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Somatotype of Contemporary Dancers

Somatotipo de Bailarinas Contemporáneas

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SUMMARY: The goal of this research was to examine the anthropometric characteristics and define the somatotypes of female junior contemporary dancers. The study included a total of 62 dancers, with a mean age of 13.16±1.11 (years + SD) and an average dance experience of 5.85±2.56 (years + SD). According the instructions of the Heath-Carter protocol for defining somatotypes, 10 anthropometric measurements were taken by a trained researcher. The somatotypes of the young dancers were calculated and obtained using R 4.2.3. The main finding of the study indicates that the dancers have moderate muscle mass and a lean body, which corresponds to the balanced mesomorph-ectomorph somatotype, aligning with the physical and aesthetic demands of contemporary dance.

KEY WORDS: Modern dance; Anthropometry; Body type; Body composition.

INTRODUCTION

Contemporary dance originated in the early 20th century as a departure from the strict conventions of classical ballet, which initially developed as a form of artistic expression within the French courts during the 16th and 17th centuries (Angioi *et al*., 2009). Contemporary dance can be characterized as an intellectually driven choreographic genre, serving as a means for self-awareness and self-reflection within modern culture. A distinct characteristic of contemporary dance is its emphasis on physicality, stemming from a pursuit to establish a link between historical and cultural shifts in the perception of the human body (Fedotova, 2023).

Over time, it has been widely recognized that notable variations in human traits are often observed in anthropometric characteristics. Through ongoing monitoring of these characteristics, a correlation has been established between human behavior and various abilities based on their anthropometric characteristics (Jaksic *et al*., 2014). Gaining a comprehensive understanding of athletes' characteristics can offer valuable insights into the factors that contribute to enhancing their competitive success (Drapsin *et al*., 2020). Body size and physique have a significant impact on performance in various sports, particularly in the realm of female aesthetic sports. Research has demonstrated the significant role of anthropometry in the context of dance and aesthetic sports, particularly in terms of its influence on the selection process and performance criteria (Liiv *et al*., 2013; Lukic, 2020). The determination of somatotype proves to be a valuable tool for characterizing body shape within the realms of contemporary dance and sports dance (Liiv *et al*., 2013, 2014). The significance of morphological characteristics in achieving optimal performance in aesthetic sports is widely recognized and emphasized in various system models used for sports analysis (Bloom, 1985; Bompa, 1985; Franks & Goodman, 1986; Norgan, 1994; Monsma & Malina, 2005).

Dance training encompasses a lengthy journey of physical, intellectual, and psychological preparation through consistent physical exercise, often commencing in childhood and persisting until retirement (Allen & Wyon, 2008). To achieve optimal performance, dancers must attain expertise in both the aesthetic and technical aspects of their art, possess psychological readiness to cope with high-pressure situations, and maintain freedom from injury (Liiv *et al*., 2013). It is worth noting that the duration and frequency of physical activity performed each day and week can lead to systematic alterations in body composition (Bandyopadhyay, 2007).

The somatotype serves as a convenient and concise means of describing an individual's overall physique, encompassing body shape and composition, regardless of body size (Carter & Heath, 1990). To determine somatotypes, anthropometric variables are measured, and the somatotypes are derived using the anthropometric somatotyping method

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proposed by Carter & Heath (1990). The somatotype, represented by a three-number rating, quantifies the morphological variation of an individual's body shape and composition. The three-number rating of the somatotype corresponds to three components, always presented in the following order:

- Endomorphy: This first component reflects the relative level of adiposity or fatness.
- Mesomorphy: The second component represents the relative robustness of the musculoskeletal system.
- Ectomorphy: The third component indicates the relative body linearity or slimness (Carter & Heath, 1990).

The determination of somatotype proves to be a valuable tool for characterizing body shape in contemporary dance and sports dance. Notably, classical ballet, contemporary dance, and dancesport dancers exhibit distinct somatotypes. In particular, female contemporary dancers tend to possess a higher level of mesomorphy compared to female ballet dancers. It has been observed that female contemporary dancers generally display greater muscularity in comparison to their ballet counterparts (Liiv *et al*., 2013). Dancers face the challenging task of effectively combining the aesthetic and physical elements of their performances. It is plausible that certain changes in training methods, with a specific focus on enhancing athletes' physical abilities, could potentially lead to a reduction in somatotype diversity (Drapsin *et al*., 2020).

A lack of recent scientific papers on the topic of somatotype and contemporary dance was spotted. The above-mentioned research provided a frame for the implementation of field research for the needs of the paper, which is to some extent pioneering. The primary objective of the present study is to define the anthropometric characteristics and somatotypes of female contemporary dancers. By examining the anthropometric profiles, we aim to gain insights into body composition, somatotype, and other relevant physical attributes in contemporary dance.

MATERIAL AND METHOD

Participants. A total of 62 dancers were involved in this study, with an age of 13.16 years (±1.11) and an average dancing experience of 5.85 years (±2.56). All participants were healthy and free from injuries or conditions that could impact their physical performance.

Anthropometrical Measurements. To evaluate the body structure characteristics of dancers, several anthropometric measurements were conducted, including body height, body weight, four skinfold thicknesses (triceps, subscapular, supraspinal, calf), bone breadths (humerus and femur diameters), and girth measurements (arm and calf). A trained researcher followed procedures to obtain all these measurements.

Body height was determined using a Martin anthropometer (GPM, Switzerland), which is an instrument specifically designed for measuring standing human body height. Skinfold thickness was measured by using a John Bull from British Indicator Ltd, UK, with an accuracy of 0.2 mm. The caliper was placed perpendicular to the site. Gently squeezed to obtain a fold of skin and subcutaneous fat. Girth measurements were taken using a steel measuring tape, which was wrapped around the body part being measured.

Using Heath Carter's method, the somatotype based on these ten measurements was calculated. This method is widely used to assess body composition and somatotype. It involves calculating three types of somatotype: endomorphy, mesomorphy, and ectomorphy.

Statistical analysis. Data are presented as means and standard deviations (±). All statistical analyses were performed using R 4.2.3 software. Dominant somatotype was calculated according to Heath-Carter's method. To determine the significance of analyses, the level was set at $p<0.05$. Before conducting analyses, normality was tested as well, using the Shapiro-Wilk test. All variables were normally distributed (Shapiro-Wilk test, $p >0.05$), allowing the use of parametric statistics.

RESULTS

Descriptive statistics of anthropometric characteristics in elite junior contemporary dancers are presented in Fig. 1.

The analysis of somatotype distribution within the sample demonstrated a high level of variation ($\chi^2 = 40.194$, $p < 0.001$). The most frequent somatotypes observed were Central Type, Endomorphic Mesomorph, and Balanced Ectomorph, each with a frequency of 12. These categories suggest a higher prevalence of lean and balanced body types among junior dancers. Other somatotypes, such as Endomorphic Ectomorph and Mesomorphic Ectomorph, were represented with frequencies of 10 and 4, respectively. In contrast, Balanced Endomorph and Ectomorphic Endomorph were the least common, occurring only once each. Overall, the results show that there is a great variety of body types in the sample of young dancers.

The dominant somatotype was calculated for participants according to Heath-Carter's method. The results are presented in Figure 2. Overall, the average somatotype for junior contemporary dancers was 2.98-3.49-3.62.

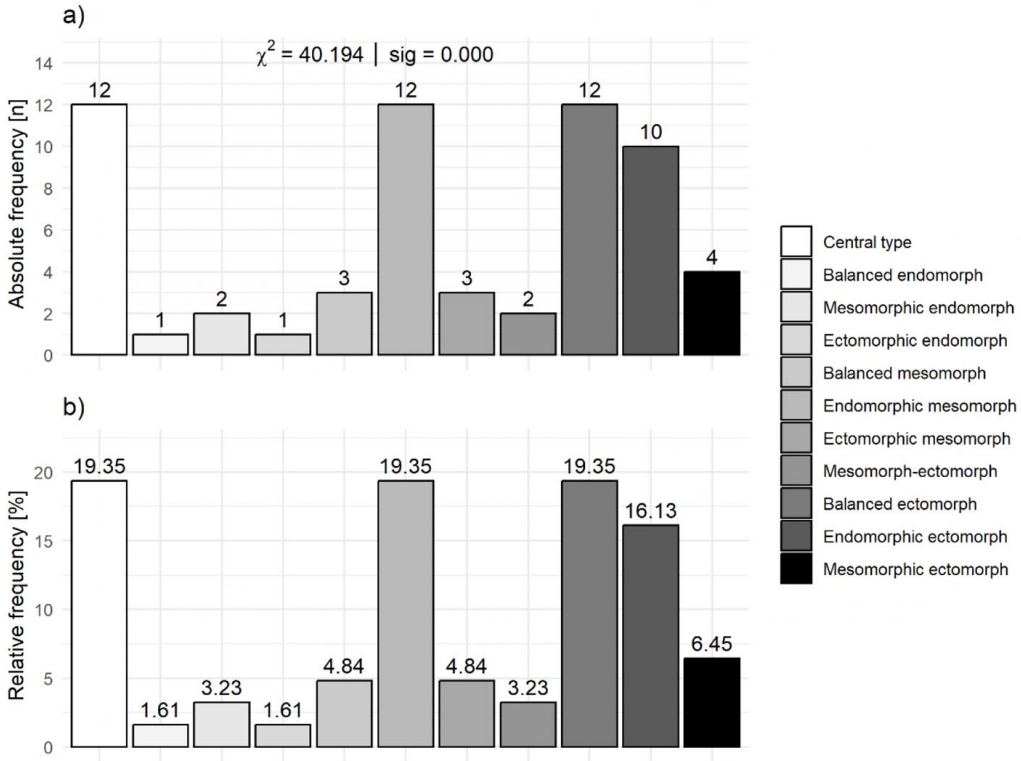

Fig. 1. Frequency of somatotype distribution.

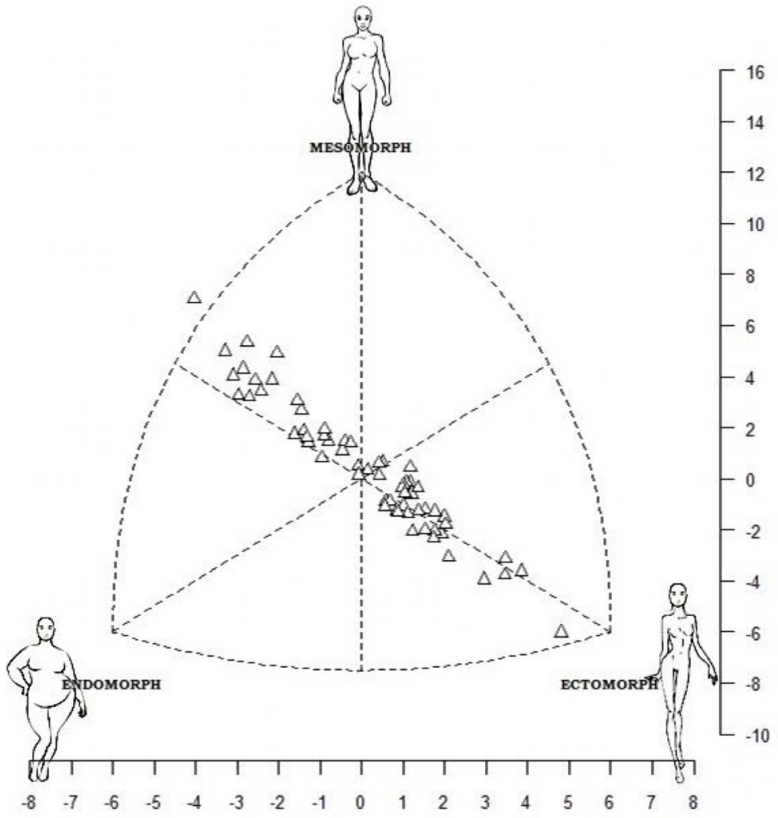

Fig. 2. Somatochart of female junior contemporary dancers.

DISCUSSION

The primary aim of this study was to define the anthropometric characteristics and somatotypes of junior contemporary dancers. The average somatotype values for junior contemporary dancers (endomorphy 2.98, mesomorphy 3.49, ectomorphy 3.62) suggest that the dancers fall into a balanced mesomorph-ectomorph category. They display a mix of muscle (mesomorphy) and leanness (ectomorphy), which aligns well with the requirements of contemporary dance for strength, control, and aesthetic grace. This combination of muscle (mesomorphy) and leanness (ectomorphy) aligns well with the physical demands of contemporary dance, where strength, control, and aesthetic grace are essential. The somatotype and anthropometric profile observed in our study support the key traits necessary for modern dance, such as flexibility, strength, and endurance. Low body fat likely enhances agility, while the mesomorphic-ectomorphic build provides the strength required for sustained and controlled movements. Strength and conditioning practices are crucial for optimizing these attributes, as highlighted in both dance and broader athletic contexts (Weldon *et al*., 2022; Ngo *et al*., 2024).

Liiv *et al*. (2013), compared the anthropometric and somatotypical profiles of classical, contemporary, and sports dancers, noting significant differences in endomorphy and mesomorphy between styles. Contemporary dancers tend to have higher muscle mass compared to classical dancers, whereas sports dancers are generally larger and heavier. This suggests that the type of training or selection process could influence the dancers' somatotypes, although this was not definitively proven in their study.

While the somatotype of athletes has been widely researched, there remains a gap when it comes to contemporary dance specifically. Only a few studies have addressed this, and more research is needed to fill this gap. Future studies could compare contemporary dancers with athletes from other aesthetic disciplines, such as ballet, rhythmic gymnastics, or figure skating, to better understand the somatotype requirements across different performance contexts.

One limitation of our study is the exclusive focus on junior athletes. However, given the prevalence of female dancers in this age category, we chose to focus on this particular sample. Future research could explore the senior category to provide a more comprehensive view of somatotype across different age groups.

Despite these limitations, our findings can serve as a valuable starting point for further research into the correlation between somatotype and contemporary dance. The data presented could also serve as a model for comparing anthropometric and somatotype data of contemporary dancers from other countries, contributing to a broader understanding of the physical characteristics required in contemporary dance.

CONCLUSION

This study offers valuable insights into the anthropometric characteristics and somatotypes of junior contemporary dancers. The findings indicate that these dancers tend to have a balanced mesomorph-ectomorph somatotype, with moderate muscle mass and a lean body, which aligns with the physical and aesthetic demands of contemporary dance. Essential qualities for this specific discipline, such as agility, strength, and endurance, are likely enhanced by their low body fat and mesomorphic-ectomorphic build, which are crucial for standing out in this artistic and physically demanding discipline.

The results of this research provide a foundational understanding of the physical profiles of contemporary dancers, offering a useful reference for future research. This study addresses the gap in the literature. It emphasizes the need for further exploration, which could deal with diverse topics, such as how physical characteristics impact dancer selection, or comparing dancers across different aesthetic sports and age groups.

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RESUMEN: El objetivo de esta investigación fue examinar las características antropométricas y definir los somatotipos de bailarinas contemporáneas jóvenes. El estudio incluyó a un total de 62 bailarinas, con una edad promedio de 13,16 ± 1,11 (años + DE) y una experiencia promedio en danza de 5,85 ± 2,56 (años + DE). De acuerdo a las instrucciones del protocolo Heath-Carter para la definición de somatotipos, un investigador capacitado realizó 10 mediciones antropométricas. Los somatotipos de las jóvenes bailarinas se calcularon y obtuvieron usando R 4.2.3. El principal hallazgo del estudio indica que las bailarinas presentan una masa muscular moderada y un cuerpo delgado, lo que corresponde al somatotipo mesomorfo-ectomorfo equilibrado, en consonancia con las exigencias físicas y estéticas de la danza contemporánea.

PALABRAS CLAVE: Danza moderna; Antropometría; Tipología corporal; Composición corporal.

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