

The body of the traceur: Linking morphology and performance in parkour

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ABSTRACT

Parkour involves overcoming environmental obstacles through running, jumping, climbing, and vaulting, placing high physical demands on practitioners. Although the discipline accommodates diverse body types, anthropometric traits, body composition, and somatotype may influence performance. Previous research has mainly reported basic indicators such as height, body mass, and BMI, leaving gaps in morphological profiling and its relationship with fitness outcomes. This study aimed to characterize the anthropometric profile, body composition, and somatotype of male parkour practitioners and to analyse their associations with standardized physical fitness tests. Twenty-four Spanish male traceurs (23.7 ± 5.6 years; 11.3 ± 4.0 years of experience) were assessed. A predominance of mesomorphy was observed, particularly in more experienced athletes. Significant correlations were found between lower fat mass and superior jump performance (SLJ, CMJ+, 3HPJ; $\rho = -0.56$ to -0.72 , $p = .004-.03$), between greater leg length and faster sprint times (40 m; $\rho = -0.61$, $p = .02$), and between limb girths and improved change-of-direction ability (T-Test; $\rho = -0.53$ to -0.67 , $p = .01-.04$). These findings underscore the relevance of muscularity and limb proportions for explosive and efficient performance, providing novel reference data for athletes, coaches, and researchers in parkour.

Keywords: Performance analysis, L' art du déplacement, Anthropometrics, Somatotype, Physical conditioning.

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INTRODUCTION

L'Art du Déplacement (i.e.: the art of movement, ADD), commonly referred to as parkour derives from the French term *parcours* ("course" or "route") and was originally developed in the late 1980s by the group known as the Yamakasi in the suburbs of Paris (Angel, 2011; Sampayo, 2020). From its beginnings in the backstreets of Évry and Lisses, the practice has spread worldwide, evolving into both a form of physical training and a cultural movement. Its practitioners, known as traceurs, progress through environments by overcoming obstacles using their own physical qualities, such as running speed, flexibility, strength, and jumping ability, without the aid of equipment. Movements are performed under conditions of high physical demand, requiring adaptation of the practitioner's abilities to the structural challenges of the environment. The foundational repertoire of movements, vaults, jumps, climbs, and landings, draws heavily from the running and jumping components of sports such as athletics and gymnastics. As a result, many of the physical requirements for success in parkour are shared with these sports, allowing traceurs to navigate demanding environments without reliance on external apparatus (Grosprêtre, Ufland, & Jecker, 2018). Thus, physical conditioning has been a central component of ADD since its inception. This is reflected in the very name Yamakasi, often mistaken as Japanese but actually derived from Lingala, meaning "*strong body, strong spirit, strong person*" (Coline, 2009; Sampayo, 2020; Torchia, 2021). Far from being merely a legacy of the discipline's origins, the emphasis on conditioning remains evident today: recent findings indicate that approximately 73% of traceurs (i.e., parkour practitioners) engage in dedicated conditioning sessions at least once per week (Elizondo-Donado et al., 2025). Beyond structured training, the discipline itself places substantial physical demands on traceurs, requiring the development of jumping capacity, balance, spatial awareness, and impact absorption capacities to move through complex environments and challenge themselves with demanding jumps. In this context, Croft and Bertram (2017) argued that athletes with greater explosive strength were able to tolerate precision landings from higher drop heights before transitioning to rolls. This suggests that enhanced muscular strength not only facilitates the generation of large forces during take-off but also improves the eccentric control required to absorb high-impact landings. In other words, by developing their jumping capacity, parkour practitioners may increase the threshold at which they can safely perform precision landings. This consistent training focus, combined with the considerable physical demands required to perform in parkour, suggests that the body composition and structural characteristics of traceurs may present distinctive features.

While parkour can be practiced by individuals with diverse physical conditions and body types, the anthropometric profile, body composition, and somatotype of practitioners may play a particularly relevant role in performance. These characteristics can influence key physical capacities such as jump capacity, change of direction ability, and sprinting ability, all of which are critical for negotiating demanding movements efficiently and safely (Pagnon, Faity, Maldonado, Daout, & Grosprêtre, 2022). Evidence from sports science highlights that some body types, such as those defined by height, mass, or body shape, are better suited for athletic disciplines (Santos et al., 2014). Nevertheless, it is also recognized that long-term practice can progressively reshape the neuromuscular system, fostering adaptations aligned with the specific demands of the sport (Aagaard, Simonsen, Andersen, Magnusson, & Dyhre-Poulsen, 2002; Cormie, McGuigan, & Newton, 2011; Markovic & Mikulic, 2010; Taube, Leukel, & Gollhofer, 2012). In parkour, few studies have systematically examined these variables. To date, research on the morphology of traceurs has focused mainly on basic indicators such as height and weight, and the subsequent BMI (Dvořák, Baláš, & Martin, 2018; Leite et al., 2011; Maldonado, Bailly, Souères, & Watier, 2019; Seyhan, 2019b; Solano Chamorro, 2016), with a few studies providing more detailed data on body composition and somatotype. Existing findings indicate that traceurs generally exhibit greater body mass compared to climbers, likely reflecting the discipline's explosive nature and its potential role in promoting a shift toward fast-twitch muscle fibres,

particularly in the lower body (Marchetti et al., 2012). Furthermore, differences in somatotype have been observed depending on expertise, with experienced traceurs showing significantly lower ectomorphy and higher mesomorphy than both beginners and gymnasts (Abellán-Aynés & Alacid, 2016; Seyhan, 2019a). Mesomorphy, which emphasizes muscularity and structural robustness, appears more pronounced in advanced practitioners, while ectomorphy, reflecting leanness and linearity, is less prevalent (Pagnon et al., 2022). The present study seeks to address these gaps by applying standardized protocols to assess anthropometry and body composition in traceurs, offering a more comprehensive description of their morphological profile and its potential implications for performance.

Few studies have examined the relationship between body composition and physical performance in parkour, leaving open questions about how anthropometric traits translate into functional capabilities. In other sports, however, this link has been studied in depth. For example, in CrossFit®, greater muscle mass has been positively correlated with strength outcomes (Menargues-Ramírez, Sospedra, Holway, Hurtado-Sánchez, & Martínez-Sanz, 2022), while in gymnastics, body build and somatotype have been shown to influence both specialization and performance level (Sterkowicz-Przybycień et al., 2019). Similarly, sprinters with greater fat-free mass and mesomorphic traits tend to achieve better results in speed and power events (Barbieri et al., 2017). These findings underline the value of exploring whether anthropometric characteristics can determine or at least influence physical test performance. In parkour, Croft and Bertram (2017) provided initial evidence that body mass and limb length may condition landing strategies, yet the relationship between anthropometry and standardized performance tests remains largely unexplored. Addressing this gap, the present study not only characterizes the anthropometric profile, body composition, and somatotype of traceurs but also examines their association with performance in specific physical tests: standing long jump (SLJ), countermovement jump with arm swing (CMJ+), triple horizontal plyometric jump (3HPJ), 5 climb-ups for time (5CUFT), 40 m sprint (Sp40), and change of direction T-Test. Such an approach provides a more holistic understanding of how morphological and functional characteristics interact to support parkour-specific performance.

The present study aims to: (1) describe detailed anthropometric characteristics, body composition, and somatotype; (2) evaluate performance outcomes in a set of physical fitness tests relevant to parkour; and (3) analyse the correlations between anthropometry, body composition, somatotype, and physical performance in order to identify how morphological traits influence functional capacities. By addressing these aims, this research seeks to provide reference data of practical value for practitioners, coaches, and researchers, offering insights into the physical profile that contributes to parkour performance and safety.

MATERIAL AND METHODS

Participants

The study included 24 Spanish Caucasian male traceurs, with a mean age of 23.7 ± 5.6 years and an average parkour experience of 11.3 ± 4.0 years. Participants were recruited via local WhatsApp training groups. The inclusion criteria for this study were at least 3 years of experience, current regular practice of parkour, ADD, or freerunning, and voluntary agreement to participate. Due to injuries and other minor inconvenience 9 traceurs withdrew from the physical condition testing phase, resulting in 15 male traceurs (23.7 ± 4.08 years old and 10.35 ± 3.40 years of experience) that participated both in the anthropometric measuring and physical condition tests. Participation was voluntary, with all participants providing informed consent, and anonymity was maintained throughout the study. The research adhered to the ethical principles outlined in the Declaration of Helsinki (2024) and was approved by the Ethical Committee of The University of the Basque

Country (UPV/EHU, CEISH, code: M10_2023_112). Participants were informed of their right to withdraw from the study at any time without consequence.

Procedure

This cross-sectional study evaluated the physical performance, anthropometric characteristics, adiposity, muscularity, bone distribution, somatotype and health indexes of traceurs using a combination of standardized functional tests and complete anthropometric assessment. The first phase involved anthropometric measurements, with participants scheduled individually over the course of one week in 45-minute time slots according to their availability. The second phase consisted of the physical performance tests, which were carried out during a single weekend session with all participants present. Both phases took place in March 2024. To evaluate physical performance, participants first completed a standardized guided warm-up (Grosprêtre & Lepers, 2016) designed to enhance readiness and minimize injury risk. The warm-up included 2 minutes of on-the-spot jogging to raise heart rate, followed by 30 seconds each of dynamic knee raises and calf raises to activate the lower limbs, and concluded with 5–10 submaximal jumps to engage the neuromuscular system and simulate the explosive actions required in the tests. Afterward, participants performed a battery of standardized field tests in the following order: five timed climb-ups (5CUFT), T-Test for change of direction ability, 40-meter sprint (Sp40), countermovement jump with arm swing (CMJ+), standing long jump (SLJ), and triple horizontal plyometric jump (3HPJ). Each test was conducted three times with at least 90 seconds of rest between attempts, and the best performance was selected for analysis. All tests were completed within a single session.

Measures

Anthropometric measures, body composition and somatotype

In this study basic anthropometric measurements, skinfolds, girths, lengths, heights and breadths were measured, and 5 component anatomical fractionation, adiposity, muscularity, bone distribution, health indexes and somatotype were calculated. All measurements adhered to the International Society for the Advancement of Kinanthropometry protocol (ISAK, 2016) and were conducted by a Level 2-certified anthropometrist, maintaining technical error of measurement within $\leq 5\%$ for skinfolds and $\leq 1\%$ for all other variables. Participants were assessed wearing minimal clothing, with all measurements taken on the right side of the body in duplicate, and the average value used for analysis. Standing height was measured to the nearest millimetre using a SECA 220 stadiometer with participants aligned to the Frankfort plane, and body mass was recorded to the nearest 0.1 kg using a calibrated medical scale. Additional basic anthropometric variables included sitting height and arm span. Skinfold thickness was assessed to the nearest millimetre at eight sites (triceps, biceps, subscapular, abdominal, suprailiac, iliac crest, thigh, and calf) using a Slimguide calliper with 0.5 mm precision, and the sums of six and eight skinfolds were computed to estimate subcutaneous fat. Girth measurements, taken with a Cescorf metal tape accurate to 1 mm, included head, neck, relaxed and flexed arm, forearm, wrist, chest, waist, hips, upper thigh (1 cm below the gluteal fold), mid-thigh, calf, and ankle, with corrected values for flexed arm and calf circumferences calculated using the formula: $\text{corrected perimeter} = \text{perimeter} - (\pi \times \text{skinfold thickness})$. Bone lengths and segment measurements including: acromiale–radiale, radiale–stylium, midstylium–dactylium, iliospinale height, trochanterion height, trochanterion–tibiale laterale, lateral tibial height, tibiale mediale–sphyriion tibiale, and foot length; were recorded with a Cescorf segmometer to the nearest millimetre, as were skeletal breadths including biacromial, biliocristal, transverse chest, antero-posterior chest and abdominal depths, humerus, bistyloid, femur, and bimalleolar breadths with a Cescorf pachymeter. Body composition was assessed using ISAK and GREC guidelines (Norton, 2019). The five-component model of Kerr (1991) was used to provide a detailed estimation of adipose, muscle, bone, skin, and residual masses, offering a more comprehensive

view of tissue distribution. In addition, the Carter–Heath method (1990) was applied to determine somatotype. Body mass index (BMI) and Waist/Hip index were subsequently calculated as well.

Physical performance

Countermovement Jump with Arm Swing (CMJ+): The CMJ+ (Acero, Sánchez, & Fernández-Del-Olmo, 2012; Gutiérrez-Dávila, Amaro, Garrido, & Rojas, 2014; Hara, Shibayama, Takeshita, Hay, & Fukashiro, 2008; McInnis & Donahue, 2024), also known as the Abalakov jump, allows participants to use arm movement to maximize vertical jump height. Traceurs started from a standing position and were free to use their arms to enhance lift-off. The jump began with a rapid descent into a self-selected countermovement depth, followed by an explosive extension of the knees and ankles, ensuring both safety and performance consistency. Participants were instructed to maintain an extended posture upon landing, and trials were repeated to ensure reliability. Jump height was measured using a laser system (Optojump Next, Microgate, Bolzano, Italy; Glatthorn et al., 2011). This test captures the contribution of upper-limb kinetics to vertical jump, providing insight into whole-body coordination during explosive movements.

Change of direction T-Test (T-Test): The T-Test evaluated multidirectional change-of-direction speed (Paule, Madole, Garhammer, Lacourse, & Rozenek, 2000; Semenick, 1990; Sheppard, Dawes, Jeffreys, Spiteri, & Nimphius, 2014), an essential ability for navigating complex urban environments in parkour. The setup used four 30-cm cones arranged in a T-shape. Participants started at cone A, sprinted 10 m forward to cone B, shuffled 5 m left to cone C, shuffled 10 m right to cone D, then returned 5 m left to cone B, before backedpedalling to cone A. At each turn, participants touched the top of the cone with their hand for precision, right hand for cones B and D, left hand for cone C. Timing gates (Witty, Microgate, Bolzano, Italy) positioned at hip height (1 m) recorded trial durations, starting and stopping as participants crossed the gate. Participants completed three trials with at least 90 seconds of passive rest between each, and the fastest time was used for analysis. This test simulates the sudden directional shifts typical of real-world parkour, providing high ecological validity for evaluating change of direction in such contexts (Strafford, Davids, North, & Stone, 2021).

Standing long jump (SLJ): Also known as horizontal jump or broad jump (Marin-Jimenez et al., 2024; Markovic & Mikulic, 2010; Rahman, 2021; Saint-Maurice, Laurson, Kaj, & Csányi, 2015; Thomas et al., 2020), was conducted to measure horizontal leg jumping capacity and coordination. Participants began with both feet parallel behind a marked starting line and were instructed to flex their knees and use arm swings to generate momentum. The goal was to leap forward as far as possible, maintaining two-footed take-off and landing. Distances were measured from the take-offline to the closest landing mark, usually the heel, with measurements taken to the nearest centimetre using a tape affixed to the floor. Trials were discarded if participants fell forward or backward, compromising landing integrity.

Triple Horizontal Plyometric Jump (3HPJ): The 3HPJ consisted of a modified version of the triple hop test (Davey et al., 2021; Hamilton, Shultz, Schmitz, & Perrin, 2008; Söyler et al., 2024), in which three consecutive horizontal broad jumps performed in a continuous, explosive sequence (Wood, 2005). Starting from a standing position, participants jumped forward as far as possible and immediately transitioned into the next jump, repeating the movement twice more. This test emphasizes lower-body power, coordination, and reactive strength, making it suitable for assessing horizontal propulsion and overall athletic explosiveness. Distances were measured from the take-offline to the closest landing point, typically the heel, using a tape affixed to the floor and recorded to the nearest centimetre. Trials were discarded if participants fell forward or backward, compromising landing integrity. Each participant completed three attempts, with the best distance used for analysis.

40-Meter Sprint Test (Sp40): To assess linear sprinting speed and acceleration, participants performed a modified 40-meter sprint with a 5-meter run-up (Altmann, Ringhof, Neumann, Woll, & Rumpf, 2019; Highton, Lamb, Twist, & Nicholas, 2012; Kolsky, Williams, Lorenzen, & Kemp, 2010; Nesser, Latin, Berg, & Prentice, 1996). This design reflects real-world parkour scenarios, where athletes typically accelerate before executing specific movements. Participants started 5 meters behind the first electronic timing gate (Microgate, Bolzano, Italy) and were instructed to accelerate naturally without altering mechanics. Timing started automatically as the athlete crossed the first gate and stopped at the 40-meter finish line, crossing the second gate. Each participant performed up to three maximal sprints, with at least 90 seconds of rest between attempts, and the fastest time was recorded for analysis. The test evaluates explosive acceleration, a key factor for efficient movement in dynamic environments.

Parkour-Specific Test: 5 Climb-Ups for Time (5CUFT): The 5CUFT was used to evaluate upper-body power and movement efficiency (Ford & Musholt, 2016), assessing participants' ability to repeatedly transition from a wall-hanging position to the top of a vertical obstacle. The test utilized a vertical wall without over grips or footholds. Participants started each repetition in a full-arm hang, with hands shoulder-width apart and feet at pelvic height in a staggered stance. On command, they initiated the climb using their preferred technique, aiming to place both feet clearly on the top surface of the wall; full standing was not required. Between repetitions, participants dropped back into a full hang with arms fully extended. Any failed repetition, such as incomplete arm extension at the bottom or insufficient foot contact on top, was disqualified. Timing was assessed via video analysis (1080p, 60 fps) in Kinovea (Version 0.9.5) (Charmant, 2021), starting from the first frame in which elbows, knees, or hips changed angles and ending when both feet contacted the top on the fifth successful repetition. Participants were instructed to maintain consistent technique, emphasizing rhythm, joint alignment, and coordination to optimize efficiency and minimize exertion. Verbal cues were provided to reinforce technical standards.

Statistical analysis

Descriptive statistics, including mean (M), standard deviation (SD), minimum (MIN), and maximum (MAX), were calculated to summarize sample characteristics and performance outcomes. In addition, anthropometric measurement, body composition, and somatotype data were also expressed in percentiles. Sample based internal percentiles were calculated in Excel using the adequate formula. Normality of the data was assessed using the Shapiro-Wilk test, and homogeneity of variances was examined with Levene's test. Relationships between variables were explored using Spearman's Rho for non-parametric data. Correlation strength was classified as trivial (<0.10), small (0.10–0.29), moderate (0.30–0.49), large (0.50–0.69), very large (0.70–0.89), or nearly perfect (>0.90) (Hopkins, 2002). All analyses were performed with Statistical Package for Social Science for Windows (SPSS, version 26, IBM Corp., Armonk, N.Y., USA), with the significance threshold set at $p < .05$.

RESULTS

Anthropometry profile measurements

Table 1 presents the results of the anthropometric characteristics of all participants. The data include mean and standard deviation, as well as percentiles (minimum, 25th, 50th, 75th, and maximum) for a wide range of measurements.

Body composition variables and indexes

Table 2 provides a detailed overview of body composition, and associated indexes for the participants. Results are expressed in means, standard deviations, and percentiles (minimum, 25th, 50th, 75th, and maximum).

Table 1. Results of anthropometric measurements from all participants (n = 24).

	M	SD	0p	25p	50p	75p	100p
Basic measurements							
Body Mass (kg)	73.3	10.1	55.4	65.8	73.3	79.8	95.3
Stretch Stature (cm)	175.6	8.3	154.0	172.0	175.2	182.5	189.5
Sitting Height (cm)	81.7	18.8	42.4	70.4	91.4	93.5	102.5
Arm span (cm)	178.4	9.0	159.4	173.0	178.8	185.3	192.5
Skinfolds							
Triceps skinfold (mm)	6.3	1.7	3.0	5.0	6.5	8.0	9.0
Subscapular skinfold (mm)	8.3	2.3	5.0	7.0	7.5	9.5	15.0
Biceps skinfold (mm)	2.6	0.6	2.0	2.0	2.5	3.0	4.0
Iliac crest skinfold (mm)	10.5	3.2	6.5	7.8	9.3	13.3	17.0
Supraspinale skinfold (mm)	6.4	2.0	3.0	5.0	6.3	7.8	11.0
Abdominal skinfold (mm)	9.6	3.8	4.5	7.0	8.5	11.9	18.3
Thigh skinfold (mm)	11.0	3.3	5.5	9.3	10.4	13.3	17.8
Calf skinfold (mm)	5.8	1.7	3.0	4.5	5.6	7.0	10.0
Girths							
Head girth (cm)	55.9	1.5	53.3	55.1	55.8	57.1	58.7
Neck girth (cm)	36.2	1.4	33.5	35.1	36.3	37.2	38.4
Arm relaxed girth (cm)	31.0	2.8	25.7	28.2	30.7	33.1	36.6
Arm flexed and tensed girth (cm)	33.1	2.9	27.9	30.7	32.9	35.0	38.9
Forearm girth (cm)	27.2	1.6	24.4	25.9	27.2	28.1	31.5
Wrist girth (cm)	16.1	0.8	14.2	15.5	16.1	16.7	17.5
Chest girth (cm)	95.2	6.9	79.8	91.5	93.6	99.6	110.5
Waist girth (cm)	79.0	4.9	68.5	74.6	79.9	82.6	88.8
Hips girth (cm)	95.3	5.3	85.0	91.4	94.8	98.7	105.5
Thigh 1cm gluteal girth (cm)	56.8	4.3	50.1	53.2	55.9	59.3	67.8
Thigh middle girth (cm)	53.0	3.7	47.8	49.6	52.0	55.4	63.4
Calf girth (cm)	36.1	1.8	33.1	34.8	35.7	37.3	41.0
Ankle girth (cm)	21.7	1.2	19.5	20.9	21.7	22.6	23.5
Lengths and heights							
Acromiale Radiale length (cm)	34.3	2.0	30.0	32.9	34.5	36.2	36.7
Radiale-stylion length (cm)	26.2	1.5	23.0	25.4	26.5	27.1	29.0
Midstylion-dactylion length (cm)	19.5	1.2	16.4	18.6	20.0	20.2	21.5
Iliospinale height (cm)	106.1	5.2	95.9	103.5	105.8	109.7	115.9
Trochanterion height (cm)	94.5	6.4	81.7	89.8	94.2	98.7	107.9
Trochanterion-tibiale laterale length (cm)	47.4	4.2	39.9	44.3	47.5	50.7	56.4
Lateral tibial height (cm)	46.3	4.5	28.6	45.1	47.0	49.0	53.0
Foot length (cm)	26.4	1.6	21.8	25.9	26.5	27.1	28.7
Tibiale mediale-sphyrion tibiale length (cm)	40.1	2.3	35.4	38.9	40.3	42.2	43.2
Breadths							
Biacromial breadth (cm)	40.7	2.2	37.7	38.3	40.7	42.2	45.1
Antero-posterior abdominal depth (cm)	19.2	1.9	15.0	18.2	19.0	20.5	22.7
Biilocrystal breadth (cm)	27.1	1.8	23.5	26.0	27.0	28.1	31.2
Transverse chest breadth (cm)	30.2	2.5	25.7	28.5	29.5	31.5	36.4
Antero-posterior chest depth (cm)	19.0	2.0	13.8	18.4	19.2	19.8	23.7
Humerus breadth (cm)	6.9	0.4	6.2	6.6	6.8	7.3	7.8
Bi-styloid breadth (cm)	5.7	0.3	5.0	5.5	5.7	6.0	6.3
Femur breadth (cm)	9.6	0.5	8.5	9.3	9.7	10.0	10.5
Bimalleolar breadth (cm)	7.3	0.6	6.1	7.0	7.4	7.6	8.5

Note: M = mean; SD = standard deviation; 0p = minimum value (0th percentile); 25p = 25th percentile; 50p = median (50th percentile); 75p = 75th percentile; 100p = maximum value (100th percentile).

Table 2. Descriptive statistics of body composition and somatotype variables and indexes (n = 24).

Variable	M	SD	0p	25p	50p	75p	100p
Five component anatomical fractionation							
Adipose mass (kg)	15.2	2.9	10.1	13.1	15.0	17.2	22.2
Muscular mass (kg)	36.5	6.0	26.0	33.0	35.7	41.0	50.0
Bone mass (kg)	8.6	1.3	6.6	7.5	8.7	9.7	11.1
Adipose mass (Kerr, 1991) (kg)	15.2	2.9	10.1	13.1	15.0	17.2	22.2
Muscle mass (Lee, 2000) (kg)	33.1	4.0	26.5	30.4	32.3	35.0	44.2
Bone mass (Rocha, 1974) (kg)	11.8	1.6	8.8	10.9	11.5	13.1	14.7
Skin mass (kg)	4.1	0.3	3.5	3.8	4.1	4.4	4.6
Residual mass (kg)	8.2	2.2	3.6	6.7	8.4	9.9	11.5
Kg difference brute mass with 5 components model	-3.1	2.9	-9.4	-5.7	-2.9	-0.6	1.1
Adiposity							
Adipose muscle index (Kerr/Lee)	0.5	0.1	0.4	0.4	0.5	0.5	0.6
Adipose muscle index (Kerr/Kerr)	0.4	0.1	0.3	0.4	0.4	0.5	0.6
Superior fat distribution	31.2	3.3	26.3	28.6	30.2	33.6	39.7
Abdominal fat distribution	33.4	4.6	23.9	31.0	33.0	36.3	42.2
Lower Fat Distribution	35.5	5.0	26.8	32.5	34.8	39.4	44.3
Sum 6 skinfolds (mm)	47.5	12.6	28.5	36.4	47.3	57.4	76.1
Sum 8 skinfolds (mm)	60.6	15.8	37.0	46.2	60.0	72.1	94.9
Muscularity							
Muscle Bone index (Lee/Rocha)	3.5	0.9	2.4	2.8	3.2	4.1	6.2
Muscle distribution in Upper Limb (%)	24.1	0.6	22.8	23.8	24.1	24.5	25.3
Muscle distribution in Trunk (%)	39.8	0.9	38.2	39.2	39.8	40.4	42.1
Muscle distribution in Lower limb (%)	36.1	0.8	34.4	35.5	36.2	36.5	37.7
Bone distribution							
Conicity index	1.1	0.0	1.1	1.1	1.1	1.1	1.2
Relative arm span (cm)	101.6	2.3	97.1	99.6	101.9	103.2	106.6
Cormic index	46.4	10.3	25.0	39.7	52.0	53.5	54.2
Forearm-Arm index	76.7	4.7	66.1	73.2	76.9	79.8	87.4
Leg-Thigh index	85.0	4.8	73.6	81.9	83.8	89.6	93.3
Acromio-iliac index	66.7	3.3	60.4	64.5	66.0	68.5	72.8
Intermembral index	75.4	2.7	69.2	73.8	75.3	76.8	81.6
Health indexes							
BMI (kg/m ²)	23.7	1.9	21.0	21.9	23.6	25.4	28.6
Waist/hip index	0.8	0.0	0.8	0.8	0.8	0.8	0.9

Note. M = mean; SD = standard deviation; 0p = minimum value (0th percentile); 25p = 25th percentile; 50p = median (50th percentile); 75p = 75th percentile; 100p = maximum value (100th percentile), BMI = Body Mass Index.

Somatotype and somatochart

The participants displayed a predominantly mesomorphic profile (5.0 ± 0.9), with the median (4.9) confirming this tendency and values ranging between 3.5 and 7.1. Endomorphy remained low (2.0 ± 0.6 ; median = 1.9), whereas ectomorphy showed the greatest variability (2.2 ± 0.8 ; range: 0.6–4.1), indicating the presence of leaner individuals (25th percentile = 1.7) within an otherwise balanced morphology. The somatochart illustrates the distribution of individual somatotypes, capturing the relative contributions of fatness (endomorph), muscularity (mesomorph), and linearity (ectomorph) to the participants' body build. This triangular representation facilitates comparisons across individuals or groups and helps highlight predominant morphological patterns in the sample. The mean somatotype and the distribution of participants are shown in Figure 1.

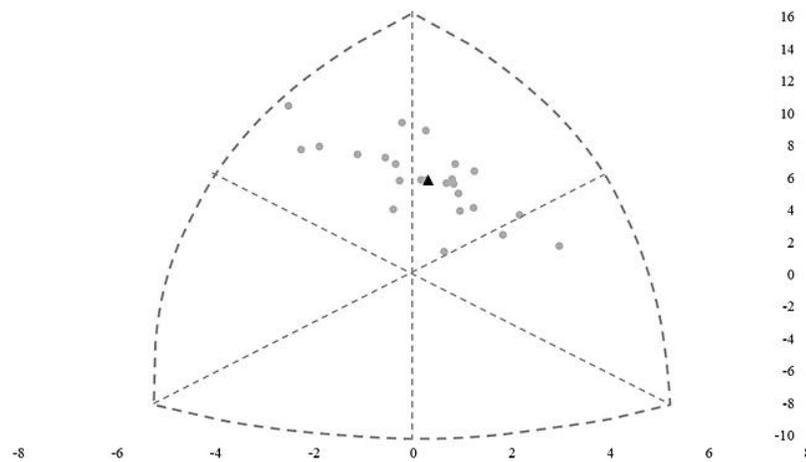


Figure 1. Participant's individual and mean somatotype values represented in a somatochart. Legend: ● = participants, ▲ = mean.

Physical performance tests

Table 3 reports the descriptive statistics of the physical performance assessments. Data are shown as means, standard deviations, and the observed minimum and maximum values.

Table 3. Results of physical performance tests (n = 15).

	M	SD	MIN	MAX
Vertical jump				
CMJ+ (cm)	56.0	8.7	37.1	72.3
Horizontal jump				
SLJ (cm)	272.8	18.8	225.0	296.0
3HPJ (cm)	851.1	61.7	723.0	961.0
Change of direction				
T-Test (s)	10.8	0.5	10.0	11.7
Sprint				
Sp40m (s)	5.1	0.2	4.8	5.5
Parkour specific test				
5 CUFT (s)	15.0	3.1	11.0	21.3

Note. CMJ+ = Countermovement Jump with arm swing, SLJ = Standing long Jump, 3HPJ = Triple horizontal plyometric jump, Sp40 = 40-meter sprint, 5CUFT = 5 climb ups for time, M = mean; SD = standard deviation; MIN = minimum value; MAX = maximum value.

Anthropometry and physical conditioning tests relationship

Correlation analyses highlighted sprinting ability (Sp40) as the test most consistently linked with anthropometric measures. Faster sprint times were strongly associated with lower calf skinfold thickness ($\rho = -0.828, p < .001$) (Figure 2H), biceps skinfold ($\rho = -0.668, p = .009$) (Figure 2G), thigh skinfold ($\rho = -0.566, p = .035$) (Figure 2I), and triceps skinfold ($\rho = -0.549, p = .042$). Sprint performance was also inversely related to adipose-muscle indexes ($\rho = -0.639$ to $-0.547, p < .05$) (Figure 2D), while positively associated with iliac spine height ($\rho = 0.622, p = .018$) (Figure 2F) and muscle distribution in the trunk ($\rho = 0.550, p = .042$) (Figure 2E). Jump performance revealed additional associations: the standing long jump (SLJ) correlated positively with arm span ($\rho = 0.616, p = .019$) (Figure 2B), acromiale-radiale length ($\rho = 0.667, p = .009$) (Figure 2A)), and foot length ($\rho = 0.566, p = .035$) (Figure 2C), but negatively with anterior-posterior chest depth ($\rho = -0.539, p = .047$). Similarly, the triple horizontal plyometric jump (3HPJ) related positively to acromiale-radiale

length ($\rho = 0.567, p = .035$) and negatively to chest depth ($\rho = -0.576, p = .031$). CMJ+ showed a negative association with the acromio-iliac index ($\rho = -0.544, p = .044$). No significant associations emerged for the T-Test or 5CUFT and anthropometric variables or body composition indexes.

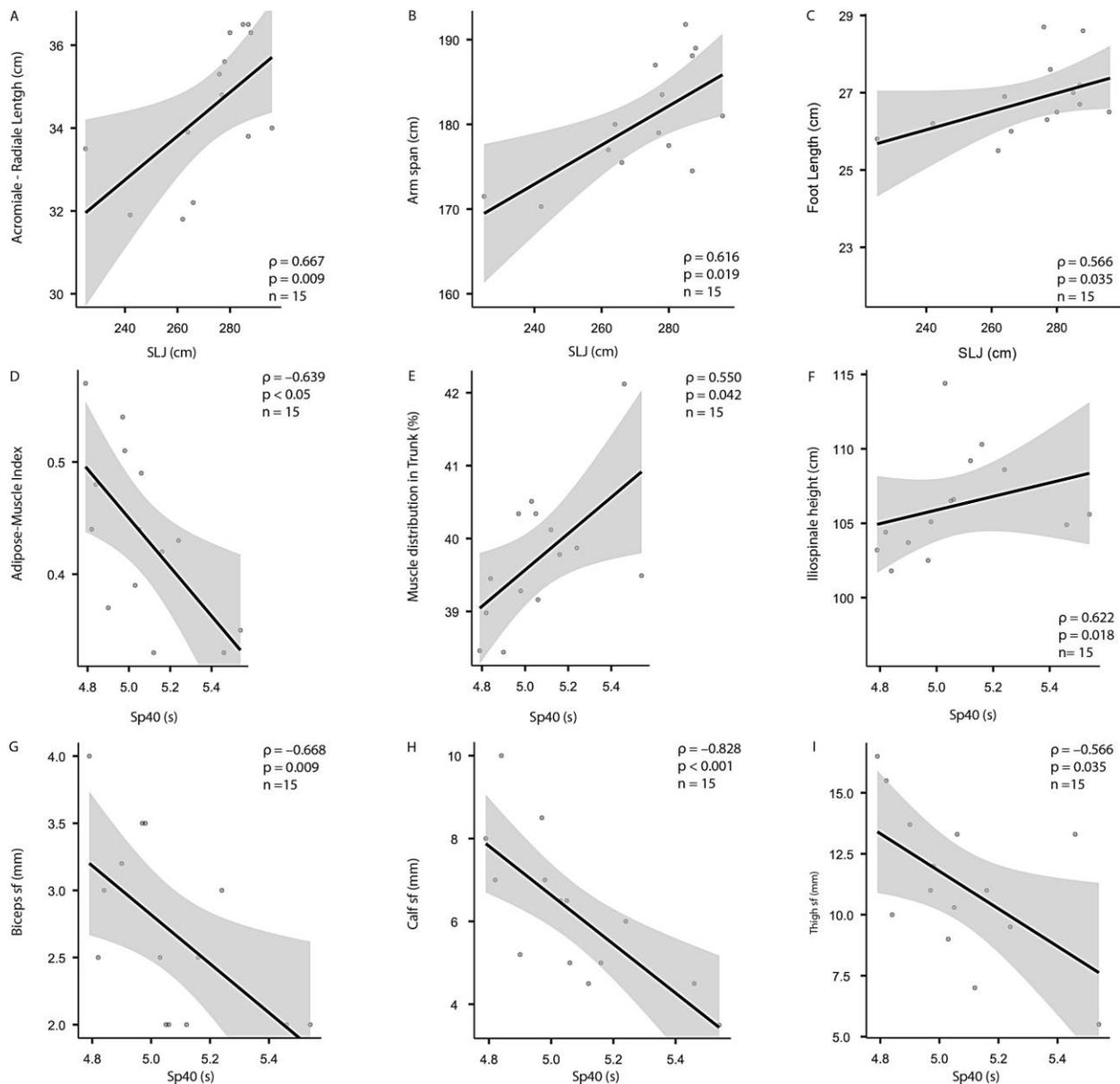


Figure 2. Spearman's rho correlation plots for Standing Long Jump (SLJ) and (A) Acromio-radiale length, (B) Am span and (C) foot length, 40m sprint (Sp40) and (D) Adipose-Muscle Index (E) Muscle distribution in trunk (%), (F) iliospinale height, (G) biceps skinfold, (H) calf skinfold and (I) thigh skinfold.

DISCUSSION

The principal objectives of this study were to conduct a detailed characterization of the anthropometric profile, body composition, and somatotype of male traceurs, and to assess the relationships between these morphological characteristics and performance in a battery of parkour-relevant physical fitness tests. This

research is justified by the scarcity of comprehensive anthropometric studies in parkour, with even fewer attempting to link this detailed morphology directly to physical performance outcomes. The novel contribution of this work lies in its integrated approach, employing a rigorous anthropometric protocol and correlation analysis to move beyond mere description towards a functional understanding of the parkour athlete's body. The most interesting results centre on the strong and consistent correlations identified. Specifically, Sp40 exhibited the most pronounced relationships, being strongly inversely correlated with calf skinfold thickness ($\rho = -0.828$, $p < .001$) and other limb skinfolds and positively associated with trunk muscle distribution. Furthermore, horizontal jumping capacity (SLJ, 3HPJ) was significantly linked to segmental lengths, such as arm span ($\rho = 0.616$, $p = .019$) and acromiale-radiale length ($\rho = 0.667$, $p = .009$), highlighting the role of leverage and body proportions in generating strength.

The analysis of body composition and somatotype is fundamental in sports science (Canda, 2012; Menargues-Ramírez et al., 2022), as it helps to define the "*morphological model*" of an athlete, which in parkour is crucial for overcoming the demanding physical challenges of the discipline. The anthropometric and body composition results of the present sample reveal a predominantly mesomorphic somatotype (5.0–2.0–2.2), with low endomorphy and moderate ectomorphy. This profile is consistent and slightly above previous findings in parkour, where mesomorphy has been repeatedly reported as the dominant component, as in Seyhan's (2019a) intervention (4.09–2.7–3.39). Interestingly, when comparing these results to Abellán-Aynes' (2016), the current sample is closer to the high performing group (5.3–1.7–2.5) than the lower performing group (4.7–2.0–2.7). The reasons underlying these results remain unknown as Abellán-Aynes' sample was similar in age (21.1 ± 2.5 years old), stature (177.3 ± 6.4 cm) and body mass (70.6 ± 9 kg) but not experience (5.6 ± 2.3 years of practice compared to the 11.3 ± 4 years of the current sample). The low levels of adiposity observed in the current sample (sum of 6 skinfolds, $\Sigma 6sf = 47.5$ mm; $\Sigma 8sf = 60.6$ mm) are also comparable to those reported in earlier studies, where traceurs consistently displayed values indicative of low body fat, such as $\Sigma 6sf = 40 - 53$ mm and $\Sigma 8sf = 54 - 67$ mm (Abellán-Aynés & Alacid, 2016; Seyhan, 2019a) or low fat percentages 7.5 – 14.05% (Abellán-Aynés & Alacid, 2016; Seyhan, 2019a; Solano Chamorro, 2016). These fat mass percentages should be interpreted with caution and not to be mixed with the current study's adipose mass results as the latter refers to the whole tissue. Beyond basic descriptors such as body mass, height, or BMI, which have been the main focus in prior research (Dvořák et al., 2018; Leite et al., 2011; Seyhan, 2019b), this report's analysis incorporated a five-component model, allowing a more detailed exploration of muscle, bone, adipose, skin, and residual mass. In this regard, results highlight a relatively balanced muscular distribution across trunk and limbs. Indices such as the muscle–bone ratio (3.5 ± 0.9) and adipose–muscle ratio (0.4–0.5) further reinforce the image of a morphology optimized for power-demanding activities. Compared to athletes in other sports, traceurs in our study exhibit similarities with explosive-oriented disciplines such as sprinting and gymnastics, where mesomorphy and low adiposity are also predominant (Barbieri et al., 2017; Menargues-Ramírez et al., 2022; Seyhan, 2019a). However, the variability in ectomorphy values suggests that parkour may involve a wider range of body shapes, reflecting both the heterogeneity of practitioners and the adaptability of the discipline. The practical implication is clear: parkour performance is supported by a body type that prioritizes muscularity and leanness over sheer mass or linearity. Consequently, conditioning programs should be designed to enhance functional strength and power while managing adiposity, optimizing the power-to-weight ratio for efficient movement and impact tolerance.

Physical conditioning is a central aspect of parkour (Grosprêtre et al., 2018), and the performance outcomes observed in this study support its relevance, demonstrating that traceurs develop high levels of explosive strength, speed, and overall athleticism. The CMJ+ results (56.0 ± 8.7 cm) surpass values previously reported in parkour populations (47.7–50.1 cm; Abellán-Aynés & Alacid, 2016; Grosprêtre & Lepers, 2016;

Strafford, Davids, Stone, & Antony, 2020), reflecting the ecological validity of including arm swing, which better simulates real-world parkour movements. Similarly, standing long jump (SLJ) performance averaged 272.8 ± 18.8 cm, consistent with or exceeding prior parkour studies (198–283 cm; (Abellán-Aynés & Alacid, 2016; Padulo et al., 2019) and comparable to team-sport athletes such as soccer, basketball, and rugby players (204–238 cm; Becker & Smith, 2015; Markovic, 2007; Porter, Anton, Wikoff, & Ostrowski, 2013). Triple horizontal plyometric jump (3HPJ) values (851.1 ± 61.7 cm) place practitioners near the lower range of elite track-and-field athletes, highlighting the substantial lower-limb explosiveness cultivated through long-term practice (Wood, 2019). Sprint capacity (Sp40 = 5.1 ± 0.2 s) also demonstrates significant neuromuscular efficiency, aligning with performance benchmarks in sprint-dominant sports such as football, lacrosse, and baseball (5.23–6.51 s; Kolsky et al., 2010; Nesser et al., 1996). Change-of-direction ability, assessed via the T-Test (10.8 ± 0.5 s), falls within ranges reported for parkour (9.33–10.90 s; Strafford et al., 2021) and is comparable to semi-professional basketball players (9.52–10.90 s; Morrison et al., 2022), though slightly slower than professional cohorts. This discrepancy likely reflects the specific movement patterns of parkour, where rapid lateral displacements are less frequent than in basketball, emphasizing the importance of sport-specific testing. The integration of parkour-specific assessments alongside conventional tests provides a more holistic perspective on functional performance, demonstrating that the discipline not only develops specialized motor skills but also cultivates transferable physical capacities applicable across athletic contexts. The collective evidence from this and previous works solidifies the notion that parkour practice cultivates an exceptional physical profile, particularly in domains of maximal strength, plyometric ability, and sprint acceleration. For coaches and athletes, this underscores the non-negotiable nature of a structured conditioning regimen that systematically develops jumping capacity, sprint speed, and strength, as these qualities form the foundational physical platform upon which technical parkour skills are built and safely executed.

Understanding the relationship between an athlete's inherent body structure and their physical capacity allows for better talent identification and training individualization. While this link is well-established in many sports, it remains significantly under-researched in parkour. The present study highlights specific relationships between anthropometric characteristics and physical performance in parkour. Sp40 was the variable most consistently associated with anthropometric traits. Faster sprint times were strongly linked to lower skinfold thicknesses in the calf ($\rho = -0.828$), biceps ($\rho = -0.668$), thigh ($\rho = -0.566$), and triceps ($\rho = -0.549$), as well as lower adipose–muscle indexes ($\rho = -0.639$ to -0.547). These findings align with studies in sprint and power-oriented athletes, where reduced subcutaneous fat and higher relative muscle mass facilitate more efficient force generation and minimize inertial resistance during high-velocity movements (Barbieri et al., 2017; Menargues-Ramírez et al., 2022). Additionally, positive associations with iliospinal height ($\rho = 0.622$) and trunk muscle distribution ($\rho = 0.550$) suggest that both segmental leverage and core muscularity contribute to sprinting efficiency in traceurs. Jump performance also demonstrated relevant correlations with anthropometry. SLJ distance positively related to arm span ($\rho = 0.616$), acromiale–radiale length ($\rho = 0.667$), and foot length ($\rho = 0.566$), while negatively associating with anterior–posterior chest depth ($\rho = -0.539$). Interestingly, when standing long jump (SLJ) performance was normalized by foot length (SLJ / foot length), participants achieved an average of 10.3 ± 0.9 “feet” of jump distance. Notably, this unit has practical relevance within the parkour community, as traceurs often estimate jumping distances using their own feet as a self-referential and intuitive measurement tool during training. This normalization therefore not only facilitates inter-individual comparison but also reflects an ecologically valid metric rooted in the discipline's practice culture. Comparable normalization strategies have previously been proposed using other anthropometric parameters, such as height or weight (Jarnig, van Poppel, & Kerbl, 2025; Nakai, Usumoto, & Takeshita, 2024; Rojas-reyes, Aedo-muñoz, Prat-luri, José, & Miarka, 2020). Although no significant associations were identified in the present study, calculating a jump-to-height ratio yielded an average of 1.56

± 0.12 , with low variability among participants. These findings suggest that, beyond absolute measures, relative indices, particularly those aligned with practitioners' own experiential references, may offer more meaningful insights for training prescription and goal setting. Furthermore, 3HPJ performance correlated positively with acromiale–radiale length ($\rho = 0.567$) and negatively with chest depth ($\rho = -0.576$). These associations reinforce the importance of limb length and structural geometry in optimizing horizontal and vertical propulsion, echoing observations in gymnasts, jumpers, and sprinters, where longer limbs and favourable lever ratios enhance explosive performance (Seyhan, 2019b; Ziv & Lidor, 2010). CMJ+ showed a negative correlation with the acromio–iliac index ($\rho = -0.544$), indicating that a relatively broader trunk may slightly limit vertical jumping height, potentially due to increased body mass distribution. Interestingly, no significant correlations were observed for the T-Test or 5CUFT with anthropometric variables, suggesting that change-of-direction ability and parkour-specific upper-body tasks may be more influenced by skill, coordination, and technique rather than pure morphology. This highlights the multidimensional nature of parkour performance, where certain capacities are heavily dependent on neuromuscular control and environmental adaptability rather than solely on structural characteristics. Collectively, these results underscore that while body composition and anthropometry significantly influence power- and speed-related tasks, functional skill acquisition remains a crucial determinant of performance in complex, parkour-specific movements, a pattern consistent with findings in gymnastics, climbing, and other agility-demanding disciplines (Croft & Bertram, 2017; Sterkowicz-Przybycień et al., 2019). Furthermore, the Conicity Index (1.1 ± 0.0), which assesses the shift from a cylindrical body shape to a double-cone, aligns with the physiological profile of athletes in sports where a high power-to-weight ratio is critical. Our sample exhibited a mean Relative Arm Span of 101.6%, indicating a "*positive ape index*" where the arm span is greater than stature. This morphological feature is a classic advantage as it may provide a longer lever for swinging movements, improve reach for wall-runs and arm jumps, and aid in climbing. The analysis of segmental indices offers even more granular insights.

The high Leg-Thigh Index (85.0) indicates a long tibia relative to the femur. This proportion is often considered advantageous for jumping and running, as the long lower leg increases the effective lever for the calf muscles, potentially allowing for greater force production at the ankle during take-off, a feature common in jumpers and sprinters (Kwon & Kim, 2025; Tomita et al., 2020). These findings provide an evidence-based rationale for training focus. Traceurs seeking to improve sprint and jump performance may benefit from conditioning that optimizes power-to-weight ratio, with particular attention to managing limb adiposity. Furthermore, coaches can use anthropometric profiling to identify innate strengths. For example, an athlete with a positive ape index and long lower legs might be coached to leverage their reach and leverage in precision jumps and explosive take-offs. Ultimately, the results confirm that while certain morphological traits provide a physical advantage, excelling in the technically complex and adaptable discipline of parkour requires dedicated skill practice that goes beyond optimizing morphology alone.

This study is not without its limitations. The cross-sectional design and modest sample size ($n = 24$ for anthropometry, $n = 15$ for performance) limit the generalizability of the findings and prevent the establishment of causal relationships. Additionally, while the physical tests selected are well-justified, these may not fully capture the complex, dynamic, and context-dependent nature of real-world parkour movements. The inclusion of more ecologically valid, obstacle-based assessments could provide additional insight into the translation of anthropometric traits into functional parkour skill. Future research should aim to recruit larger and more diverse cohorts, including female practitioners and athletes of varying skill levels, and employ longitudinal designs to track how morphological and performance changes co-evolve with structured training.

CONCLUSIONS

In conclusion, this research provides a comprehensive and detailed anthropometric portrait of the male traceur, establishing a profile dominated by mesomorphy, low adiposity, and a powerful musculoskeletal structure. The novel analysis of correlations demonstrates that performance in foundational tasks like sprinting and jumping is significantly influenced by specific morphological traits, particularly low limb skinfolds and advantageous segmental lengths. These findings offer valuable evidence-based insights for traceurs and coaches, highlighting that while parkour is celebrated for its inclusivity, high-level performance in its most power-demanding actions is associated with a distinct and optimized physical constitution. This knowledge can inform more targeted training and talent development strategies within the discipline.

AUTHOR CONTRIBUTIONS

Andoni Elizondo-Donado contributed to the conceptualization and design of the study, participant recruitment, data collection, statistical analysis, interpretation of the results, and drafting of the manuscript. He also coordinated the research process and approved the final version submitted for publication. Josune Rodríguez-Negro contributed to the study design, supervised data collection procedures, supported data interpretation, and critically revised the manuscript. She approved the final version of the manuscript. Javier Yanci contributed to the methodological design, supervised the analytical procedures, assisted in the interpretation of results, and critically revised the manuscript. He approved the final version of the manuscript.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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