	24	2
Elbow Breadth 	cm	-	-	-	-	48.10	4.80	43.52	5.45	46.70	5.20	38.30	55.20	-	-	-	-	-	40.90	4.16	34.60	40.40	48	-	-	38	4
Hip breadth 	cm	27.50	4.30	20.50	34.50	36.40	2.80	39.07	3.20	38.30	4.60	30.70	45.80	-	-	-	-	-	37.40	2.80	32.60	37.50	42.40	-	-	39	3
Popliteal Height 	cm	-	-	-	-	35.50	2.40	40.38	2.13	38.80	2.20	35.10	42.40	-	-	-	-	-	38.30	1.98	35.50	38.40	41.60	-	-	-	-

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Anthropometric Dimensions	Unit	**Source:** Lavender, Marras y Sabol (2002). **Population**: Mexico, **Year:** 1998. **Age:** 23.4 ± 5.5, **Occupation:** Operators				**Source:** Castellucci et al. (2021). **Population**: Chile, **Age:** Adultas, **Occupation:** Non-specific.				**Source:** Ávila, Prado y González (2007). **Population**: Cuba, **Year:** 2001. **Age:** 30-40, **Occupation:** Agricultural, industrial and commercial sector ***n*** = 583.				**Source:** Liu, Sánchez y Parga (1999). **Population**: Mexico, **Year:** 1999. **Age:** 24.20 ± 5.10, **Occupation:** Maquiladora. ***n*** = 110.					**Source:** Ávila, Prado y González (2007). **Population:** Colombia, **Year:** 2001. **Age:** 30-39, **Occupation:** Non-specific . ***n*** = 256.					**Source:** Bassett, Romaguera (2011). **Population**: Argentina, **Year:** 2009. **Age:** 18-65, **Occupation:** Non-specific ***n*** = 113.		**Source:** Rojas, Chacín (2000). **Population**: Venezuela, **Year:** 2000. **Age:** 18-65, **Occupation:** Printing press. ***n*** = 16.	
						Year: 1995.		**Year:** 2016.																							
		Mean	**SD**	**Percentile**		**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Percentile**		**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Mean**	**SD**
				5	**95**							**5**	**95**			**5**	**50**	**95**			**5**	**50**	**95**				
Thigh Clearance 	cm	13.50	1.70	10.80	16.20	14.90	1.77	15.15	1.59	16.20	1.90	13	19.30	-	-	-	-	-	14	1.25	11.90	14.10	16.30	-	-	-	-
Abdominal Depth 	cm	21.80	4.70	14	29.50	25.10	3.97	23.82	4.94	25.70	5.10	17.20	34.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Unit. = Unit, **SD** = Standard Deviation..

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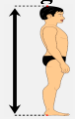
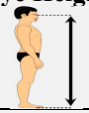
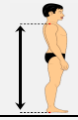
Table 3. Anthropometric Dimensions of the Latin American Male Population.

Anthropometric Dimensions	Unit	**Source:** Castellucci et al. (2021). **Population**: Chile, **Age:** Adults, **Occupation:** Non-specific.				**Source:** Ávila, Prado y González (2007). **Population**: Mexico, **Year:** 2001. **Age:** 18-65, **Occupation:** Industrial Workers. ***n*** = 396.					**Source:** Ávila, Prado y González (2007). **Population**: Colombia, **Year:** 2001. **Age:** 40-59, **Occupation:** Non-specific ***n*** = 271.					**Source:** Salazar, Henrich, Larios (2018) **Population**: Peru, **Year:** 2017. **Age:** 24.2 ± 5.1, **Occupation:** Non-specific. ***n*** = 471.		**Source:** Bassett, Romaguera (2011). **Population**: Argentina, **Year:** 2009. **Age:** 18-65, **Occupation:** Non-specific. ***n*** = 113.		**Source:** Rojas, Chacín (2000). **Population**: Venezuela, **Year:** 2000. **Age:** 18-65, **Occupation:** Printing press. ***n*** = 22.	
		Year: 1995.		**Year:** 2016.																	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
								5	**50**	**95**			**5**	**50**	**95**						
Weight 	kg	69.30	11	81.40	13.10	73	12.33	55.31	72.10	97.30	72	10.37	54.50	71.20	89.20	75.53	12.16	77	12.80	80.70	18.11
Height 	cm	168.80	6.70	171	6.50	167.50	6.28	157.60	166.80	178	167.50	5.93	157.60	167.50	177.30	166.56	6.42	169.30	7	170	7
Eye Height 	cm	158.40	6.70	160.07	6.38	155	6.18	144.70	154.60	165.10	156.80	5.85	147	156.90	166.30	-	-	-	-	158	6
Shoulder Height 	cm	139.20	6	141.62	5.99	138	5.85	128.10	137.70	147.70	137.20	5.46	128.20	137.30	146.10	-	-	-	-	143	6
Elbow Height 	cm	104.50	4.90	104.19	4.83	106.80	5.50	98.80	106.50	114.50	105.70	4.36	98.70	105.90	112.40	-	-	-	-	111	5

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Anthropometric Dimensions	Unit	**Source:** Castellucci et al. (2021). **Population**: Chile, **Age:** Adults, **Occupation:** Non-specific.				**Source:** Ávila, Prado y González (2007). **Population**: Mexico, **Year:** 2001. **Age:** 18-65, **Occupation:** Industrial Workers. ***n*** = 396.					**Source:** Ávila, Prado y González (2007). **Population**: Colombia, **Year:** 2001. **Age:** 40-59, **Occupation:** Non-specific ***n*** = 271.					**Source:** Salazar, Henrich, Larios (2018) **Population**: Peru, **Year:** 2017. **Age:** 24.2 ± 5.1, **Occupation:** Non-specific. ***n*** = 471.		**Source:** Bassett, Romaguera (2011). **Population**: Argentina, **Year:** 2009. **Age:** 18-65, **Occupation:** Non-specific. ***n*** = 113.		**Source:** Rojas, Chacín (2000). **Population**: Venezuela, **Year:** 2000. **Age:** 18-65, **Occupation:** Printing press. ***n*** = 22.	
		Year: 1995.		**Year:** 2016.																	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
								5	**50**	**95**			**5**	**50**	**95**						
Sitting Height 	cm	89.70	3.50	91.23	3.50	87.60	3.12	82.50	87.70	92.70	88	2.91	83.30	88.10	92.60	-	-	-	-	87	4
Sitting Eye height 	cm	79.40	4.20	80.35	3.33	-	-	-	-	-	77.90	2.98	72.70	78	82.70	-	-	-	-	76	4
Sitting Shoulder height 	cm	60.20	3.80	61.90	2.85	58.10	2.76	53.50	58.20	63.80	58.70	2.62	53.90	58.80	63.10	-	-	-	-	-	-

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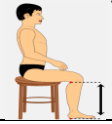
Anthropometric Dimensions	Unit	**Source:** Castellucci et al. (2021). **Population**: Chile, **Age:** Adults, **Occupation:** Non-specific.				**Source:** Ávila, Prado y González (2007). **Population**: Mexico, **Year:** 2001. **Age:** 18-65, **Occupation:** Industrial Workers. ***n*** = 396.					**Source:** Ávila, Prado y González (2007). **Population**: Colombia, **Year:** 2001. **Age:** 40-59, **Occupation:** Non-specific ***n*** = 271.					**Source:** Salazar, Henrich, Larios (2018) **Population**: Peru, **Year:** 2017. **Age:** 24.2 ± 5.1, **Occupation:** Non-specific. ***n*** = 471.		**Source:** Bassett, Romaguera (2011). **Population**: Argentina, **Year:** 2009. **Age:** 18-65, **Occupation:** Non-specific. ***n*** = 113.		**Source:** Rojas, Chacín (2000). **Population**: Venezuela, **Year:** 2000. **Age:** 18-65, **Occupation:** Printing press. ***n*** = 22.	
		Year: 1995.		**Year:** 2016.				**Percentile**					**Percentile**									
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**5**	**50**	**95**	**Mean**	**SD**	**5**	**50**	**95**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Sitting Elbow height 	cm	25.40	4	24.46	2.44	24.60	2.84	20.10	24.50	28.30	-	-	-	-	-	-	-	-	-	24	3
Elbow Breadth 	cm	51.90	4.90	48.77	4.78	53.10	5.49	44.30	52.90	62	46.10	4.26	39.20	46.10	53.10	-	-	-	-	41	5
Hip Breadth 	cm	34.40	2.90	36.25	2.61	37.40	3.13	32.80	37.20	42.30	-	-	-	-	-	-	-	-	-	38	4
Popliteal Height 	cm	40.10	2.80	43.62	2.32	41.20	2.56	37.40	41.20	45.30	41.80	2.18	41.80	41.80	45.20	-	-	-	-	-	-

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Anthropometric Dimensions	Unit	**Source:** Castellucci et al. (2021). **Population**: Chile, **Age:** Adults, **Occupation:** Non-specific.				**Source:** Ávila, Prado y González (2007). **Population**: Mexico, **Year:** 2001. **Age:** 18-65, **Occupation:** Industrial Workers. ***n*** = 396.					**Source:** Ávila, Prado y González (2007). **Population**: Colombia, **Year:** 2001. **Age:** 40-59, **Occupation:** Non-specific ***n*** = 271.					**Source:** Salazar, Henrich, Larios (2018) **Population**: Peru, **Year:** 2017. **Age:** 24.2 ± 5.1, **Occupation:** Non-specific. ***n*** = 471.		**Source:** Bassett, Romaguera (2011). **Population**: Argentina, **Year:** 2009. **Age:** 18-65, **Occupation:** Non-specific. ***n*** = 113.		**Source:** Rojas, Chacín (2000). **Population**: Venezuela, **Year:** 2000. **Age:** 18-65, **Occupation:** Printing press. ***n*** = 22.	
		Year: 1995.		**Year:** 2016.																	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Percentile**			**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
								5	**50**	**95**			**5**	**50**	**95**						
Thigh Clearance 	cm	14	1.80	16.54	1.49	15.20	1.81	12.70	15	17.80	14.90	1.20	13.10	14.90	17	-	-	-	-	-	-