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Characterization of competitive match demands in U13 football players using GPS: An exploratory study in a Chilean professional club

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Abstract

Background: Tracking physical effort with GPS has become essential for understanding what modern football demands on the pitch. Even so, few studies describe external physical demands, including positional and high-speed running metrics, in U13 players during official matches in South America, particularly in Chile.

Aims: This study described the external physical load of U13 football players during official Chilean youth league matches using GPS technology.

Methods: We conducted a descriptive observational study with repeated measurements, tracking 19 male U13 players from one Chilean professional club across seven official matches of the 2026 National Children's Opening Championship of Grassroots Football, using 10 Hz SPT2 GPS units.

The unit of analysis was the player-match observation: 50 first-half observations from 19 players (used for positional description) and 21 full-match observations from 10 players who completed both halves. Only 10 players contributed full-match observations because most tracked players were substituted before the end of a match (42% of first-half observations came from players who completed both halves). The main metrics were total distance, speed zones, sprint distance, high-speed running (HSR), maximum speed, and work rate.

Results: In full-match observations, players covered a mean total distance of 6,990 ± 966 meters, with similar mean distances in the first and second halves (3,506 ± 534 vs 3,484 ± 562 m), although individual half-to-half differences were large. In the first half, midfielders showed the highest descriptive values for total distance and work rate, whereas defenders showed the highest sprint distance and HSR; positions were not compared statistically. Mean maximum speed was 26.0 ± 1.1 km/h, with 426 ± 197 meters of HSR and 12.9 ± 7.6 sprints per match. HSR, sprint distance, and effort counts varied widely across observations (coefficients of variation, 46% to 59%) compared with total distance (14%) and maximum speed (4%).

Conclusion: These preliminary data describe the external load of U13 players from one club and should not be generalized beyond this context. The wide variability in HSR and sprint metrics may have practical implications for individualized monitoring, and biological maturity is one possible contributor; neither was evaluated in this study, and both require testing in future research.

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INTRODUCTION

Football is one of the most popular sports globally and relies on a constant mix of low-intensity efforts and explosive actions that put high demands on both the metabolic and neuromuscular systems (Hostrup & Bangsbo, 2023; Schimpchen et al., 2021). As match intensity has steadily increased over recent years (Callau-Arbo et al., 2026), tracking workload has become a routine task for coaching, fitness, and medical staff who aim to support performance and manage fatigue (Robertson et al., 2023), although practitioners perceive the effectiveness of monitoring for injury prevention and performance enhancement as lower than expected (Akenhead & Nassis, 2016).

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While players rely mostly on aerobic metabolism throughout a match, key decisive actions depend on high-intensity anaerobic and neuromuscular output (Crang et al., 2021). In top-level football, players change actions roughly 1,200 to 1,400 times per game, which places football among the most physically demanding intermittent team sports (Hostrup & Bangsbo, 2023); these figures come from top-level players and should not be extrapolated to U13 players. Tactical and physical demands are also relevant at youth levels, where internal training intensity is monitored in relation to player well-being (Silva et al., 2022) and physical attributes differ by playing position (Miçooğulları, 2024).

To track these demands, global navigation satellite system (GNSS) units, commonly referred to as GPS units, have become a standard tool in professional football for measuring physical load during both matches and training (Akenhead & Nassis, 2016; Crang et al., 2021); the term GPS is used throughout this article for consistency with common usage. Combining GNSS with accelerometers, gyroscopes, and magnetometers gives a clear picture of individual output, capturing metrics like total distance, top speed, effort distribution across speed zones, sprint counts, and high-intensity running (Pons et al., 2021; Schulze et al., 2021). FIFA approval for match use has further accelerated the adoption of this technology across different competitive levels (FIFA, 2019).

Because these devices process data in real time, they help staff make practical decisions on adjusting training volumes, structuring recovery, and refining physical preparation (Robertson et al., 2023). This makes GPS technology useful not just in top-tier professional leagues, but also in developmental pathways (Ferraz et al., 2023). In U13 football specifically, GPS tracking can help monitor long-term player development (Algroy et al., 2021; Polo, 2024). It allows staff to build individual performance profiles, manage match loads, and identify physical imbalances possibly related to growth and maturation (Marković et al., 2024; Theodoropoulos et al., 2020). The U13 category corresponds to a period of rapid growth and wide maturational variability. Players of the same chronological age can differ markedly in stature, body mass, strength, and speed (Wik, 2022), and maturity status has been related to selection and playing time in elite youth football (Eskandarifard et al., 2022; Massa et al., 2022). Common absolute speed thresholds may therefore not correspond to high-speed running for every player (Freeman et al., 2023), and growth and maturation have been discussed as factors related to injury in youth football (Wik, 2022). These characteristics, together with the competitive demands, limit the direct extrapolation of reference values from professional or older youth football to this category.

However, data on external loads in U13 categories remain limited, especially for official matches in South American youth competitions. In Chile, Sepúlveda et al. (2024) described positional match intensity in 16 U19 players (17 to 19 years) from a professional club during five matches of the final phase of the national first-division championship, using GPS at 10 Hz; their findings were obtained in older players and cannot be extrapolated to U13 players. Match-play movement has also been analyzed in U13 to U15 players in New Zealand and in U14 players in Norway (Algroy et al., 2021; Atan et al., 2016). To our knowledge, official-match GPS data for U13 players in Chile, including descriptive positional values and high-speed running metrics, have not been reported. Differences in pitch surfaces, half lengths, and overall match tempo could limit the direct applicability of European benchmark data to this region.

This study describes the external physical load of U13 football players across seven official matches of the 2026 National Children's Opening Championship of Grassroots Football using GPS devices. The specific objectives were (i) to describe the full-match external load of players who completed both halves; (ii) to describe first-half external load by playing position; and (iii) to compare descriptively the mean distance covered in the first and second halves. By recording variables such as total distance, high-intensity running, sprint distance, and maximum speed, the study aims to provide preliminary, context-specific data on match demands in Chilean youth football that can inform the design of age-appropriate training programs.

METHOD

Study Design and Sample

We conducted a descriptive observational study with repeated measurements using non-probabilistic convenience sampling. The research took place at a professional club in south-central Chile that currently plays in the Primera B promotion league. Nineteen male U13 players competing

in the 2026 National Children's Opening Championship of Grassroots Football (organized by the ANFP) were tracked during seven official matches played between 14 March and 10 May 2026. Players were recruited through the club after it authorized the study. Eligibility criteria were registration in the club's U13 squad for the championship, written parental or guardian consent with player assent, and no injury restricting match play. This national tournament is structured into regional divisions, with the southern zone including eight U13 teams. Each of the 19 players (whole team; goalkeepers (n=2) were excluded from the study) had their external load recorded in at least one match (1 to 6 matches per player); any players with physical injuries that restricted match play were excluded. The unequal number of matches per player reflects differences in playing opportunities (rotation and substitutions, as allowed by the competition rules), the availability of ten tracking units per match, and the playing-time decisions of the coaching staff who decided which players wore the tracking devices; the authors had no influence in these decisions. Because substitutions and player rotation are frequent in children's competitions, as allowed by the competition rules, not all tracked players completed both halves: 21 of the 50 first-half observations (42%) belonged to players who completed both halves, and only 10 of the 19 players did so in at least one match. Anthropometric data were available for 16 of the 19 players, and Table 1 outlines their characteristics.

Procedure

We obtained authorization from the club after presenting the study's aims and protocols. Participation was voluntary, and players could withdraw at any time without consequences. Parents or legal guardians signed informed consent forms, and players signed assent forms following the principles of the Declaration of Helsinki. The Ethics Committee at Universidad Católica del Maule approved the study protocol (Minute No. 139/2024); the approval covers the data collection reported here, which took place in 2026. We tracked external load across seven official league matches, with all data collection handled by trained evaluators experienced with the specific equipment and testing protocols.

Body Composition

Body mass, skeletal muscle mass (SMM), and body fat percentage were measured using an InBody 120 bioelectrical impedance analyzer (Arlington Heights, IL; capacity 5–250 kg, accuracy 0.1 kg) following suggested manufacturer protocols: early morning, fasted, before training session; participants wore their lightweight training clothes. Height was measured using a Seca 213 portable stadiometer (Hamburg, Germany; accuracy 0.1 cm) with players aligned in the Frankfurt plane. Body mass index (BMI) was calculated as body mass divided by height squared.

GPS Data Collection

External load was tracked using SPT2 units (SPT Group Pty Ltd., Melbourne, Australia) approved under the FIFA Quality Programme for EPTS (FIFA, 2019). Before each match, units were activated at least 15 minutes before the match in order to acquire a proper satellite signal; satellite reception and signal loss were monitored according to the user manual of the devices, and recordings with invalid data were checked by the researchers. These devices feature 10 Hz GNSS tracking combined with an accelerometer, gyroscope, and magnetometer, and were worn in fitted vests positioned between the players' shoulder blades. Ten units were available and were distributed among the players selected by the coaching staff; no player had a dedicated unit, so between 4 and 10 players were tracked per match. The authors had no influence on this selection. Tracked first-half observations were distributed as defenders 40%, midfielders 34%, and forwards 26%, and all three positions were represented in six of the seven matches; however, because tracking depended on unit availability and on which players took part in each match, selection toward certain positions or performance profiles cannot be fully excluded. Data were processed through the Gametraka platform. Work rate (m/min) was calculated by the platform as the total distance divided by registered playing time (including added time; m/min); it therefore reflects individual playing time and differs slightly among matches. Matches took place on full-size synthetic turf pitches with 40-minute halves. Speed zones followed the default settings on the platform: walking (Z1, <3.8 km/h), jogging (Z2, 3.8 to <10 km/h), running (Z3, 10 to 18 km/h), and sprinting (Z4, >18 km/h), which were

chosen for comparability with thresholds used in previous research on young players (Algroy et al., 2021; Atan et al., 2016; Dwyer & Gabbett, 2012). Absolute thresholds allow comparison with earlier youth match-analysis studies, but they may classify relative intensity differently among players with different maturity and fitness; in highly trained U13 to U18 players, the distance covered above individual maximal aerobic speed was greatest in the youngest groups (Mendez-Villanueva et al., 2013). The zone distances reported here are therefore interpreted as absolute external load, not as relative intensity. Sprint distance is the distance covered in Z4. A sprint or HSR effort was counted when the player remained above the corresponding threshold for at least 1 second, following the platform settings. High-speed running (HSR) was defined as any distance covered above 16.2 km/h and therefore includes sprint distance; the two variables are not additive. The 16.2 km/h value (4.5 m/s) was used as an absolute criterion by default in the proprietary platform. It is numerically close to the lowest maximal aerobic speeds (4.43 to 5.05 m/s, about 15.9 to 18.2 km/h) reported in 17 male academy players aged about 20 years (Kavanagh et al., 2023); that study did not validate a fixed HSR threshold or include U13 players, and argued instead for individualized thresholds. Because individual aerobic capacity was not measured here, the threshold does not represent each player's own maximal aerobic speed, and HSR is interpreted as an absolute-speed metric. Maximum speed was the peak speed recorded in each observation.

Statistical Analysis

Data are presented as mean ± standard deviation (SD) alongside minimum and maximum values; for full-match data, medians and interquartile ranges (IQR) are also reported (Table 4). The Shapiro-Wilk test was used only to describe the distribution of the anthropometric variables, and exact p-values are reported. The unit of analysis was the player-match observation (one player in one match). First-half external load metrics are broken down by position using all first-half observations: defenders (20 observations from 7 players), midfielders (17 observations from 7 players), and forwards (13 observations from 6 players); one player appeared in two positions, so the 50 first-half observations came from 19 different players. Full-match data include only observations of players who completed both halves of a match (21 observations from 10 players). Only 10 of the 19 players contributed because most tracked players were substituted before the end of a match, as described in Study Design and Sample. Because the same players contributed repeated observations, the observations are not statistically independent; pooled summaries are therefore descriptive, and player-level means (n = 10) are provided as a sensitivity summary (Table 4). In the pooled summaries, each observation has the same weight, so players with more observations contribute more to the means (two players contributed 10 of the 21 full-match observations) and the pooled values may reflect their characteristics more than those of the other players. Player-level means give each player equal weight, and the player is the unit that can be considered independent, so comparing both summaries shows whether the pooled values depend on the players with most observations; because each player-level mean rests on only 1 to 5 observations, this comparison is a descriptive check and not an inferential analysis. No inferential comparisons between positions or halves were performed. Analyses were conducted in R software (R 4.6.1; R Core Team, 2026) and JASP version 0.96 (JASP Team, 2026).

RESULTS AND DISCUSSION

Results

Table 1 outlines the physical and body composition profile of the 16 players with anthropometric data (not available for 3 of the 19 tracked players due to absence on the evaluation day). These three players contributed GPS observations (5 of 50 first-half and 2 of 21 full-match observations). Mean age at the date of the first match was 12.8 years. Body mass and height varied considerably across individual players (Table 1).

Table 1. Characterization of the Sample (n = 16 Players with Anthropometric Data). M ± SD; Min–Max

Variable	n	M ± SD	Min	Max	W (p)
Age (years)	16	12.8 ± 0.4	12.1	13.4	0.967 (0.787)
Body mass (kg)	16	52.2 ± 10.1	35.3	72.1	0.977 (0.930)

Variable	n	M ± SD	Min	Max	W (p)
Height (cm)	16	159.9 ± 10.9	143	173	0.894 (0.064)
BMI (kg/m^2)	16	20.2 ± 1.9	17.0	24.1	0.916 (0.146)
SMM (kg)	16	23.2 ± 5.2	15.8	33.1	0.944 (0.399)
% Fat mass	16	14.4 ± 6.8	5.0	26.4	0.937 (0.318)

SD: standard deviation; BMI: body mass index (mass/height^2); SMM: skeletal muscle mass; W (p): Shapiro-Wilk statistic and exact p-value. Age is decimal age at the date of the first match (14 March 2026). Anthropometric data were available for 16 of the 19 tracked players.

Table 2 shows the external load recorded during the first half across playing positions, based on 50 player-match observations from 19 players (defenders: 20 observations, 7 players; midfielders: 17 observations, 7 players; forwards: 13 observations, 6 players; one player appeared in two positions). Midfielders showed the highest average values for total distance, jogging and running distances, and work rate, whereas defenders showed the highest averages for sprint distance and high-speed running, and forwards reached the highest average maximum speed. Across positions, the variability (SD relative to the mean) of sprint distance, HSR, and effort counts was greater than that of total distance, whereas maximum speed was the least variable metric. Because this study is descriptive, the number of players per role is small, and the same players contributed several observations; these positional patterns are descriptive only, were not statistically tested, and should not be taken as evidence of systematic positional effects.

Table 2. External Load Variables in the First Half of Play by Playing Position (50 Player-Match Observations from 19 Players). M ± SD

Variable	Defense (20 obs.) M ± SD	Midfield (17 obs.) M ± SD	Forward (13 obs.) M ± SD
Z1 – Walking (m)	632 ± 150	539 ± 104	648 ± 128
Z2 – Jogging (m)	1842 ± 412	2003 ± 321	1777 ± 391
Z3 – Running (m)	932 ± 353	1187 ± 268	907 ± 278
Z4 – Sprint (m)	150 ± 93	81 ± 57	136 ± 69
Total distance (m)	3556 ± 761	3810 ± 498	3468 ± 603
Maximum speed (km/h)	25.6 ± 1.5	25.1 ± 1.6	26.4 ± 1.0
No. Sprints	7.8 ± 4.7	4.4 ± 3.1	7.1 ± 3.9
HSR (m)	260 ± 143	162 ± 81	236 ± 88
No. HSR	15.1 ± 7.9	7.9 ± 5.0	13.5 ± 4.9
Work rate (m/min)	83.8 ± 16.5	91.1 ± 10.8	81.0 ± 12.9

Z1: <3.8 km/h; Z2: 3.8 to <10 km/h; Z3: 10 to 18 km/h; Z4–Sprint: >18 km/h; HSR: high-speed running (>16.2 km/h; includes Z4 distance); No. Sprints and No. HSR: number of sprint and HSR efforts; obs.: player-match observations (defenders: 20 from 7 players; midfielders: 17 from 7 players; forwards: 13 from 6 players); Work rate: total distance divided by registered playing time (including added time; m/min).

Table 3 presents the output of the 21 observations from the 10 players who completed both halves (1 to 5 observations per player). Mean total distance was about 7,000 meters, and mean distances in the first and second halves were similar (3,506 ± 534 vs 3,484 ± 562 m; mean difference of about 23 m). Individual half-to-half differences (second-half minus first-half distance; negative values indicate less distance in the second half) were large (range, −946 to +901 m; SD of the differences, 519 m) and were negative in 13 and positive in 8 of the 21 observations (Figure 1); therefore, similar mean distances do not indicate stable pacing or the absence of fatigue at the individual level. HSR, sprint distance, and sprint and HSR counts showed substantial variability across observations (coefficients of variation of about 46% to 59%), compared with about 14% for total distance and about 4% for maximum speed. Medians were generally close to the means, and player-level means (n = 10) gave similar mean values with smaller SDs (Table 4), as expected when repeated observations from the same player are averaged. The pooled mean total distance (6,990 m) was lower than the mean of the player-level averages (7,210 m) because pooled values give more

weight to the two players with five observations each (10 of the 21 observations), whose mean total distances (6,974 and 6,858 m) were lower than the average of the other eight players (7,283 m).

Table 3. External Load Variables: Full Match (21 Player-Match Observations from 10 Players). M ± SD; Min–Max

Variable	n	M ± SD	Min	Max
Distances by playing time				
Distance 1H (m)	21	3506 ± 534	2314	4702
Distance 2H (m)	21	3484 ± 562	2328	4424
Total distance (m)	21	6990 ± 966	5529	9126
Speed zones				
Z1 – Walking (m)	21	1360 ± 294	956	1915
Z2 – Jogging (m)	21	3626 ± 590	2540	4874
Z3 – Running (m)	21	1762 ± 572	955	2923
Z4 – Sprint (m)	21	242 ± 134	62	554
Intensity indicators				
Maximum speed (km/h)	21	26.0 ± 1.1	23.3	27.8
No. Sprints	21	12.9 ± 7.6	2	30
HSR (m)	21	426 ± 197	155	964
No. HSR	21	24.1 ± 11.7	5	54
Work rate (m/min)	21	82.3 ± 10.9	65.8	106.1

Z1: <3.8 km/h; Z2: 3.8 to <10 km/h; Z3: 10 to 18 km/h; Z4–Sprint: >18 km/h; HSR: high-speed running (>16.2 km/h; includes Z4 distance); No. Sprints and No. HSR: number of sprint and HSR efforts; Work rate: total distance divided by registered playing time (including added time; m/min).

Table 4. Full-Match External Load: Player-Match Observations and Player-Level Means (Sensitivity Summary)

Variable	Observations (n=21) M ± SD	Observations (n=21) Median [IQR]	Player means (n=10) M ± SD
Distance 1H (m)	3506 ± 534	3356 [3215–3726]	3601 ± 297
Distance 2H (m)	3484 ± 562	3563 [3011–3837]	3609 ± 334
Total distance (m)	6990 ± 966	6978 [6157–7507]	7210 ± 529
Z1 – Walking (m)	1360 ± 294	1346 [1064–1609]	1332 ± 164
Z2 – Jogging (m)	3626 ± 590	3639 [3197–4029]	3768 ± 335
Z3 – Running (m)	1762 ± 572	1638 [1470–2149]	1873 ± 417
Z4 – Sprint (m)	242 ± 134	212 [154–276]	237 ± 73
Maximum speed (km/h)	26.0 ± 1.1	26.0 [25.3–26.8]	26.2 ± 0.9
No. Sprints	12.9 ± 7.6	13.0 [8.0–18.0]	13.4 ± 5.1
HSR (m)	426 ± 197	429 [300–506]	426 ± 89
No. HSR	24.1 ± 11.7	23.0 [16.0–31.0]	23.6 ± 7.0
Work rate (m/min)	82.3 ± 10.9	84.4 [73.4–88.5]	85.0 ± 6.2

Player means: mean of each player's observations (1 to 5 per player), then mean ± SD across the 10 players. IQR: interquartile range. Other abbreviations as in Table 3. Pooled and player-level means differ because pooled means weight each player by the number of observations (see Results).

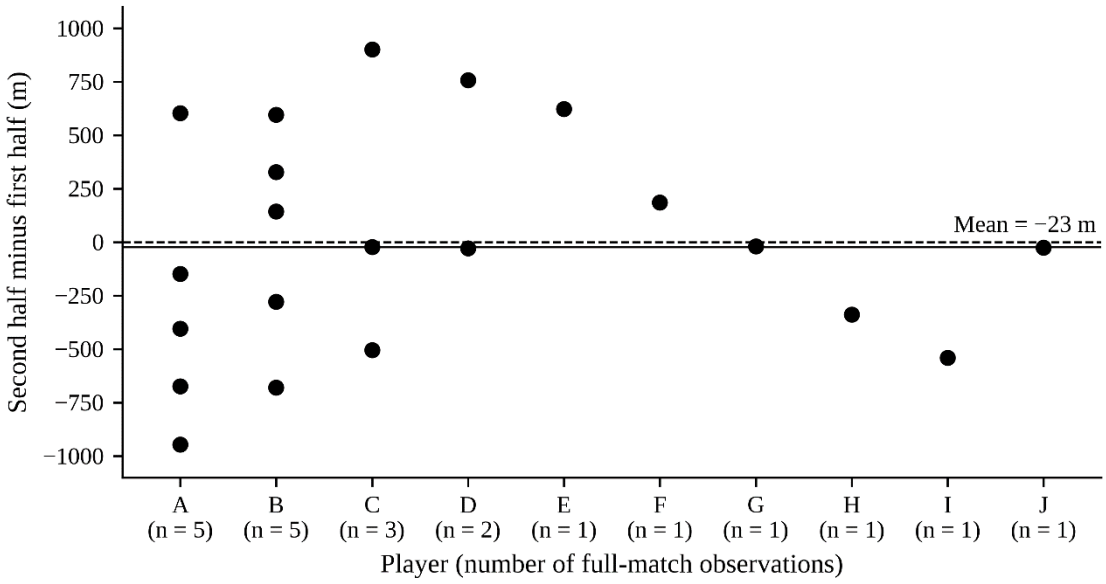


Figure 1. Individual half-to-half differences in distance covered (second half minus first half) in the 21 full-match observations from 10 players. Each dot is one observation; players are ordered by number of observations. Solid line: mean difference (−23 m); dashed line: no difference.

Discussion

This study aimed to describe the match loads of Chilean U13 football players during official competitive play using GPS units. Overall, full-match observations showed a mean of roughly 7,000 meters per match with similar mean distances in both halves, alongside position-specific descriptive patterns related mostly to high-intensity work. HSR, sprint distance, and sprint and HSR counts also showed more variability, relative to their means, than total distance (coefficients of variation of about 46% to 59% vs 14%), whereas maximum speed was the least variable metric (about 4%). Previous studies suggest that growth and biological maturation could contribute to this variability; however, maturation was not assessed in this study, and other factors such as fitness, playing role, playing time, and match context may also contribute.

The overall distances recorded are comparable to those reported in youth football. Algroy et al. (2021) reported a mean total distance of 7,645 ± 840 m in Norwegian U14 players (7,590 to 7,952 m depending on competitive level). The mean of 6,990 m recorded here is about 650 m (9%) lower, although within one standard deviation of that mean; comparisons are limited by differences between studies in age, match format and duration, speed thresholds, competitive level, and unit of analysis. Physical loads appear to increase with age in youth football, specifically relative distance per minute, high-speed running, and sprint work (Riboli et al., 2022; Vieira et al., 2019).

The average work rate measured here (82.3 m/min) is lower than rates reported for older academy tiers (approximately 90 to 120 m/min; Riboli et al., 2022), although work rate in this study was calculated over each player's registered playing time, including added time, which may differ from the definitions used in other studies and limits direct comparison. Likewise, mean high-speed running (426 m) and sprint distance (242 m) appear lower than values generally reported for older youth categories (Vieira et al., 2019), but differences in speed thresholds and match duration limit direct comparison.

The players also differed widely in body mass (35.3 to 72.1 kg) and stature (143 to 173 cm). Although the relationship between these characteristics and the variability in HSR and sprint metrics was not assessed, previous research in highly trained U15 players found that maturation had the greatest impact on match running performance, including distance above 16 km/h, particularly in attacking players (Buchheit & Mendez-Villanueva, 2014), and maturation has also been related to selection and playing time in elite youth players (Eskandarifard et al., 2022; Massa et al., 2022). This hypothesis cannot be confirmed with the present data, because fitness, tactical role, playing time, and match context could also contribute.

Positional trends in the data are partly consistent with previous research. In the first half, midfielders showed the highest total distance, running distance, and work rate, which is consistent with studies in U14 to U17 categories highlighting their continuous involvement in linking play and keeping ball possession (Algroy et al., 2021; Miçooğulları, 2024). Defenders showed the highest high-speed running and sprint distance, and forwards reached the highest top speeds. In adult professional football, the largest high-intensity distances usually correspond to wide players and forwards, and central defenders show the lowest values (Di Salvo et al., 2007, 2009); however, because all defenders were grouped in a single category here, without distinguishing central defenders from full-backs, this comparison should be interpreted with caution. In U19 players from a Chilean professional club, forwards showed the highest match intensities (Sepúlveda et al., 2024), which differs from the higher HSR and sprint distance of defenders in our first-half data; differences in age, competition, thresholds, and sample size prevent direct comparison. A possible explanation, not tested here, is that youth players rotate roles more often and have less fixed tactical duties (Polo, 2024). These patterns could also reflect team formation (Aquino et al., 2017; Vilamitjana et al., 2021), opponent level and match location (Morgans et al., 2025), or the score and match outcome (Augusto et al., 2022), none of which was recorded here. Moreover, these observations come from a small number of players per position who contributed repeated observations and were not tested statistically. Full-match values correspond to a subgroup of players with more playing time and should not be taken as representative of the whole squad or compared directly with the first-half positional values.

Implications

The present results directly support only a descriptive use: they provide preliminary reference information on the match demands of U13 players who completed the match (about 7 km, 430 m of HSR, 13 sprints, and a peak speed of about 26 km/h per match), together with evidence of wide variability among observations, which suggests complementing group averages with individual data. Recommendations on individualized monitoring come from previous literature, not from the present data. Absolute speed cutoffs for high-speed running or sprinting may distort the actual workload recorded for players at different maturity levels (Freeman et al., 2023); absolute thresholds were used in this study, individualized thresholds were not evaluated, and maturity status was not assessed, which limits the interpretation of individual demands. According to previous studies, relative speed metrics tailored to each player's physical profile may provide a more appropriate representation of individual external load (Kavanagh et al., 2023; Mendez-Villanueva et al., 2013), especially in U13 groups where biological growth differences between teammates can be large; this recommendation was not tested in the present study. Positional differences should be interpreted with caution given the small number of players per position and the absence of statistical analysis. On a practical level, these data offer preliminary descriptive information for coaches and fitness staff who aim to align training sessions with match demands in Chilean youth football.

Research Contribution

This study adds descriptive data for a region rarely featured in existing literature. Most published research on youth match loads originates in Europe, Oceania, or North America, leaving South American and Chilean youth setups largely unstudied, with few exceptions (Sepúlveda et al., 2024). To our knowledge, these are among the first official match GPS data for U13 players in Chile that include descriptive positional values and high-speed running metrics. For coaches and fitness staff, these values give an order of magnitude of the match demands of U13 players who complete a match (about 7 km, 430 m of HSR, and 13 sprints), show that individual demands varied widely, and suggest that team averages should not be used as a single target for all players. For researchers, the data illustrate how unequal exposure and repeated observations affect summary statistics, provide variability estimates (SDs and coefficients of variation) that can inform sample-size planning for multi-club studies, and show the importance of reporting the time base used for work rate. The speed thresholds used are similar to those reported in earlier youth studies (Algroy et al., 2021; Atan et al., 2016), which allows partial comparison with international data, although differences in definitions remain and should not be directly compared. The data also raise the question of whether biological maturation contributes to the variability in HSR and sprint metrics, and the study illustrates how

device availability and substitutions limit individual follow-up. The values are preliminary and context-specific (one club, seven matches) and may serve as a starting point for future tracking across age brackets and maturation stages.

Limitations

Several study constraints should be kept in mind when reading these results. All participants came from a single club in south-central Chile, and the data come from seven matches, which limits how broadly these figures apply across other regions or competitive tiers. The design was descriptive and observational, so it captured match loads without establishing cause-and-effect relationships or tracking changes across an entire season. The same players contributed repeated, non-independent observations with unequal contributions (1 to 6 per player in the first-half data; 1 to 5 per player in the full-match data, where two players contributed 10 of the 21 observations), and because only 10 units were available, between 4 and 10 players were tracked per match. Because tracking depended on unit availability and on which players took part in each match, selection toward certain positions or performance profiles cannot be fully excluded. Full-match averages describe players who completed both halves and therefore had more playing time; whether they were starters was not recorded. Because maturation and fitness have been related to minutes played in elite youth football (Eskandarifard et al., 2022), this subgroup may over-represent more mature or fitter players. Midfielders contributed only 2 of the 21 full-match observations, and the pooled mean total distance (6,990 m) was about 3% lower than the mean of player-level averages (7,210 m), showing that the pooled values are sensitive to the players with the most observations. Substitutes and players with less playing time are not represented, so the net direction of any bias cannot be determined, and the averages should not be taken as representative of the whole squad. Positional analysis was limited to the first half, and the number of players per position was small, so positional comparisons remained purely descriptive rather than statistically tested; defenders were also grouped in a single category without distinguishing central defenders from full-backs. Absolute speed thresholds were used, and individual aerobic capacity was not measured. Work rate was calculated over each player's registered playing time, including added time, which limits comparison with studies that define playing time differently. Years of experience, training methodology (including weekly training sessions), and competitive level were not reported. Biological maturation was not assessed, and game context (such as scoreline, opponent strength, tactical formations, position changes, and match location) was not factored into the analysis.

Suggestions

Follow-up studies should recruit larger cohorts across multiple clubs and geographical regions and monitor players over one or more seasons. They should adopt standardized GPS protocols (explicit thresholds, recording of minutes played, and contextual variables), assess maturation directly or estimate it (for example, percentage of predicted adult height or years from peak height velocity), and use mixed-effects models with player (and match) as random effects to separate individual development, position, and match-to-match variability.

CONCLUSION

This descriptive study provides preliminary reference values for the external load of U13 players in official matches of one Chilean professional club. In full-match observations, players covered about 7,000 m per match, with similar mean distances in both halves but large individual half-to-half differences. These values are somewhat lower than those generally reported for older academy categories. HSR, sprint distance, and sprint counts showed much greater relative variability than total distance, whereas maximum speed was the most stable variable (CV about 4%). Full-match averages correspond to a subgroup of players with more playing time and do not necessarily represent the whole squad. As a possible practical implication, not a conclusion derived from the analysis, this variability suggests that individualized load monitoring could be worth considering; the usefulness of individualized monitoring and the possible influence of biological maturation were not evaluated and should be examined in future studies that measure maturation directly. These results are specific to this context and should not be generalized to Chile or South America as a whole.

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AUTHOR CONTRIBUTION STATEMENT

AA and JM: Conceptualization, Methodology. HR and JM: Investigation. RS, JM and HR: Formal analysis. AA, JM and HR: Writing original draft. RS: Writing original draft (translation into English). All authors: Writing, review, and editing.

AI DISCLOSURE STATEMENT

The authors declare that ChatGPT (OpenAI; GPT-5.6 Terra, July 2026), an AI language model, was used solely in the English-language translation and editing stage, limited to correcting grammatical errors and refining sentence structures of text written by the authors. In addition, during the revision of the manuscript in response to peer review, Claude (Anthropic; model Claude Sonnet 5.5, accessed through the claude.ai web interface, October 2026) was used to assist with checking the consistency between the manuscript and the data files, recalculating descriptive statistics, and drafting revised English wording; the authors independently recalculated all values reported in the tables from the raw Gametraka exports using R software, JASP v0.96, and Microsoft Excel, and the results matched. All ideas, analyses, interpretations, and academic content are the authors' own. The authors take full responsibility for the content of the publication.

CONFLICTS OF INTEREST

The authors confirm the absence of any potential conflicts of interest—financial, institutional, or personal—that could influence the conduct of this study, the analysis of data, the preparation of the manuscript, or its publication. The tracking devices were institutional equipment of the university program, and the authors have no financial or commercial relationship with the device manufacturer or software provider.

ETHICAL APPROVAL

The study protocol was reviewed and approved by the Ethics Committee of Universidad Católica del Maule, Chile (Approval No. 139/2024). Ethical approval was granted in 2024, prior to data collection conducted in 2026. The study was conducted in accordance with the ethical principles of the World Medical Association Declaration of Helsinki and the applicable institutional ethical guidelines.

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