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Original Investigation

Does maturity status affect the mechanical response to high-speed running activities during international youth football match play?

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Abstract

Background: Alterations in running mechanics during Football match play have been associated with an increased risk of injury for youth athletes. **Objectives:** To assess maturity status on youth football players' gait outputs during match play and to examine within- and between-match observations. **Methods:** Players (N= 147) anthropometric data (14.35 ± 1.33 years, height 166.28 ± 8.80 cm, weight 56.24 ± 10.85 kg; Seated height 89.14 ± 5.28 cm) were collected prior to the start of the tournament during familiarisation sessions). All matches were monitored using foot-mounted inertial measurement units (F-IMU; Playermaker™) to quantify the gait metrics (contact time, flight time, stride length), with estimations of vertical stiffness presented. Data were analysed using a linear mixed model. Statistical significance was accepted as $p \leq 0.05$, and effect size was calculated using partial eta-squared (η^2). Magnitude of effect sizes was *small* ($0.2 < ES < 0.6$), *moderate* ($0.6 < ES < 1.2$), *large* ($1.2 < ES < 2$) and *very large* (≥ 2). **Results:** No significant between-game differences in gait symmetry or cadence across the tournament. Meaningful within-game increases in contact duration asymmetry emerging as early as the second phase of match play ($p > 0.01$; Moderate to large effect sizes). Post-PHV players demonstrated greater odds of exceeding a 5% asymmetry threshold compared with their Pre-PHV counterparts. **Conclusion:** Within-match increases in contact time and contact duration asymmetry were evident during high speed running activities as early as the second phase of match play for all maturity groups. Future research should examine the longitudinal relationship between in-match gait asymmetry, biological maturation, and injury incidence.

Keywords: International Football, gait, maturation, fatigue

Introduction

Alterations in running mechanics during Football match play have been associated with either a performance enhancement or an increased risk of injury.¹⁻³ Understanding why and how an athlete alters their running mechanics can help practitioners provide better support within their training programme.² However, assessments for monitoring alterations in running mechanics have been limited to profiling closed environment activities on an individual athlete basis, given the required methods adopted (i.e., video recordings, motion analysis), which are unable to be applied within open environments such as match play.^{2,4} Recent technological advancements in wearable technologies, such as Isoinertial Measurement Unit (IMU) devices, may extend running mechanics insights into open environments.² Promisingly, foot-mounted inertial measurement units (F-IMUs) have demonstrated good levels of validity and reliability to quantify locomotor metrics^{5,6} and gait-based metrics such as contact time, flight time and stride length.⁷⁻⁹ Recent work has demonstrated the feasibility of utilising F-IMUs to quantify both technical and locomotor outputs during international youth tournament match play, highlighting substantial within-match differences and high inter-individual variability in youth populations.¹⁰ However, movement patterns and physical performance in youth populations are significantly influenced by developmental changes owing to biological maturation,⁴ and therefore, the influence on gait characteristics during match play and congested fixtures remains unknown.

In youth sport, the impact of biological maturation is greatest surrounding peak height velocity (PHV), which signifies a time of substantial morphological and neuromuscular change, characterised by rapid increases in limb length, body mass and alterations in segmental inertia.^{11,12} These rapid structural changes may disrupt previously established motor coordination patterns, resulting in transient alterations in movement mechanics. Previous literature has demonstrated that maturity status can influence sprint performance, stride characteristics and lower-limb stiffness regulation.¹³⁻¹⁵

The period surrounding PHV has been related to the phenomenon of ‘adolescent awkwardness’ in that transient alterations in coordination and movement efficiency are observed.^{4,14,16,17} During this time, neuromuscular control may lag behind rapid skeletal growth, potentially altering spatiotemporal gait parameters such as contact time, flight time and stride length.⁴ Reductions in movement economy and altered force attenuation strategies have also been reported during this period,^{12,13} suggesting that

stiffness modulation and impact loading characteristics may be affected, increasing the risk of potential injury.

Despite these associations with injury risk, much of the existing evidence examining interactions between biological maturation and movement mechanics has been derived from controlled, closed-environment assessments such as laboratory-based sprinting, jump testing or motion capture protocols.^{13,15} While these approaches provide detailed biomechanical insight, they may lack ecological validity when attempting to understand locomotor behaviour during the highly variable and unpredictable demands of competitive match play.⁷ Football match running is characterised by frequent accelerations, decelerations, multidirectional movements and fluctuating intensities, which may interact differently with maturation compared to linear, pre-planned testing conditions.¹⁸ Consequently, there is a need to investigate whether maturity-related alterations in gait mechanics are observable within open, match-based environments.

Therefore, the purpose of the present study was to examine the influence of biological maturation on gait characteristics during competitive international youth Football match play using F-IMU. A secondary aim was to explore within- and between-match variability in gait parameters across maturation.

Methods

Participants

A total of 147 football players (14.35 ± 1.33 years, height 166.28 ± 8.80 cm, weight 56.24 ± 10.85 kg; Seated height 89.14 ± 5.28 cm), from nine Oceania countries, competed at a U15 Male tournament (April 2025). Squad sizes for each country were either 16 ($N = 7$) or 18 ($N = 2$). Both Oceania FA and the individual countries provided their consent and voluntarily enrolled in this study. The study attained ethical approval (AUT; **25/92**). One player ($N = 1$) was excluded from the study, as they did not participate in any match play.

Experimental Design

Before the tournament, all countries and their representatives were invited to attend an online familiarisation session, outlining the protocol during the tournament. During the international tournament, all teams arrived within 48 hours of the first round of fixtures. The day before the first match, as part of their team's training, players and staff were familiarised with the procedures for data collection and walked through them with members of the research team. On this training day, all players' heights, seated heights and weights were taken to calculate the maturity status of the players.

As part of the match day procedure, teams were fitted with foot-mounted IMU devices (Playermaker; See below for further details) at a designated location outside the changing room, 1 hour before kick-off. Each team was then permitted to warm up 45 to 15minutes before kick-off. This warm-up was team-led, with no input from the research team, to maintain the descriptive nature of the study. Players would then go through their final preparations and return to the field of play 5 minutes before kick-off for national anthems and handshakes. Each game consisted of 3 periods of 25 minutes, with a penalty shoot-out at the end of each game, regardless of the result. Breaks between each period were planned to be 10 minutes in duration. At the end of the match, players and staff returned to the designated area, with all devices returned. Due to the developmental nature of the tournament, players regularly changed positions within and between games. For this purpose, positional data was excluded from the current study, with only outfield players included in the analysis. A total of 17 matches were monitored throughout the tournament, with teams playing an average of 5 games across 8 days, with 1 rest day on average between games.

Biological maturity estimation

Biological maturity status was estimated using the maturity ratio method proposed by Fransen et al.¹⁹ The Fransen method was selected because it has demonstrated improved classification accuracy compared with traditional maturity offset equations in adolescent athletes²⁰ and provides a practical, non-invasive approach for large-scale field-based studies involving international youth cohorts. Prior to the tournament, standing height, seated height, body mass and chronological age were collected by trained researchers following standard anthropometric procedures.^{19,21} Standing and seated height were

measured to the nearest 0.1 cm using a portable stadiometer, while body mass was recorded to the nearest 0.1 kg using calibrated digital scales. Leg length was subsequently calculated as standing height minus seated height. All anthropometric data was measured by two ISAK accredited researchers, with both confirming the measurement.

These anthropometric variables, alongside chronological age, were entered into the Fransen maturity estimation equation to derive a maturity ratio. From this ratio, estimates of age at peak height velocity (APHV) and maturity offset (MO; years from PHV) were calculated. Maturity offset values were used to classify players into biological maturity groups: Pre-PHV (< -1.0 years from PHV), Circa-PHV (-1.0 to +1.0 years from PHV), and Post-PHV (> +1.0 years from PHV). These classifications have previously been used to examine maturation-related differences in youth football populations.²⁰

Inertial Measurement Units

Technical actions and Locomotor activities were quantified using commercially available F-IMUs (PlayerMaker™, Tel Aviv, Israel). Each F-IMU incorporated two components from the MPU-9150 multi-chip motion tracking module (InvenSense, California, USA), being a 16 g triaxial accelerometer and a 2000°•sec-1 triaxial gyroscope. Housed in manufacturer-supplied, tightly fitting silicone straps, each player was equipped with two IMUs (one for each foot), which were located above the lateral malleolus on the football boot. To diminish issues related to inter-unit reliability, it was aimed that players used the same F-IMUs throughout the data collection period.^{22,23} All devices were activated via a Bluetooth connection to an iPad (Apple Inc, California) before each match. Data were uploaded to the manufacturer's cloud-based software (v.3.22.0.02) post-session by members of the research team. The start and end of each match were identified by the system's artificial intelligence system, with researchers verifying these times, along with substitutes, prior to data being exported from the manufacturer's cloud-based software into Microsoft Excel 365.

Gait Metrics

The foot-mounted IMU's detects the orientation and translation of the participants limbs during their gait cycle, allowing the detection of heel strike, toe-off, zero-velocity and non-gait patterns.^{4,6} Using these phases of the cycle, contact time (heel strike to toe-off), flight time (toe-off to the next heel strike/contact), stride length (the distance between each subsequent heel strike) was calculated per limb.⁴ Using estimation algorithms utilising gait metrics, individuals body mass, height and limb length, both leg stiffness and vertical stiffness were reported.^{4,24,25} Using the uni-lateral limb outputs, symmetry metrics were calculated to assess the differences between limbs.

Statistical Analysis

Before the analysis, Q-Q plots and stem and leaf charts were monitored to check for normal distribution, with no visual deviation from normality observed. Assumptions of normality were further assessed with boxplots of the residuals and a scatterplot of the predicted values. A linear mixed model was then used to assess the differences between match play periods for the technical and locomotor activities. General linear models were able to account for the different numbers of samples for each team and individual player during match play. Post-hoc pairwise comparisons, with Sidak-adjusted p-values, were conducted in the event of a statistically significant F-ratio. Analyses were completed using IBM SPSS Statistics for Windows software (release 20; SPSS Inc., Chicago, IL, USA). Two-tailed statistical significance was accepted as $p \leq 0.05$, and measures of effect size were calculated using partial eta-squared (η^2). Magnitude of the effect sizes was *small* ($0.2 < ES < 0.6$), *moderate* ($0.6 < ES < 1.2$), *large* ($1.2 < ES < 2$) and *very large* (≥ 2).

Results

After removing missing values and substituting data, there were 1055 data sets for gait-derived metrics. No differences for gait metrics across maturity age groups, between different games during the tournament were identified within the model. For absolute outputs within games,

the gait metrics are presented for overall, high-speed running and sprint speed thresholds (Figure 1). Meaningful within-game increases in contact duration asymmetry are evident during the second phase of match play across all maturity groups (Figure 2). Effect size matrix's for all comparisons are available within the appendix (Appendix 1 & 2). For symmetry (Figure 2), Post-PHV players demonstrated greater odds of exceeding a 5% asymmetry threshold compared with their Pre-PHV counterparts.

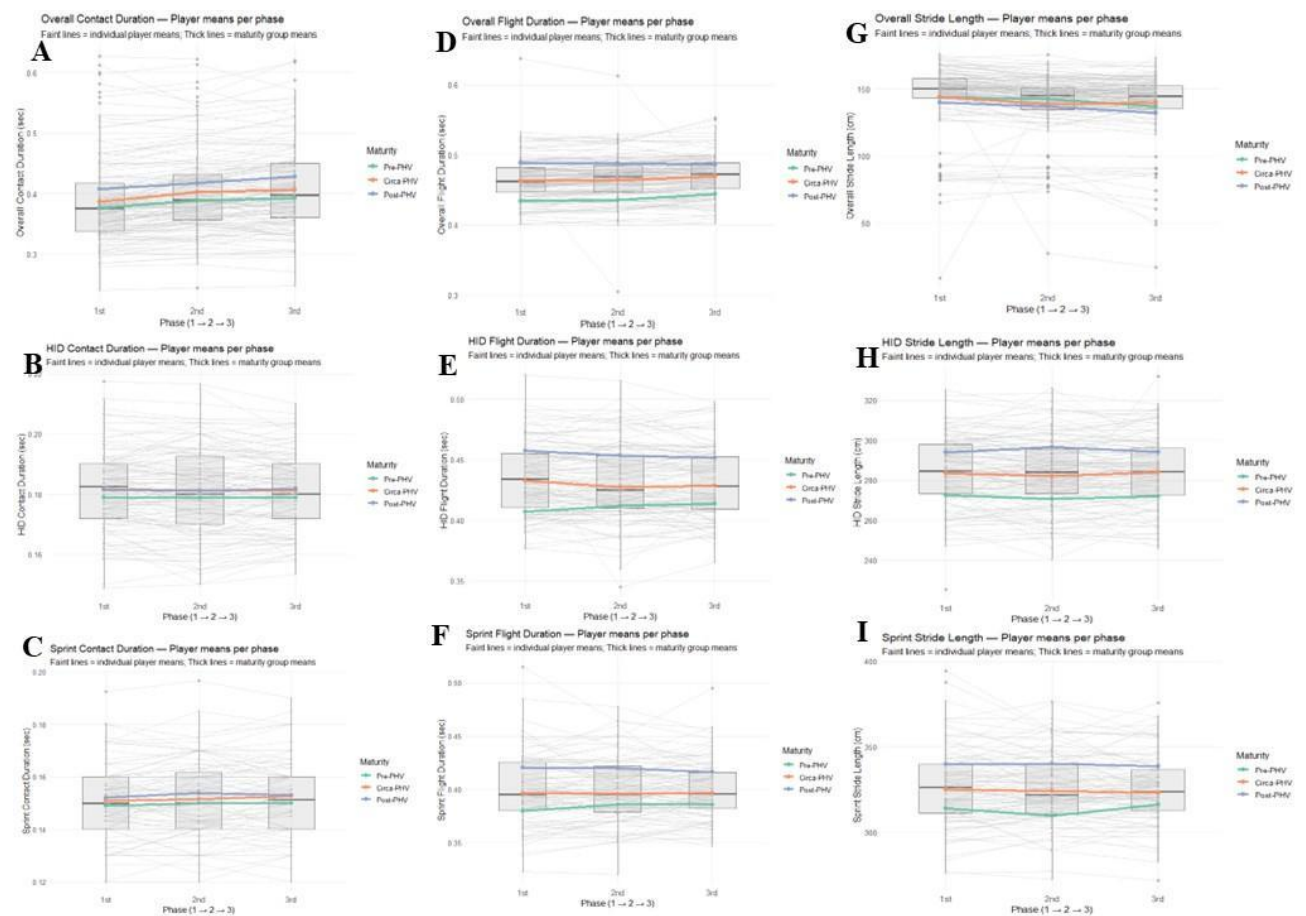


Figure 1. Within-game individual and maturity group level differences in players' absolute gait metrics. A) Contact time >2m/s, B) Contact time >4m/s, C) Contact time >5.5m/s, D) Flight time >2m/s, E) Flight time >4m/s, F) Flight time >5.5m/s, G) Stride Length >2m/s, H) Stride Length >4m/s, I) Flight >5.5m/s,

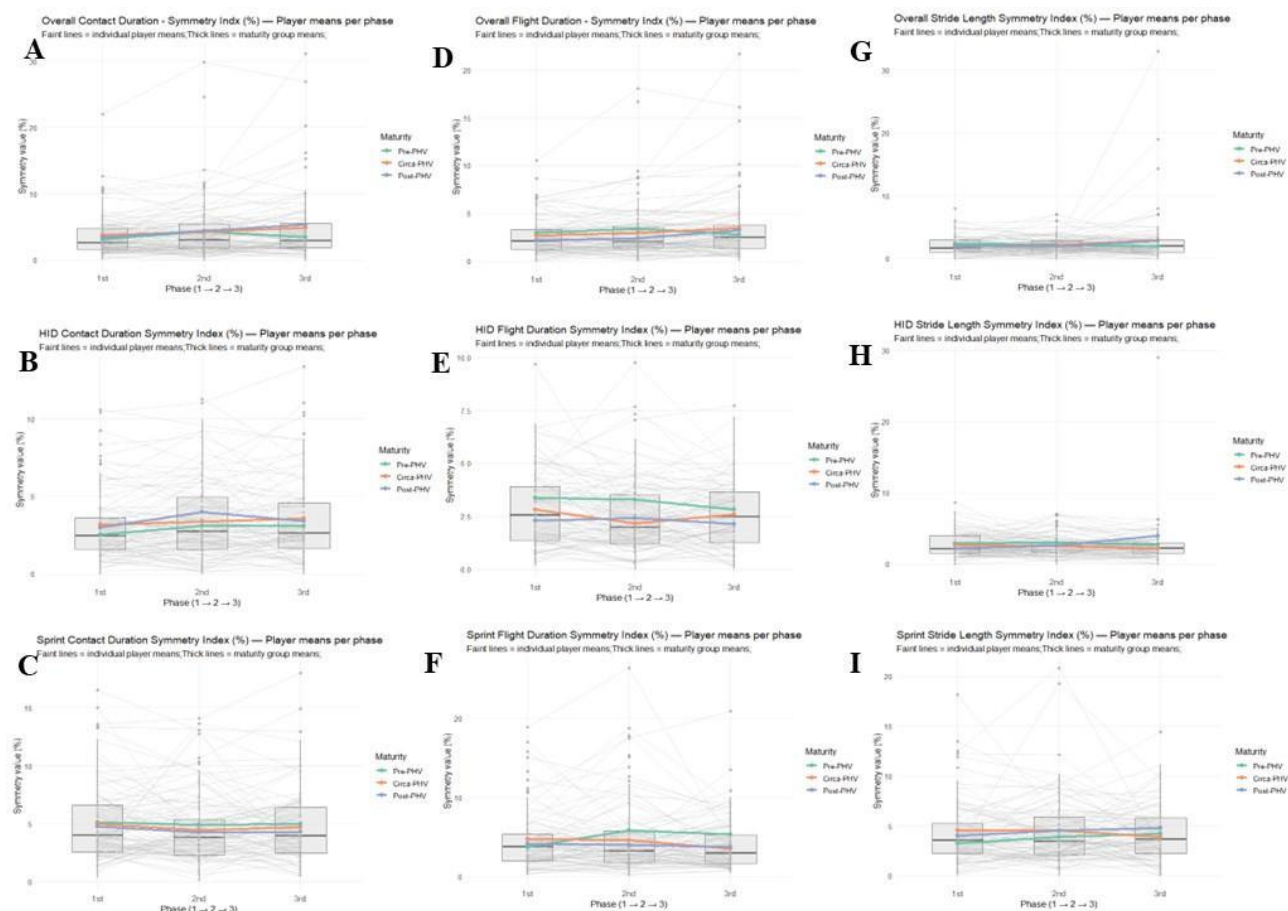


Figure 2. Within-game individual and maturity group level differences for players running symmetries (%) observed in match play. A) Contact time symmetry >2m/s, B) Contact time symmetry >4m/s, C) Contact time symmetry >5.5m/s, D) Flight time symmetry >2m/s, E) Flight time symmetry >4m/s, F) Flight time symmetry >5.5m/s, G) Stride Length symmetry >2m/s, H) Stride Length symmetry >4m/s, I) Flight symmetry >5.5m/s,

Vertical stiffness showed significant differences for both within match alterations and between maturity group differences ($P > 0.01$; See **Figure 3**). However, within match differences only showed small effect sizes, maturity group differences showed moderate (Pre vs. Circa & Circa vs. Post) and large (Pre vs. Post) effect sizes.

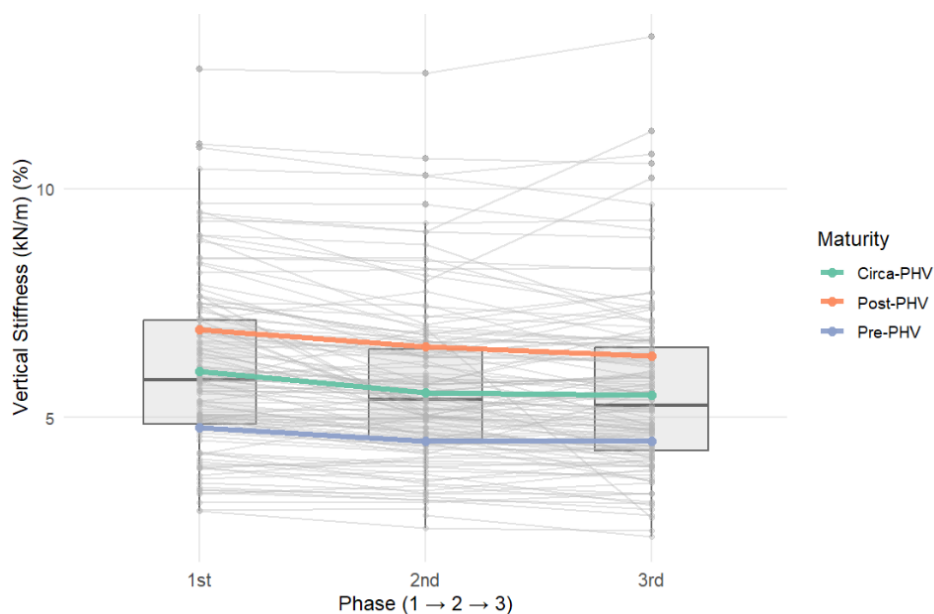


Figure 3. The within match and between maturity group vertical stiffness observations during international youth football match play.

Both maturity status and match phase significantly affected vertical stiffness; however, maturity status accounted for a substantially greater proportion of the observed variance. Post-hoc comparisons demonstrated clear differences between maturity groups, with moderate-to-large effect sizes, whereas phase-related differences were limited and generally associated with small effects.

Discussion

The purpose of the present study was to examine the influence of biological maturation on gait symmetry characteristics during competitive youth international tournament match play, and to explore both within- and between-match alterations in locomotor behaviour. This was the first study of its kind, to the authors' knowledge, to assess gait alterations during youth international football match play. The main findings were: 1) No significant between-game differences in gait symmetry or cadence across the tournament, suggesting limited evidence of cumulative fatigue; 2) Meaningful within-game increases in contact duration asymmetry emerging as early as the second phase of match play (**Figure 1,2&3**); 3) Post-PHV players demonstrated greater odds of exceeding a 5% asymmetry threshold compared with their Pre-PHV counterparts. Collectively, these findings suggest that acute, match-

induced alterations in gait symmetry may be more influential than accumulated tournament load in this cohort, with maturity status potentially moderating these responses.

Contrary to concerns surrounding fixture congestion in youth tournaments, chronological match order did not significantly influence gait symmetry or cadence at the cohort level. Although visual inspection suggested some variation in responses between maturity groups, but these differences were not supported by a statistically significant interaction effect and therefore it should be considered that the recovery period between matches was sufficient to mitigate cumulative locomotor disruption for all players. These findings align with previous research indicating that, when appropriate recovery windows are provided, youth athletes may demonstrate substantial resilience to short-term tournament scheduling.^{26,27} Although previous research highlighted concerns regarding limited recovery windows during youth tournaments,¹⁰ the present findings suggest that one day between matches may be sufficient to prevent cumulative alterations in gait symmetry within this cohort. However, it should be noted that within youth tournaments, player rotation may become a factor in our interpretations, with the focus more on individual player development/ opportunities, rather than the outcome of the match, altering the substitution strategies of coaches.²⁸

In contrast to the absence of between-game effects, clear within-match alterations in gait symmetry were observed (Figure 1). Players were substantially more likely to exceed the 5% contact-duration asymmetry threshold as match play progressed, with meaningful increases emerging as early as the second phase (Figure 2). These findings align with previous work conducted during the same international youth tournament structure, where reductions in locomotor and technical outputs were evident after the first 25-minute period.¹⁰ While that study quantified volume-based decrements, the present findings extend this understanding by demonstrating that spatiotemporal gait asymmetries may also emerge early within match play. Together, these findings suggest that acute neuromuscular alterations may underpin the previously observed reductions in physical outputs. Previous literature has demonstrated that fatigue can disrupt inter-limb coordination, alter force attenuation strategies, and modify lower-limb stiffness regulation,²⁹⁻³¹ all of which may manifest as increased contact-time

asymmetry. Importantly, maturity status appeared to moderate these responses. Post-PHV players demonstrated greater odds of exceeding asymmetry thresholds compared with Pre-PHV players (Figure 2). While this may initially seem counterintuitive, it may reflect the complex interaction between biological maturation, force production capacity, and mechanical loading. More mature players typically produce greater sprint velocities and absolute forces,^{12,14} potentially amplifying detectable asymmetries when neuromuscular fatigue develops.

The concept of “adolescent awkwardness” provides an additional theoretical lens through which these findings may be interpreted. Rapid growth during PHV can temporarily disrupt established motor coordination patterns, as neuromuscular control must adapt to altered limb lengths and segmental inertial properties.^{12,16} However, it is important to consider that not all athletes experience this phenomenon to the same extent. Athletes who enter PHV with a well-developed neuromuscular and strength foundation may be better equipped to tolerate rapid structural changes without substantial disruption to movement coordination. Conversely, those lacking a robust athletic base prior to PHV may demonstrate more pronounced alterations in movement strategies when exposed to acute fatigue. Therefore, the observed within-game increases in asymmetry may not solely reflect maturational status per se, but rather the complex interaction of growth-related changes with other individual factors that were not all assessed in the present study. This reinforces the importance of long-term athletic development models that prioritise movement quality, unilateral strength development, and coordination training before and during PHV.^{13,32} However, within the current study, the training age and competency level of the participants was not accounted for and is a limitation in our ability to observe adolescent awkwardness. Future research is recommended to incorporate longitudinal participant information and longitudinal match play/ training observations to assess if this theoretical concept is observed during open environments.

It is also important to acknowledge that the present findings represent a cross-sectional snapshot within a tournament setting. While asymmetry increased within matches, we cannot determine whether these changes represent transient fatigue responses, early markers of injury susceptibility, or normal

adaptive variability. Longitudinal tracking across growth phases would be required to determine whether players demonstrating acute within-match asymmetry are subsequently at greater risk of injury. Notably, substantial inter-individual variability was observed (Figure 1, 2 & 3). Several players exhibited pronounced asymmetry spikes that were not reflected in group means, further emphasising that group-level analyses may obscure meaningful individual responses. Consistent with previous observations within this population, where variance in match locomotor and technical outputs was primarily explained by the individual rather than the team or phase of play,¹⁰ the present findings also demonstrated substantial inter-individual variability in gait symmetry responses. This reinforces the need for individualised monitoring approaches in youth tournament settings.

Practical Applications

The present findings highlight several applied considerations for practitioners working within youth football environments. Although no cumulative between-game alterations were observed, the emergence of within-match increases in contact-duration asymmetry suggests that acute fatigue-related neuromuscular changes may develop earlier than commonly anticipated during tournament play. As such, integrating wearable monitoring technologies to track gait symmetry during matches may provide valuable insight into emerging fatigue responses, particularly in players demonstrating elevated or progressively increasing asymmetry. Given the greater likelihood of Post-PHV players exceeding asymmetry thresholds, practitioners should consider implementing targeted neuromuscular and unilateral strength interventions during and following periods of rapid maturation to support coordination and stiffness regulation. Furthermore, because substantial inter-individual variability was evident, symmetry data should be interpreted within an individualised framework rather than relying solely on group averages or fixed thresholds. Monitoring training and match exposure during periods of accelerated growth may assist in mitigating transient increases in asymmetry and potentially reduce injury risk, supporting a more developmentally informed approach to athlete management.

Limitations

Several limitations should be acknowledged. First, biological maturity was estimated using the Fransen method, which, although widely used in field-based research, is subject to estimation error and potential misclassification.³³ Predictive equations may be less accurate across ethnically diverse or international cohorts, and the applicability of the equation to the present Oceania-based sample warrants consideration. Future studies may benefit from more direct assessments of biological maturity, such as skeletal age via radiography or ultrasound-based methods. Second, while asymmetry thresholds (>5%) were used to classify “undesirable” gait patterns, these cut-offs are somewhat arbitrary and may not directly correspond to clinically meaningful injury risk. Longitudinal injury surveillance data would be required to establish predictive validity. Third, substitution patterns, positional roles, and absolute external loads were not incorporated into the current models, limiting interpretation of the mechanisms underpinning asymmetry changes. Finally, the observational design precludes causal inference between asymmetry alterations and injury risk.

Conclusion

Youth international tournament match play did not result in cumulative between-game alterations in gait symmetry, suggesting adequate recovery between fixtures. However, within-match increases in contact time and contact duration asymmetry were evident as early as the second phase of play, with Post-PHV players demonstrating greater odds of exceeding asymmetry thresholds. These findings indicate that acute match-induced locomotor alterations may present a more relevant consideration than chronic tournament load in this population. Although the role of “adolescent awkwardness” cannot be definitively confirmed, maturity-related differences and substantial individual variability highlight the importance of individualised monitoring strategies during youth development. Future research should examine the longitudinal relationship between in-match gait asymmetry, biological maturation, and injury incidence.

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347

348 **Statements and Declarations**

349 *Ethical considerations*

350 This study was reviewed and approved by the Auckland University of Technology Ethics Committee
351 (AUTEC; approval number 25/92).

352 *Consent to participate*

353 Informed consent to participate was obtained prior to the tournament. Both the Oceania Football
354 Confederation and the participating national federations provided their consent, and all players
355 voluntarily enrolled in the study.

356 *Consent for publication*

357 Not applicable. This article contains no identifiable individual data, images or videos; all data are
358 presented in anonymised and aggregated form.

359 *Declaration of conflicting interest*

360 The author(s) declared the following potential conflicts of interest with respect to the research,
361 authorship, and/or publication of this article: the first author is employed by the company that provided
362 the foot-mounted IMUs used to collect players' technical performance data. However, the first author
363 was not involved in the statistical analysis to avoid any perceived bias.

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366 article.

367 *Data availability*

368 The data that support the findings of this study are available from the corresponding author upon
369 reasonable request. The data are not publicly available due to privacy restrictions relating to youth
370 participants.

371

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455 **Appendix 1: Effect size matrix for maturity status**

456	Overall Flight Duration		
457	Pre-PHV	Circa-PHV	Post-PHV
458	Pre-PHV	L***	L***
459	Circa-PHV	L***	M***
460	Post-PHV	L***	M***
461	Overall_Contact_Duration		
462	Pre-PHV	Circa-PHV	Post-PHV
463	Pre-PHV		S
464	Circa-PHV		
465	Post-PHV	S	
466	Overall_Stride_Length		
467	Pre-PHV	Circa-PHV	Post-PHV
468	Pre-PHV		S
469	Circa-PHV	S	
470	Post-PHV		
471	HID Contact Duration		
472	Pre-PHV	Circa-PHV	Post-PHV
473	Pre-PHV	S*	S*
474	Circa-PHV	S*	
475	Post-PHV	S*	
476	HID Flight Duration		
477	Pre-PHV	Circa-PHV	Post-PHV
478	Pre-PHV	L***	L***
479	Circa-PHV	L***	M***
480	Post-PHV	L***	M***
481	HID Stride Length		
482	Pre-PHV	Circa-PHV	Post-PHV
483	Pre-PHV	L***	L***
484	Circa-PHV	L***	M***
485	Post-PHV	L***	M***
486	Sprint Flight Duration		
487	Pre-PHV	Circa-PHV	Post-PHV
488	Pre-PHV	S	L***
489	Circa-PHV	S	M***
490	Post-PHV	L***	M***
491	Sprint Stride Length		
492	Pre-PHV	Circa-PHV	Post-PHV
493	Pre-PHV	S*	L***
494	Circa-PHV	S*	M***
495	Post-PHV	L***	M***
496	Sprint Stride Length		
497	Pre-PHV	Circa-PHV	Post-PHV
498	Pre-PHV	S*	L***
499	Circa-PHV	S*	M***
500	Post-PHV	L***	M***

506
507 HID Contact Duration Symmetry Index (%)
508 Pre-PHV Circa-PHV Post-PHV
509 Pre-PHV S M*
510 Circa-PHV S
511 Post-PHV M*
512
513 HID Flight Duration Symmetry Index (%)
514 Pre-PHV Circa-PHV Post-PHV
515 Pre-PHV M** M
516 Circa-PHV M**
517 Post-PHV M
518
519 HID Stride Length Symmetry Index (%)
520 Pre-PHV Circa-PHV Post-PHV
521 Pre-PHV S
522 Circa-PHV S
523 Post-PHV
524
525 Overall Cadence (steps/min)
526 Pre-PHV Circa-PHV Post-PHV
527 Pre-PHV S M*
528 Circa-PHV S
529 Post-PHV M*
530
531 Sprint Contact Duration Symmetry Index (%)
532 Pre-PHV Circa-PHV Post-PHV
533 Pre-PHV S S
534 Circa-PHV S
535 Post-PHV S
536
537 Sprint Flight Duration Symmetry Index (%)
538 Pre-PHV Circa-PHV Post-PHV
539 Pre-PHV S S
540 Circa-PHV S
541 Post-PHV S
542
543
544
545 Sprint Stride Length Symmetry Index (%)
546 Pre-PHV Circa-PHV Post-PHV
547 Pre-PHV S S
548 Circa-PHV S
549 Post-PHV S
550

551 **Appendix 2: Effect size matrix for phase of the match**

552 Overall Contact Duration Symmetry Indx (%)
553 1st 2nd 3rd
554 1st S**
555 2nd

556 3rd S**
 557
 558 Overall Flight Duration Symmetry Indx (%)
 559 1st 2nd 3rd
 560 1st S*
 561 2nd
 562 3rd S*
 563
 564 Overall Flight Ratio Symmetry Index (%)
 565 1st 2nd 3rd
 566 1st **
 567 2nd
 568 3rd **
 569
 570 Overall Cadence (steps/min)
 571 1st 2nd 3rd
 572 1st M*** M***
 573 2nd M***
 574 3rd M***
 575
 576 Overall Contact Duration
 577 1st 2nd 3rd
 578 1st S**
 579 2nd
 580 3rd S**
 581
 582
 583 Overall Stride Length
 584 1st 2nd 3rd
 585 1st S**
 586 2nd
 587 3rd S**
 588