Biodemography and Social Biology

ISSN: 1948-5565 (Print) 1948-5573 (Online) Journal homepage: www.tandfonline.com/journals/hsbi20

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To cite this article: Özgür Nalbant, Hatice Gülsoy, Zümre Özdemir Güler, Sevda Özütürker, Barış Kılıç, Faruk Ay & Gülüşan Özgün Başibüyük (09 Jan 2026): Age-related variations in somatotype: a study on older adults in Türkiye, Biodemography and Social Biology, DOI: 10.1080/19485565.2025.2610187

To link to this article: https://doi.org/10.1080/19485565.2025.2610187

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BIODEMOGRAPHY AND SOCIAL BIOLOGY
https://doi.org/10.1080/19485565.2025.2610187

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Age-related variations in somatotype: a study on older adults in Türkiye

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ABSTRACT

This study aims to investigate the age and sex-related variations in somatotype among older adults in Türkiye using the Heath-Carter method. Anthropometric measurements were taken from 2128 participants (1,009 males and 1119 females) aged 65 and over, selected through stratified sampling from the seven regions of Türkiye. The findings indicated that the most prevalent somatotype in both sexes was Endo-Mesomorph, accounting for 50% of males and 58.1% of females. With advancing age, a decrease was observed in body weight, height, Body Mass Index (BMI), and body fat percentage in both sexes. Age-related remodeling of body composition was further reflected in somatotype patterns: while endomorphy declined in males, both endomorphy and mesomorphy decreased progressively in females. Across all age groups, mesomorphy remained more dominant than endomorphy, suggesting relative preservation of muscularity. In conclusion, this study demonstrates that the Endo-Mesomorph somatotype is predominant among older adults in Türkiye, with notable age- and sex-related differences: ***age-related*** changes include a decline in endomorphy in males, while both endomorphy and mesomorphy decrease in females. ***These results offer new evidence from a large Turkish cohort and align with international findings on age-related body composition remodeling, supporting the development of tailored, culturally relevant interventions for healthy aging.***

Introduction

The aging process is characterized by progressive changes in body composition, which have significant impacts on health and functional capacity (Pontzer et al. 2021). As individuals age, there is a decline in lean body mass – comprising muscle and bone tissues – while body fat mass increases, accompanied by changes in its distribution throughout the body (Briand et al. 2025). These morphological changes not only elevate the risks of various chronic diseases but can also lead to impairments in both basic and instrumental activities of daily

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/19485565.2025.2610187

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living (Ponti et al. 2020). Therefore, the need for accurate information regarding body composition in older adults is becoming increasingly important. Age-related body composition remodeling is well documented, including reductions in lean and bone mass alongside fat redistribution, which collectively increase frailty risk (Hall et al. 1981; JafariNasabian et al. 2017; Santanasto et al. 2017).

Somatotype analysis, an anthropometric method, offers an effective tool for comprehensively evaluating body physique. First defined by Sheldon, Stevens, and Tucker (1940) and later refined by Heath and Carter and Heath (1990), this method quantifies body structure through three fundamental components: endomorphy (relative fatness), mesomorphy (musculoskeletal development), and ectomorphy (relative linearity). The components of somatotype can be associated not only with anthropometric, biochemical, and functional parameters but also with lifestyle factors and environmental variables (Baranauskas et al. 2024). Unlike unidimensional measurements such as Body Mass Index, somatotype analysis provides a more comprehensive understanding of structural body balance. Its relationship with body composition has been confirmed in various studies (Martínez-Mireles et al. 2025). Unlike BMI, which is a simple weight-to-height ratio, somatotype integrates multiple dimensions of physique, offering a more nuanced tool to capture age- and sex-specific patterns (Carter and Heath 1990; Kim and Won 2022).

Although studies examining the age- and sex-related variations in somatotype in older populations highlight the importance of this topic, the existing literature is limited (Shimrah et al. 2020). Current studies consistently report that somatotype characteristics change with aging across different societies. For instance, Kalichman and Kobyliansky (2006) reported that the endomorphy component in women increases until their 60s and then declines afterward. Similarly, Buffa et al. (2005) observed a gradual decrease in endomorphy in older age groups. The direction and magnitude of these changes may vary across populations, and highlight the need for further studies involving diverse populations to clarify age-related morphological and physiological changes. Evidence from diverse cohorts – including Sardinian, Chuvash, Javanese, and Korean older adults – shows population-specific variations, reinforcing the importance of localized studies (Buffa et al. 2005; Kalichman and Kobyliansky 2006; Rahmawati, Janatin, and Kumi 2008; Yoo, Park, and Kim 1996).

Based on this need, the present study aims to determine the age-related changes in somatotype and the differences between genders among older adults living in Türkiye, using the Heath and Carter method. The findings obtained are intended to provide evidence-based insights for gerontological interventions targeting older adults, and to contribute to improving the quality of life for future generations. In Türkiye, where 10.2% of the population is now aged 65 or older (TÜİK 2023), research on somatotype in older adults remains scarce, making such investigations both timely and necessary.

Materials and Methods

The study included male and female individuals aged 65 and over residing in Türkiye. A stratified sampling method was employed in the research. Each of the seven geographical regions in Türkiye was defined as a stratum, and 26 provinces within these strata were selected as the sample. The number of observations to be drawn from each stratum was determined according to the Turkish Statistical Institute population data. The

sample size for the participating sample group was calculated using the formula $N = Nt^2 \sqrt{2}/(N-1).d^2 + t^2 \sqrt{2}$, considering a population standard deviation (√) of 15.17, a significance level (α) of 0.01, and a margin of error (d) of ±0.75. Accordingly, it was determined that the sample size would be 2721 out of the 3,327,593 individuals aged 60 and above.

The principles of the Declaration of Helsinki were adhered to; participants were fully informed about the study, and each gave written informed consent.

After the evaluations, 2128 individuals, consisting of 1009 males and 1119 females, participated in the study, excluding those who could not complete the measurements or who withdrew due to health issues. The participants were categorized by sex (male/female) and age (65–74, 75–84, and ≥85 years). Ethical approval for the study was obtained from the Ethics Committee of Cumhuriyet University under decision number 2014–03/15. The stratified sampling approach ensured representativeness across Türkiye's seven geographical regions, thereby minimizing selection bias and enhancing the generalizability of the findings.

Anthropometric measurements were taken according to the recommendations of the Anthropometric Standardization Reference Manual (ASRM) and the International Biological Programme (IBP) organizations (Norton and Olds 2004; Weiner and Lourie 1969). Height (cm), weight (kg), biceps circumference (cm), calf circumference (cm), knee and elbow width (cm), and calf, triceps, subscapular, and supraspinal skinfold thickness (mm) were evaluated. Height, biceps, and calf circumference were measured using a tape measure; body weight was measured using a calibrated scale; humerus and femur widths were measured using a sliding caliper; and skinfold thickness (calf, triceps, subscapular, supraspinal) was measured using a skinfold caliper. All anthropometric measurements were taken with participants wearing minimal, researcher-approved clothing. Body Mass Index (BMI) was calculated using the kg/height^2 formula. Body fat percentage was estimated using the Jackson, Pollock, and Ward (1980) formula:

$$\text{Body Fat Percentage} = (1.097 - 0.0008 \times \text{total skinfold thickness}) \times 100$$

Biceps circumference was measured at the midpoint of the upper arm, both in flexion and extension. Calf circumference was measured at the widest area of the calf without applying excessive pressure. Skinfold thickness measurements were taken while the participant's muscles were relaxed, with the caliper maintained on the skinfold for 2–3 seconds. Each measurement was repeated twice, and the average value was recorded. Triceps skinfold thickness was measured vertically between the acromion and olecranon; subscapular skinfold thickness at a 45° angle from the inferior angle of the scapula; supraspinal skinfold thickness at a 45° anterior angle approximately 5–7 cm above the anterior superior iliac spine; and calf skinfold thickness vertically on the medial aspect at the region of maximum calf girth. Knee width was measured between the medial and lateral femoral condyles, with the participant seated at a right angle. Elbow width was measured between the medial and lateral humeral epicondyles while the arm was bent with the palm facing the shoulder. Pressure was applied during width measurements to reduce adipose interference.

The Heath-Carter method was selected because it integrates skeletal, muscular, and adiposity components, making it particularly suitable for aging populations, where single indicators such as BMI may underestimate multidimensional changes in physique.

The Heath-Carter somatotype formula was used to determine body structure. The formulas for endomorphy, mesomorphy, and ectomorphy are provided below:

- Endomorphy = 0.7182 + 0.1451(X) − 0.00068(X^2) + 0.0000014(X^3)
  X = 170.18 ×(Triceps skinfold thickness (mm) + Subscapular skinfold thickness (mm) + Supraspinale skinfold thickness (mm))/Height (cm).
- Mesomorphy = 0.858 ×Elbow width (cm) + 0.061 ×Knee width (cm) + 0.188 ×Upper arm circumference (cm) + 0.161 ×Calf circumference (cm) + 0.131 ×Height (cm) + 4.5
  Modified Upper Arm Circumference = Upper Arm Circumference – (Triceps skinfold thickness (mm)/10)
  Modified Calf Circumference = Calf Circumference – (Calf skinfold thickness (mm)/10)
- Ectomorphy:
  HWR = Height/$\sqrt[3]{\text{Weight}}$
  If HWR ≥40.75 → 0.732 ×HWR − 28.58
  If 38.25 < HWR < 40.75 → 0.463 ×HWR − 17.63
  If HWR ≤38.25 → 0.1

Heath-Carter Somatogram Coordinate Formula:

X = ectomorphy – endomorphy

Y = 2 ×mesomorphy - (endomorphy + ectomorphy)

The obtained values were statistically analyzed using SPSS version 28.0. Descriptive statistics for anthropometric variables were calculated separately for each age and gender group and presented as means and standard deviations. Based on the distributional characteristics of the data, parametric tests were used. Somatotype values were compared by gender within each age group. For normally distributed data, the Independent Samples t-test was used for pairwise comparisons, while one-way ANOVA and post hoc Tukey tests were applied across all groups. A significance level of $p < 0.05$ was considered statistically significant, and significant differences were marked with an asterisk (*) in the tables.

Results

In the comparison of somatotypes of men and women according to age (Table 4), there was a significant difference between endomorph, mesomorph and ectomorph values ($p < 0.05$). While there were significant differences between the endomorph and ectomorph values of all participant males between age groups ($p < 0.05$), there was no significant difference between the mesomorphy values ($p > 0.05$). While there was a significant difference between endomorph and mesomorph values of all women ($p < 0.05$), there was no significant difference between ectomorph values ($p > 0.05$).

Differences in somatotype components, body mass index (BMI), and body fat percentage (%fat) among older adults were examined based on gender and age groups (Table 5). Accordingly:

Additionally, some cells in the table were intentionally left blank. Specifically, comparisons were not made for subgroups consisting of only one gender, and the number of female participants aged 85 and older with valid body fat percentage data was insufficient for statistical analysis. In the “Total” rows, only F/p values were reported, while individual pairwise comparison results (t/p) were not presented in these rows (Supplementary Table S3).

Discussion

This study thoroughly investigated age- and sex-related somatotype changes in older adults in Türkiye. Our findings revealed the Endo-Mesomorph somatotype as predominant (54.3%) (Table 3), reflecting body composition adaptations during aging. A key strength of our study is the comprehensive anthropometric measurements from a large sample of 2128 older Turkish participants (1,009 men, 1119 women), offering valuable insights into this population. According to somatotype classification, Endo-Mesomorph was predominant in both men (50%) and women (58.1%), whereas balanced somatotypes were the least frequent. Similar findings were also reported in other gerontological cohorts (Buffa et al. 2005; Kalichman and Kobyliansky 2006), confirming that age- and sex-related somatotype trends are consistent across different populations.

Somatotype variations are commonly observed with aging. Kalichman and Kobyliansky (2006) and other studies (Buffa et al. 2005; Rahmawati, Janatin, and Kumi 2008; Yang et al. 2016; Yoo, Park, and Kim 1996) support substantial age- and sex-related somatotype changes. This study observed decreases in body weight, height, BMI, and total body fat in both sexes with advancing age (Table 1). While aging generally increases body fat percentage and decreases lean mass (Kim and Won 2022), our finding of reduced total body fat may relate to severe lean mass loss (sarcopenia) and overall weight loss common in very old age. This disproportionate lean mass decrease can lead to a reduction in overall fat mass due to factors such as decreased appetite. Similar to Hall et al. (1981), biceps and calf circumferences, and triceps, subscapular, suprailiac, and calf skinfold thicknesses decreased in both genders (Table 2).

It is important to distinguish between BMI, absolute fat mass, and somatotype. While BMI is a general weight-to-height ratio, it does not differentiate lean from fat mass. Fat mass and fat percentage clarify body composition, whereas somatotype integrates proportional and morphological traits, offering a more nuanced assessment (Carter and Heath 1990; Ponti et al. 2020). Our findings showed that body weight, height, BMI, and body fat decreased with increasing age in both sexes, consistent with age-related body composition changes reported in the literature. Significant differences were found between men and women in anthropometric variables such as triceps, subscapular, and suprailiac skinfold thicknesses, as well as humerus and femur diameters and calf circumferences, highlighting clear gender-related body composition differences. These patterns align with gerontological evidence showing late-life reductions in subcutaneous fat and overall fat percentage alongside pronounced losses of lean mass (Briand et al. 2025; Hall et al. 1981; Santanasto et al. 2017). Imaging- and physiology-based assessments likewise

Table 1. Descriptive characteristics of body composition variables by age and gender.

Age	65 – 74 years				75–84 years				85 and above years				Age Groups
Gender	Men ($n = 669$)		Women ($n = 676$)		Men ($n = 290$)		Women ($n = 347$)		Men ($n = 50$)		Women ($n = 96$)		S
Measurements	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	p
Weight (kg)	77,69	14,4	71,75	14,3	74,58	11,9	65,16	13,0	67,31	12,5	60,16	10,5	0,00*
Height (cm)	164,90	6,5	150,60	6,5	163,02	6,7	147,04	6,8	160,51	7,9	145,44	6,1	0,00*
BMI (kg/m^2)	28,51	4,7	31,61	5,9	28,02	3,8	30,11	5,5	26,11	4,3	28,46	4,8	0,00*
BF (%)	19,32	7,6	33,56	5,0	19,01	7,4	31,21	5,9	15,47	7,4	29,77	6,1	0,00*

S: Significant, $p < 0.05$. Abbreaviations: BMI., Body Mass İndex; BF., Percent body fat.

Table 2. Anthropometric measurements by age and gender (Detailed results in Supplementary Table S1).

Age	65 – 74 years		75–84 years		85 and above years		Groups		Age Groups	Gender Groups
Gender	Men	Women	Men	Women	Men	Women	Men	Women	S	S
Measurements	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	p	p
Triceps sk	7,09 ± 5,6	14,12 ± 6,4	7,44 ± 5,2	12,23 ± 6,3	5,25 ± 5,2	10,85 ± 6,4	7,10 ± 5,4	13,26 ± 6,5	0,00*	0,00*
Subscapular sk	15,86 ± 6,4	18,18 ± 7.0	14,64 ± 5,9	15,69 ± 6,8	12,77 ± 5,0	13,52 ± 6,5	15,35 ± 6,3	17,01 ± 7,0	0,00*	0,00*
Suprailiac sk	9,33 ± 6,0	13,40 ± 6,7	8,59 ± 6,1	11,37 ± 7,0	6,52 ± 5,5	11,27 ± 6,9	8,98 ± 6,0	12,59 ± 6,9	0,00*	0,00*
Calf sk	5,88 ± 5,1	10,09 ± 4,7	6,18 ± 5,1	9,19 ± 5,0	5,25 ± 5,2	8,82 ± 4,7	5,93 ± 5,1	9,70 ± 4,8	0,60	0,00*
Humerus dia	7,06 ± 0,4	6,70 ± 0,6	7,01 ± 0,5	6,45 ± 0,6	6,97 ± 0,4	6,37 ± 0,5	7,04 ± 0,4	6,60 ± 0,6	0,00*	0,00*
Femur dia	9,82 ± 0,8	9,72 ± 1,1	9,88 ± 0,6	9,67 ± 1,1	9,78 ± 0,7	9,72 ± 1,2	9,84 ± 0,7	9,70 ± 1,1	0,95	0,00*
Biceps crf	25,23 ± 3,0	26,16 ± 3,5	24,42 ± 3,0	24,53 ± 3,4	22,50 ± 3,1	22,80 ± 3,3	24,86 ± 3,2	25,37 ± 3,6	0,00*	0,00*
Calf crf	31,94 ± 4,0	30,95 ± 4,2	30,91 ± 3,6	29,65 ± 4,0	28,82 ± 3,4	28,53 ± 3,5	31,49 ± 3,9	30,34 ± 4,1	0,00*	0,00*

S: Significant, $p < 0.05$. Abbreaviations: sk.,skinfold(mm); dia.,diameter(cm); crf.,circumference(cm).

Table 3. Frequency distribution of somatotypes among older adults in Türkiye.

Gender	Somototype	Endo-Ectomorph	Endo-Mesomorph	Balanced Endomorph	Meso-Ectomorph	Meso-Endomorph	Mesomorph-Ectomorph	Mesomorph-Endomorph	Balanced Mesomorph	Ecto-Mesomorph	Ecto-Endomorph	Ectomorph-Endomorph	Balanced Ectomorph	Center	Total
Men	Frequency	8	505	11	14	138	13	162	88	34	2	7	18	9	1009
($n = 1009$)	Percent	0,8	50	1,1	1,4	13,7	1,3	16,1	8,7	3,4	0,2	0,7	1,7	0,9	100
Women	Frequency	1	650	6		236	3	200	12	2	2	3	2	2	1119
($n = 1119$)	Percent	0,1	58,1	0,5		21,1	0,3	17,9	1,1	0,2	0,2	0,3	0,1	0,1	100

Table 4. Somatotype components by age and gender (Detailed results in Supplementary Table S2).

Age	65 – 74 years			75–84 years			85 and above years			Total	
Gender	Men	Women	S	Men	Women	S	Men	Women	S	Men	Women
Body Type	Mean±SD	Mean±SD	*p*	Mean±SD	Mean±SD	*p*	Mean±SD	Mean±SD	*p*	*p*	*p*
Endomorphy	3,2±1,5	5,0±1,5	0,00*	3,1±1,4	4,4±1,6	0,00*	2,5±1,4	4,0±1,6	0,00*	0,02*	0,00*
Mesomorphy	4,5±1,5	5,8±1,8	0,00*	4,4±1,3	5,6±1,8	0,00*	4,0±1,5	5,3±1,8	0,00*	0,07	0,01*
Ectomorphy	0,7±0,9	0,2±0,4	0,00*	0,6±0,7	0,2±0,5	0,00*	1,0±1,0	0,3±0,5	0,00*	0,01*	0,07

S: Significant, $p < 0.05$.

Table 5. Comparison of somatotype components, BMI and body fat by age and gender (Summary; full results in Supplementary Table S3).

		Endomorphy		Mesomorphy		Ectomorphy		BMI		BF	
Age	Gender (n)	Mean±SD	*p*	Mean±SD	*p*	Mean±SD	*p*	Mean±SD	*p*	Mean±SD	*p*
65–74	Men	3.2±1.5	0.00*	4.5±1.5	0.00*	0.7±0.9	0.00*	31.47±6.0	0.00*	33.1±6.5	0.00*
65–74	Women	5.0±1.5		5.8±1.8		0.2±0.4		28.02±4.9		17.68±11.3	
75–84	Men	3.1±1.4	0.00*	4.4±1.3	0.00*	0.6±0.7	0.00*	29.8±5.6	0.00*	29.62±9.6	0.00*
75–84	Women	4.4±1.6		5.6±1.8		0.2±0.5		27.4±4.1		15.59±13.0	
85+	Men	2.5±1.4	0.00*	4.0±1.5	0.00*	1.0±1.0	0.00*	28.19±4.9	0.00*	28.08±9.6	0.00*
85+	Women	4.0±1.6		5.3±1.8		0.3±0.5		25.68±4.2		12.27±12.4	

$p < 0.05$.

document age-related remodeling of body composition (Ponti et al. 2020), and shifts in energy expenditure across the life course may further influence these profiles (Pontzer et al. 2021). These findings underscore the importance of designing age- and sex-specific interventions in gerontology, particularly programs aimed at maintaining muscularity and preventing excessive adiposity in advanced age.

In women, significant endomorphy differences were also observed (Table 4), with mesomorphic values higher than endomorphic, consistent with Baltadjiev and Vladeva (2014). Kalichman and Kobyliansky (2006) reported increasing endomorphy among women until the sixth decade, followed by a decline. Our study similarly found a gradual decrease in endomorphy in older women (Table 4), which Buffa et al. (2005) linked to age-related changes in fat proportions. The reduction in skinfold thicknesses (triceps, subscapular, suprailiac, calf) in both sexes (Table 2) supports these endomorphy changes. Hormonal shifts in women, particularly post-menopausal reductions in estrogen, are known to affect fat distribution and skinfold thicknesses, illustrating the complex interplay between total fat mass and fat distribution in aging. Significant differences between men and women in anthropometric variables (e.g., skinfold thicknesses, humerus and femur diameters, calf circumferences) were observed, reinforcing gender-related body composition variations. These sex-specific trajectories align with reports of higher adiposity and post-menopausal fat redistribution in women, together with relative preservation of mesomorphic traits in men (Buffa et al. 2005; Kalichman and Kobyliansky 2006; Kim and Won 2022). The observed patterns in Figures 1–3 are consistent with Santanasto et al. (2017), who showed functional decline associated with reductions in mesomorphic traits, emphasizing the clinical significance of these somatotype profiles.

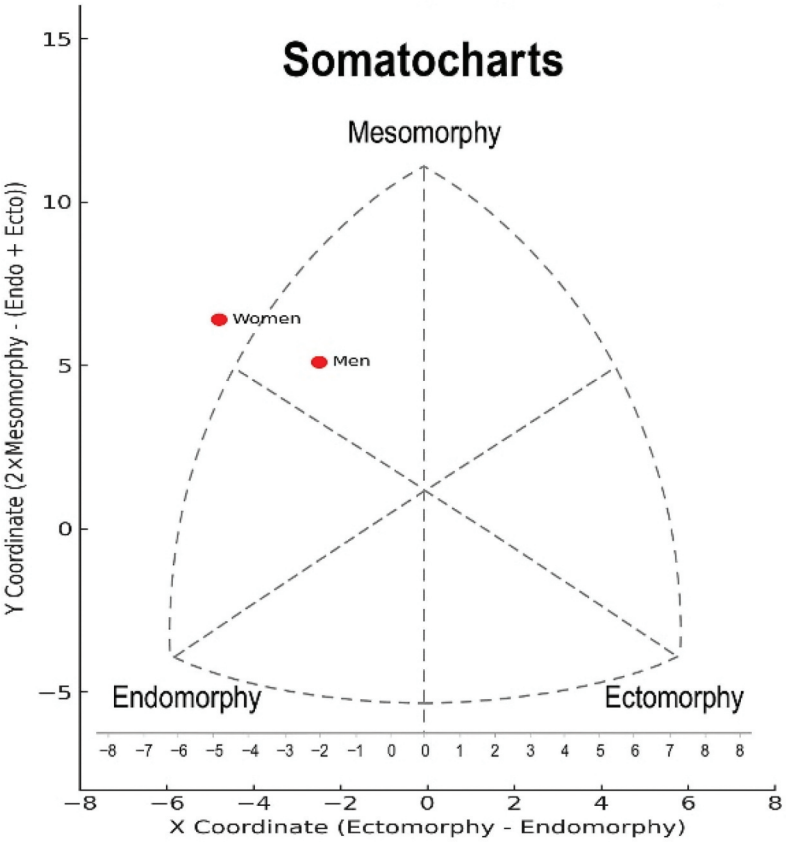


Figure 1. Somatotype profiles of men and women aged 65–74 years in Türkiye. In the 65–74 age group, the somatotype profile of male individuals was identified as endo-mesomorphic (Endo: 3.2, Meso: 4.5, Ekto: 0.7). Female individuals in the same age group exhibited a meso-endomorphic profile (Endo: 5.0, Meso: 5.8, Ekto: 0.2).

The somatotype changes observed are closely linked to general physiological decline. Santanasto et al. (2017) highlight body composition remodeling (lean mass loss, central fat accumulation) and its association with mortality. Age-related sarcopenia affects mesomorphy, and adipose tissue changes affect endomorphy. These changes indicate adverse health outcomes (e.g., falls, insulin resistance, chronic disease). Low mesomorphy and high endomorphy (especially with visceral adiposity) may increase the risk of metabolic syndrome and cardiovascular disease.

Somatotype analysis offers a valuable tool for assessing health risks and developing preventive interventions in older adults. Our study contributes data from the Turkish population, a region where specific dietary habits, traditional lifestyles, and physical activity levels may influence somatotype. Future research should further investigate these cultural and environmental influences.

The study of somatotypes is important not only in sports sciences but also in medical and physical anthropology. In gerontology and geriatrics, it helps explain the physiological and

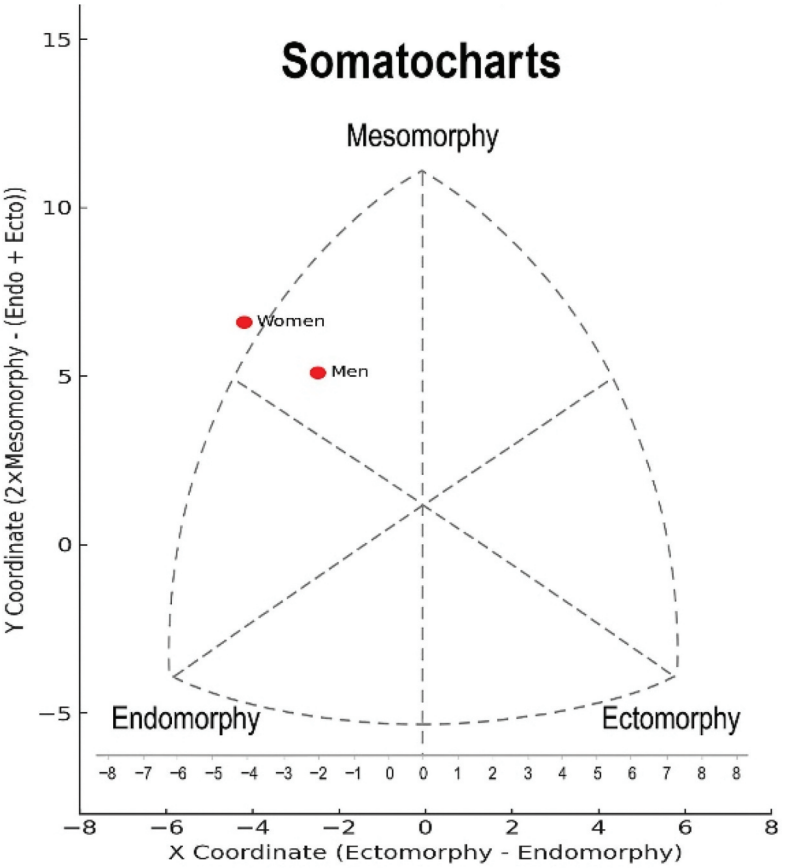


Figure 2. Somatotype profiles of men and women aged 75–84 years in Türkiye. In the 75–84 age group, male individuals showed an endo-mesomorphic somatotype (Endo: 3.1, Meso: 4.4, Ekto: 0.6). Female individuals displayed a meso-endomorphic somatotype (Endo: 4.4, Meso: 5.6, Ekto: 0.2).

morphological changes associated with aging. However, research in this area is limited. Findings from diverse populations can guide gerontological interventions and improve the quality of life for future generations.

Limitations

This study has some limitations. The small sample size in the 85+ age group, the cross-sectional design, and potential measurement errors may affect the generalizability of the findings. Moreover, confounders such as physical activity, socioeconomic status, and chronic diseases were not fully controlled. Nevertheless, the study offers valuable insights into somatotype variations among older adults in Türkiye and provides a foundation for future gerontological research.

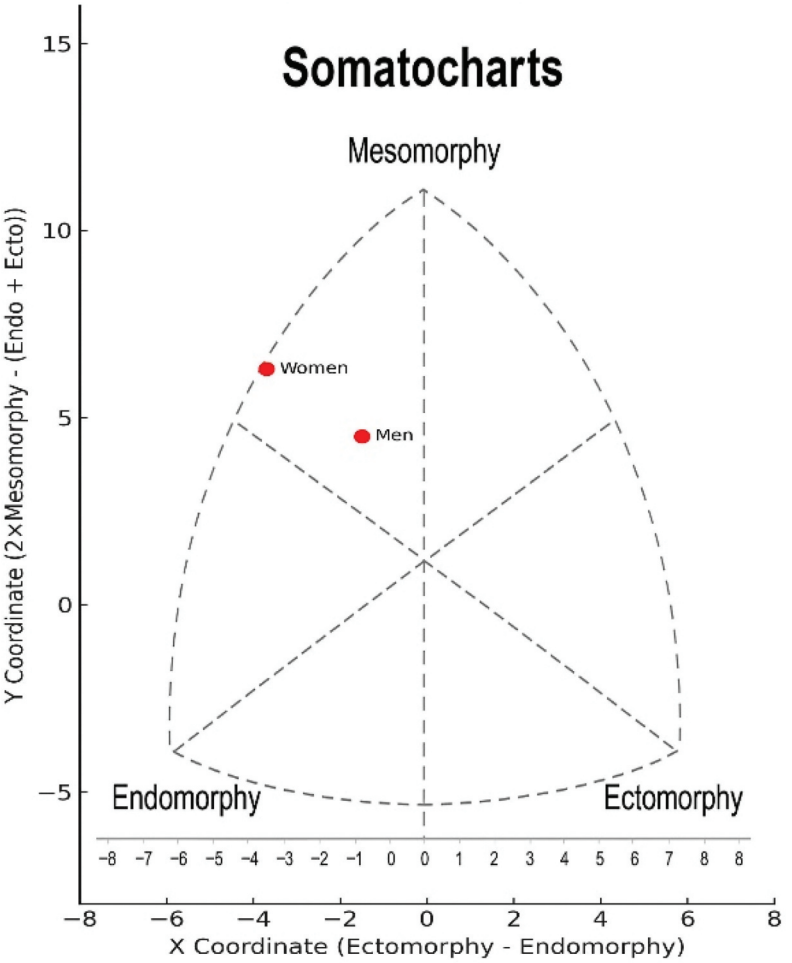


Figure 3. Somatotype profiles of men and women aged 85+ years in Türkiye. In individuals aged 85 and over, male participants exhibited a mesomorphic somatotype approaching balance (Endo: 2.5, Meso: 4.0, Ekto: 1.0). Female participants showed a meso-endomorphic somatotype (Endo: 4.0, Meso: 5.3, Ekto: 0.3).

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

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References

Baltadjiev, A. G., and S. V. Vladeva. 2014. "Correlations Between Human Somatotype Components and Some Anthropometric Parameters in Male Patients with type 2 Diabetes Mellitus." *Folia Medica* 56 (3): 175–181. https://doi.org/10.2478/folmed-2014-0025.

Baranauskas, M., I. Kupčiūnaitė, J. Lieponienė, and R. Stukas. 2024. "Dominant Somatotype Development in Relation to Body Composition and Dietary Macronutrient Intake Among High-Performance Athletes in Water, Cycling and Combat Sports." *Nutrients* 16 (10): 1493. https://doi.org/10.3390/nu16101493.

Briand, M., J. Raffin, E. Gonzalez-Bautista, B. Vellas, L. Ferrucci, M. Cesari, and Y. Rolland. 2025. "Body Composition and Aging: Cross-Sectional Results from the INSPIRE Study in People 20 to 93 Years Old." *GeroScience* 47 (2): 863–875. https://doi.org/10.1007/s11357-024-01245-6.

Buffa, R., V. Succa, D. Garau, E. Marini, and G. Floris. 2005. "Variations of somatotype in elderly Sardinians." *American Journal of Human Biology* 17 (3): 403–411. https://doi.org/10.1002/ajhb.20141.

Carter, J. E. L., and B. H. Heath. 1990. *Somatotyping: Development and Applications*. New York: Cambridge University Press.

Hall, D. A., A. D. Blackett, A. R. Zajac, S. Switala, and C. M. Airey. 1981. "Changes in skinfold thickness with increasing age." *Age and Ageing* 10 (1): 19–23. https://doi.org/10.1093/ageing/10.1.19.

Jackson, A. S., M. L. Pollock, and A. Ward. 1980. "Generalized equations for predicting body density of women." *Medicine and Science in Sports and Exercise* 12 (3): 175–181. https://doi.org/10.1249/00005768-198023000-00009.

JafariNasabian, P., J. E. Inglis, W. Reilly, O. J. Kelly, and J. Z. Ilich. 2017. "Aging human body: Changes in bone, muscle and body fat with consequent changes in nutrient intake." *Journal of Endocrinology* 234 (1): R37–R51. https://doi.org/10.1530/JOE-16-0603.

Kalichman, L., and E. Kobyliansky. 2006. "Sex- and age-related variations of the somatotype in a Chuvasha population." *Homo: Internationale Zeitschrift für die Vergleichende Forschung am Menschen* 57 (2): 151–162. https://doi.org/10.1016/j.jchb.2006.01.002.

Kim, S., and C. W. Won. 2022. "Sex-different changes of body composition in aging: A systemic review." *Archives of Gerontology and Geriatrics* 102:104711. https://doi.org/10.1016/j.archger.2022.104711.

Martínez-Mireles, X., E. J. Nava-González, M. López-Cabanillas Lomelí, D. S. Puente-Hernández, M. Gutiérrez-López, J. O. Lagunes-Carrasco, R. López-García, and E. Ramírez. 2025. "The shape of success: A scoping review of somatotype in modern elite athletes across various sports." *Sports* 13 (2): 38. https://doi.org/10.3390/sports13020038.

Norton, K., and T. Olds. 2004. *Anthropometrica: A textbook of Body Measurement for Sports and Health Courses*. UNSW Sidney: UNSW Press.

Ponti, F., A. Santoro, D. Mercatelli, C. Gasperini, M. Conte, M. Martucci, L. Sangiorgi, C. Franceschi, and A. Bazzocchi. 2020. "Aging and imaging assessment of body composition: From fat to facts." *Frontiers in Endocrinology* 10:861. https://doi.org/10.3389/fendo.2019.00861.

Pontzer, H., Y. Yamada, H. Sagayama, P. N. Ainslie, L. F. Andersen, L. J. Anderson, and K. R. Westerterp. 2021. "Daily energy expenditure through the human life course." *Science* 373 (6556): 808–812. https://doi.org/10.1126/science.abe5017.

Rahmawati, N. T., H. Janatin, and A. Kumi. 2008. "Age-related variation on somatotypes of Javanese people in Yogyakarta Province." *Berkala Ilmu Kedokteran* 40 (4): 181–188.

Santanasto, A. J., B. H. Goodpaster, S. B. Kritchevsky, I. Miljkovic, S. Satterfield, A. V. Schwartz, M. Visser, T. B. Harris, and A. B. Newman. 2017. "Body composition remodeling and mortality: The Health Aging and Body Composition Study." *The Journals of Gerontology: Series A* 72 (4): 513–519. https://doi.org/10.1093/gerona/glw163.

Sheldon, W. H., S. S. Stevens, and W. B. Tucker. 1940. *The varieties of human physique*. New York: Harper and Brothers.

Shimrah, C., S. Kaur, G. Kaur, and S. Chandel. 2020. "Somatotype characteristics of Sunni Muslim population: A cross-sectional study." *The Oriental Anthropologist* 20 (1): 113–124. https://doi.org/10.1177/0972558X20913699.

TÜİK (Turkish Statistical Institute). 2023. "Statistics on the elderly, 2022 (News Bulletin No. 49667)." https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Yaslilar-2022-49667 .

Weiner, J. S., and J. A. Lourie. 1969. *Human biology: a guide to field methods* (I.B.P. Handbook). Oxford, UK: Blackwell Scientific Publications.

Yang, L. T., N. Wang, Z. X. Li, C. Liu, X. He, J.-F. Zhang, H. Han, Y.-F. Wen, Y.-H. Qian, and H.-J. Xi. 2016. "Study on the adult physique with the Heath-Carter anthropometric somatotype in the Han of Xi'an, China." *Anatomical Science International* 91 (2): 180–187. https://doi.org/10.1007/s12565-015-0300-9.

Yoo, B. C., I. S. Park, and Y. S. Kim. 1996. "Analysis of Somatotype Using Korean Elderly women's Anthropometric Measurement." *Journal of the Ergonomics Society of Korea* 15 (2): 149–155.