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Playing Position and the Injury Incidence Rate in Male Academy Soccer Players

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Context: Whether playing position influences injury in male academy soccer players (ASPs) is unclear.

Objective: To determine if playing position was associated with injury in ASPs.

Design: Descriptive epidemiology study.

Setting: English, Spanish, Uruguayan, and Brazilian soccer academies.

Patients or Other Participants: A total of 369 ASPs from the under-14 to under-23 age groups, classified as post-peak height velocity using maturity offset, and grouped as goalkeepers, lateral defenders, central defenders, lateral midfielders, central midfielders, or forwards.

Main Outcome Measure(s): Injuries were recorded prospectively over 1 season. Injury prevalence proportion (IPP), days missed, and injury incidence rate (IIR, injuries/1000 training or match hours, n = 116) were analyzed according to playing position.

Results: No association with playing position was observed for any injury type or location regarding IPP ($P \geq .089$) or days missed ($P \geq .235$). The IIR was higher in central defenders than in lateral defenders for general (9.30 versus 4.18 injuries/1000 h, $P = .009$), soft tissue (5.14 versus 1.95 injuries/1000 h, $P = .026$), and ligament or tendon injuries (2.69 versus 0.56 injuries/1000 h, $P = .040$). The central versus lateral or forward positions were not associated with IPP ($P \geq .051$) or days missed ($P \geq .083$), but general IIR was greater in the central position than the lateral or forward positions (8.67 versus 6.12 injuries/1000 h, $P = .047$).

Conclusions: Academy soccer players' playing positions were not associated with IPP or days missed, but the higher general, soft tissue, and ligament or tendon IIRs in central defenders suggest that this position warrants specific attention regarding injury-prevention strategies. These novel findings highlight the importance of considering training or match exposure when investigating the influence of playing position on injury in ASPs.

Key Words: football, adolescents, maturation, epidemiology, soft tissue injury

Key Points

- The incidence rate of general injuries (all injuries combined) was greater for centrally positioned players (particularly defenders) compared with those players occupying lateral or forward positions.
- Injury prevalence and days missed because of injury did not appear to be influenced by playing position in male academy soccer players.
- This study highlights the importance of accounting for training and match exposure when investigating the influence of playing position on injury in academy soccer players and suggests that injury-prevention strategies in this population should focus on the central playing positions.

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A soccer team comprises 11 players occupying different playing positions, which reflect their location on the pitch and different tactical roles during matches. During the development of academy soccer players (ASPs), specific skills or physical qualities may lead to players being selected for certain playing positions because of variations in the tactical and physiological requirements of those positions.[1,2] In professional soccer, goalkeepers (GKs) perform the greatest proportion of low-intensity actions, which differs from outfield players, who exhibit more running, ball possession, and high-intensity activity.[3] However, the distance covered and frequency of in-game playing actions vary among outfield positions and may contribute to the different physical demands experienced by outfield ASPs.[4] Knowledge of whether these differences relate to injury in ASPs could inform position-specific training and recovery strategies in an attempt to mitigate the injury risk in this underresearched population.

Playing position is linked to injury incidence rate (IIR) in professional soccer,[5] with wide midfielders having the highest match IIR and central defenders (CDs), the highest training IIR. Other team sports, such as American football and rugby union, also demonstrate an association of playing position with injury.[6,7] Although the collision-based nature of these sports accounted for much of the variance in contact injuries, rugby union positions performing more sprints and high-speed running displayed a greater number of noncontact thigh and hamstrings injuries.[7] High-speed running is one of several playing demands in professional soccer that induce fatigue and muscle damage[8] and may affect the risk of noncontact injury in certain positions. Similarly, players in positions requiring them to tackle more frequently might be at higher risk of contact injury, whereas those who regularly jump and land may sustain more injuries to the ankle or knee ligaments.[9] Accordingly, different quantities, intensities, and durations of playing actions may underpin the positional differences in injury reported in some studies of professional and academy soccer athletes.[5,10]

The few studies of ASPs in which authors have reported injuries according to playing position are limited by sample size,[10,11] variable categorization of playing positions,[10–14] and lack of information regarding maturity status,[10,12–15] the last of which is an important risk factor in ASPs.[16] Yet it is unclear if different approaches to categorizing playing positions affect whether associations with injury are detected. For example, grouping defenders as 1 playing position overlooks evidence from professional soccer that a greater number of sprints are performed by lateral defenders (LDs) than by CDs.[1] Further, grouping lateral midfielders (LMs) and central midfielders (CMs) together does not account for differences in low- and high-speed running distances reported in youth players: the former players have exhibited higher high-speed running distances.[17] In addition, lateral players perform more accelerations and decelerations than central players in both professional and youth soccer,[18] which has implications for fatigue and acute muscle damage.[8] Consequently, segregating lateral and central players may better reflect their distinct activity profiles and may be more appropriate for detecting differences in injuries experienced as a consequence of playing position.[2] High-speed running and sprint activities are similar in forward- and laterally positioned ASPs,[19] suggesting possible similarities in their noncontact injuries. However, previous investigations of injury and playing position in ASPs did not account for these differences,[10,12,14,15] and those that did lacked robust statistical analyses.[13,20] Thorough investigation is required to determine whether different playing positions can influence the injury risk in ASPs.

The aim of our study was to examine whether playing position was associated with injury in a large cohort of physically mature, male ASPs from 8 academies in 4 countries. Outfield players were grouped by specific playing positions (according to documented activity profiles) to determine whether different approaches to categorizing playing position affected the ability to detect associations with injury. We hypothesized that a greater proportion of players in lateral and forward positions (typically associated with more high-intensity activities) would exhibit soft tissue injuries than those in central positions. We also hypothesized that this would be reflected in a greater soft tissue IIR for those in lateral and forward positions. Because of their unique activity profile characterized by few high-intensity actions, we hypothesized a lower proportion of injured GKs than outfield players (and, similarly, a lower IIR in GKs). We therefore performed all analyses with and without GKs.

METHODS

Participants and Study Period

We recruited 369 high-level male ASPs (age = 17.8 ± 1.9 years, height = 1.78 ± 0.07 m, body mass = 72.8 ± 8.5 kg) registered with the academies of 1 of 8 professional soccer clubs from England, Spain, Uruguay, and Brazil. Of the 5 English academies, 2 were categorized under the Premier League's Elite Player Performance Plan (EPPP) as category 1, and 2 were category 2. One English academy operated independently of the EPPP and competed regularly with category 1 academies (under-23 [U23] level). The Uruguayan academy was in the highest national category (category A). No classification system exists for soccer academies in Spain or Brazil; however, the Spanish and Brazilian academies in this study are recognized as among the most successful in their respective countries for producing professional players. To control for the influence of maturity status on injury,[16] only ASPs classified as post-peak height velocity (PHV) were included. Participants' maturity status was calculated via noninvasive methods, using a previously validated regression equation that took into consideration player age, body mass, standing height, and sitting height.[21] This allowed calculation of the maturity offset, providing a prediction of years from PHV. To account for the error in the equation (approximately 0.5 years),[21] players with a maturity offset >+1.0 years were categorized as post-PHV. One season's injury record per player was included for analysis, with 142 players for season 2014–2015, 17 for 2016–2017, and 210 for 2017–2018. All players participated in regular soccer training and competitive match play in accordance with the Premier League's EPPP for the English clubs. Written informed consent was obtained from club officials and players, with parental consent and player assent collected for all participants <16 years of age. The study received approval from the university research ethics committee and

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was performed in accordance with the Declaration of Helsinki.

Playing Position

Each player self-recorded his playing position via questionnaire. Players were grouped as GKs (n = 34), CDs (n = 66), LDs (n = 56), CMs (n = 97), LMs (n = 59), and forwards (FWDs, n = 57). Based on previous literature[1,17,18] describing differences in match activity between central and lateral positions, further analysis was performed comparing central players (CENT; CDs and CMs, n = 163) with lateral and forward players (LAT/FWD; LDs, LMs, and FWDs, n = 172).

Injury Recording and Definitions

Injuries were diagnosed and recorded by medical personnel at each club following published guidelines.[22] Injuries were recorded if they had taken place during soccer-related activity and resulted in a player being unable to participate in training or competition for ≥24 hours after the occurrence or onset. Players were considered injured until approved by club medics to return to training and availability for match selection. *Days missed* were calculated as the difference between the date of injury and the date of return to full training and selection availability. Only injuries sustained during the investigated season were analyzed, meaning that if players began the season injured, existing injuries were not recorded. Injury history was unavailable for this study, and no players were excluded on the basis of previous injury. Injuries were categorized based on those most frequently recorded in a previous injury audit for this cohort.[23] *Noncontact injuries* were those without a clear incident involving contact with another player, the ball, or another object, with each injury category including contact and noncontact injuries unless stated. Muscle and ligament or tendon injuries were investigated collectively as soft tissue injuries and also as separate categories because of different tissue structures and injury causes.[24]

Statistical Analyses

We analyzed prevalence, days missed, and incidence for each injury category. Injury prevalence proportions (IPPs)[25] were calculated with 95% CIs and compared between groups using binomial regression to determine whether the proportions (percentages) of players sustaining ≥1 injury or remaining injury free during the season differed. Comparison of days missed between groups was conducted using the Kruskal-Wallis H test of variance or Mann-Whitney *U* test (data not normally distributed, presented as median and interquartile range), including only players who had incurred ≥1 injury for each category. Individual exposure minutes during training and matches were available for 116 ASPs from England, Spain, and Brazil (age = 18.2 ± 1.9 years, height = 1.80 ± 0.07 m, body mass = 73.6 ± 8.5 kg). The IIRs for these players are presented as the number of injuries/1000 hours with 95% CIs.[26] The IIRs were calculated relative to *total exposure* (the sum of training exposure plus match exposure) because not all injury records specified whether an injury had occurred during training or a match. A generalized linear model assuming a Poisson distribution, with exposure hours as an offset representing the time at risk, was used to derive rate ratios (RRs) with 95% CIs for each injury category. Statistical significance was set at $P < .05$. Statistical analyses were performed using R (version 3.5.1; RStudio) for comparisons of IPPs and IIRs. Comparisons of days missed were performed using SPSS (version 25.0; IBM Corp).

RESULTS

Total Injuries and Days Missed

A total of 261 injuries were recorded, resulting in 7149 days missed (19.5 ± 42.3 days/injury). As expected, more than half (61.0%) of the injuries were noncontact. The most common types of injury were to muscle (36.4%) and ligament or tendon (30.3%), and the most frequent locations were the thigh (29.9%), knee (20.7%), and ankle (15.3%).

Injury Prevalence Proportions

Details of the IPPs when ASPs were grouped according to individual playing position and by CENT and LAT/FWD positions are presented in Table 1. No difference in IPP was observed by playing position for any injury category, with or without GKs ($P \geq .104$ and $P \geq .089$, respectively). We found no differences in IPP when segregating ASPs by activity profile for any injury category with GKs included ($P \geq .210$) or excluded ($P \geq .212$), although there was a nonsignificant tendency for the thigh injury IPP to be higher in LAT/FWD players than in GKs (18.7% versus 2.9%, $P = .051$).

Days Missed

Details of the days missed for each category are shown in Table 2. The cumulative days missed per player because of an injury in any category did not differ by playing position, with or without GKs ($P \geq .235$ and $P \geq .239$, respectively). Similarly, cumulative days missed for any injury category did not differ among CENTs, LAT/FWDs, and GKs ($P \geq .083$). With GKs excluded, CENTs tended to miss more days from ankle injuries than did LAT/FWDs (median [interquartile range] = 41.5 [48.0] versus 18.0 [26.5], $P = .053$). No further differences in days missed were noted for any other injury category (*P* values > .05).

Injury Incidence Rates

Incidence rates for a large subsample of ASPs with exposure records available (n = 116) are provided in Table 3. For specific positional roles, the general IIR was lower for LDs (RR = 0.45; 95% CI = 0.24, 0.80; $P = .009$) and GKs (RR = 0.43; 95% CI = 0.17, 0.89; $P = .038$) compared with CDs. Similarly, the soft tissue IIR was lower for LDs (RR = 0.38; 95% CI = 0.15, 0.85; $P = .026$) and GKs (RR = 0.22; 95% CI = 0.04 0.75; $P = .041$) compared with CDs. The IIR of ligament or tendon injuries was lower for LDs than for CDs (RR = 0.21; 95% CI = 0.03, 0.77; $P = .040$). No other differences were observed among playing positions. When segregating ASPs based on activity profile, we found that the general IIR was lower for LAT/FWDs (RR = 0.71; 95% CI = 0.50, 1.00; $P = .047$) and GKs (RR = 0.46; 95% CI = 0.19, 0.93; $P = .048$) compared with

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Table 1. Injury Prevalence Proportion (%) and 95% CI for Each Injury Category According to Playing Position and Activity Profile

	Playing Position						Activity Profile		
Injury Category	Goalkeepers (n = 34)	Central Defenders (n = 66)	Lateral Defenders (n = 56)	Central Midfielders (n = 97)	Lateral Midfielders (n = 59)	Forwards (n = 57)	Goalkeepers (n = 34)	Central Positions (n = 163)	Lateral or Forward Positions (n = 172)
General	44.1 (27.4, 60.8)	45.5 (32.5, 56.5)	41.1 (28.2, 54.0)	37.5 (27.9, 47.1)	42.4 (29.8, 55.0)	39.4 (26.7, 52.1)	44.1 (27.4, 60.8)	40.7 (33.2, 48.2)	40.9 (33.6, 48.2)
Noncontact	26.5 (11.7, 41.3)	30.3 (19.2, 41.4)	32.1 (19.9, 44.3)	25.0 (16.4, 33.6)	27.1 (15.8, 38.4)	30.4 (18.5, 42.3)	26.5 (11.7, 41.3)	26.5 (19.7, 33.3)	29.2 (22.4, 36.0)
Soft tissue	26.5 (11.7, 41.3)	30.3 (19.2, 41.4)	32.1 (19.9, 44.3)	36.5 (26.9, 46.1)	37.3 (25.0, 49.6)	37.5 (24.9, 50.1)	26.5 (11.7, 41.3)	33.3 (26.1, 40.5)	35.7 (28.5, 42.9)
Muscle	14.7 (2.8, 26.6)	13.6 (5.3, 21.9)	17.9 (7.9, 27.9)	19.8 (11.9, 27.7)	25.4 (14.3, 36.5)	25.0 (13.8, 36.2)	14.7 (2.8, 26.6)	17.3 (11.5, 23.1)	22.8 (16.5, 29.1)
Ligament or tendon	8.8 (0.7, 18.3)	19.7 (10.1, 29.3)	16.1 (6.5, 25.7)	14.6 (7.6, 21.6)	13.6 (4.9, 22.3)	14.3 (5.2, 23.4)	8.8 (0.7, 18.3)	16.7 (11.0, 22.4)	14.6 (9.3, 19.9)
Noncontact soft tissue	26.5 (11.7, 41.3)	28.8 (17.9, 39.7)	30.4 (18.4, 42.4)	24.0 (15.5, 32.5)	27.1 (15.8, 38.4)	28.6 (16.9, 40.3)	26.5 (11.7, 41.3)	27.2 (20.4, 34.0)	29.2 (22.4, 36.0)
Growth related	2.9 (−2.7, 8.5)	0.0	0.0	0.0	3.4 (−1.2, 8.0)	1.8 (−1.7, 5.3)	2.9 (−2.7, 8.5)	0.0	1.7 (−0.2, 3.6)
Low back, sacrum, or pelvis	2.9 (−2.7, 8.5)	6.1 (0.3, 11.6)	3.6 (−1.3, 8.5)	3.1 (−0.3, 6.5)	1.7 (−1.6, 5.0)	7.1 (0.4, 13.8)	2.9 (−2.7, 8.5)	4.3 (1.2, 7.4)	4.1 (1.1, 7.1)
Knee	14.7 (2.8, 26.6)	16.7 (7.7, 25.7)	14.3 (5.1, 23.5)	13.5 (6.7, 20.3)	13.6 (4.9, 22.3)	10.7 (2.7, 18.7)	14.7 (2.8, 26.6)	14.8 (9.3, 20.3)	12.9 (7.9, 17.9)
Ankle	2.9 (−2.7, 8.5)	10.6 (3.2, 18.0)	8.9 (1.4, 16.4)	7.3 (2.1, 12.5)	11.9 (3.6, 20.2)	8.9 (1.5, 16.3)	2.9 (−2.7, 8.5)	8.6 (4.3, 12.9)	9.9 (5.4, 14.4)
Thigh	2.9 (−2.7, 8.5)	13.6 (5.3, 21.9)	14.3 (5.1, 23.5)	14.6 (7.6, 21.6)	20.3 (10.0, 30.6)	21.4 (10.8, 32.0)	2.9 (−2.7, 8.5)	14.2 (8.8, 19.6)	18.7 (12.9, 24.5)
Hamstrings muscle	0.0	4.5 (−0.5, 9.5)	5.4 (−0.5, 11.5)	7.3 (2.1, 12.5)	13.6 (4.9, 22.3)	10.7 (2.7, 18.7)	0.0	6.2 (2.5, 9.9)	9.9 (5.4, 14.4)

CENTs, with the soft tissue IIR lower for GKs than for CENTs (RR = 0.24; 95% CI = 0.04, 0.78; $P = .049$). No other differences were seen between activity profiles.

DISCUSSION

This study is the first to comprehensively investigate the influence of playing position on injury in male ASPs, accounting for the confounding effect of maturation in a large cohort (n = 369) recruited from numerous academies in multiple countries. The main finding was that, when exposure records were considered in a large subsample of ASPs (n = 116), the IIR of all injuries from 1 season was higher for CENTs than for LAT/FWDs and GKs (8.67 versus 6.12 and 3.95 injuries/1000 hours, respectively). Our analysis of specific positional roles suggested the differences between outfield players were primarily driven by higher IIRs in CDs versus LDs for general injuries, soft tissue injuries, and ligament or tendon injuries. With a lack of difference in injury prevalence between positions, the position-dependent differences in injury incidence highlight the importance of recording exposure when investigating injury risk according to playing position in this population and indicate that injury-prevention strategies should be a focus in ASPs performing central positions.

Based on activity profile data,[3,17] we hypothesized that relatively more LAT/FWDs would be injured than CENTs and that relatively fewer GKs would be injured than players in outfield positions. Our LAT/FWD players tended to sustain relatively more thigh muscle injuries than GKs, potentially because of more sprints involving high-intensity eccentric contractions of the hamstrings and the quadriceps.[8] These actions lead to indicators of muscle damage,[27] which could increase the susceptibility to muscle strain injuries. Other authors researching ASPs reported fewer injuries for GKs than for those in outfield positions using odds ratios,[10] incidence rates,[12,20] and percentages of players injured[13] but without statistical comparisons of those data. In a study with statistical analysis, the authors[11] reported that among 14- to 16-year-old players, GKs experienced more hand and upper body injuries and fewer ankle injuries than players in outfield positions. However, our statistical analysis of IPPs across all playing positions, with and without GKs, suggested that the proportion of ASPs who were injured during a season was unaffected by playing position.

Days missed due to injury did not differ according to playing position either, although CENT tended to miss more days across the season from ankle injuries than LAT/FWD (41.5 versus 18.0 median days). This could be a consequence of more tackles occurring in central positions or more jumping and landing by CDs,[19] potentially leading to more severe injuries. Nonetheless, when we accounted for exposure minutes, the IIR for all injuries was greater in CENTs compared with LAT/FWDs and GKs, indicating that ASPs in central positions were at greater risk of injury in general. Comparison of specific outfield roles revealed that the rates of all injuries, soft tissue injuries, and ligament or tendon injuries were statistically higher for CDs than for LDs (Table 3). A greater frequency of tackling and blocking could increase the risk of contact injury in CDs, with the required regular jumping and landing from heading the ball potentially increasing their risk of ligament or

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Table 2. No. of Days Absent Per Injured Player for Each Injury Category According to Playing Position and Activity Profile[a]

Injury Category	Playing Position						Activity Profile		
	Goalkeepers (n = 34)	Central Defenders (n = 66)	Lateral Defenders (n = 56)	Central Midfielders (n = 97)	Lateral Midfielders (n = 59)	Forwards (n = 57)	Goalkeepers (n = 34)	Central Positions (n = 163)	Lateral or Forward Positions (n = 172)
General	22.0 (58.0)	32.5 (32.5)	28.0 (55.0)	27.5 (36.8)	24 (57.5)	21.0 (32.3)	22.0 (58.0)	29.5 (33.5)	24.0 (48.0)
Noncontact	16.0 (72.5)	28.5 (50.3)	33.0 (61.0)	18.0 (34.0)	21.0 (57.8)	23.0 (41.0)	16.0 (72.5)	24.0 (37.0)	23.5 (49.0)
Soft tissue	17.0 (25.5)	25.0 (33.0)	32.5 (39.8)	18.0 (34.0)	18.0 (37.8)	19.0 (28.5)	17.0 (25.5)	23.5 (34.0)	22.0 (34.0)
Muscle	14.0 (15.0)	17.0 (20.0)	18.5 (35.8)	14.0 (16.0)	11.0 (17.0)	18.5 (27.8)	14.0 (15.0)	15.5 (16.5)	15.0 (26.0)
Ligament or tendon	30.5 (53.4)	26.0 (53.0)	28.0 (31.0)	27.0 (38.0)	23.0 (43.0)	29.0 (128.5)	30.5 (53.4)	27.0 (44.5)	28.0 (35.0)
Noncontact soft tissue	16.0 (72.5)	24.0 (42.3)	30.0 (56.5)	21.0 (17.5)	20.0 (55.3)	20.5 (28.8)	16.0 (72.5)	23.5 (25.8)	23.0 (36.8)
Growth related	NA	NA	NA	NA	10.0 (4.0)	NA	NA	NA	8.0 (NA)
Low back, sacrum, or pelvis	NA	95.0 (193.3)	88.0 (NA)	14.0 (NA)	NA	9.0 (14.3)	NA	34.0 (151.0)	21.0 (77.0)
Knee	15.0 (46.0)	29.0 (27.0)	13.0 (37.8)	18.0 (40.5)	21.5 (38.8)	57.0 (217.5)	15.0 (46.0)	26.0 (35.5)	26.0 (48.5)
Ankle	NA	40.0 (63.0)	28.0 (35.0)	43.0 (59.0)	17.0 (30.0)	10.0 (22.5)	NA	41.5 (48.0)	18.0 (26.5)
Thigh	NA	21.0 (22.5)	19.5 (29.3)	17.5 (20.5)	12.0 (34.8)	21.0 (30.5)	NA	18.0 (19.0)	17.0 (30.5)
Hamstrings muscle	NA	21.0 (NA)	6.0 (NA)	18.0 (37.0)	16.0 (43.8)	22.0 (35.8)	NA	19.5 (22.8)	12.0 (35.0)

Abbreviation: NA, not applicable.

[a] Data are presented as median (interquartile range).

tendon injury.[9] Although no specific injury location was associated with playing position, the ankle IIR appeared to be higher in CDs than in other positions (Table 3), thus perhaps lending some support to the hypothesis. However, this finding was not significant, likely because of the relatively low prevalence of ankle injuries. A lack of difference between outfield positions for noncontact and noncontact soft tissue injuries implies that the differences we report could be influenced by actions involving physical contact, and it is possible that the lack of difference for more specific injury categories is due to the relatively low number of injuries recorded. Further investigation of larger cohorts is needed to explain these apparent playing position-specific differences in the IIRs of ASPs. Yet our data highlight the importance of accounting for exposure when investigating position-specific injury risks in ASPs.

In earlier English academy research, defenders and midfielders were most commonly injured among 9- to 19-year-olds,[12] with more thigh muscle injuries in midfielders than in defenders and GKs in another cohort aged 8 to 16 years.[14] Still, none of these researchers accounted for maturation, which has been shown to influence the injury risk in ASPs.[16] The authors[20] of a recent study reported a higher IIR for CMs than for other positions in 18- to 21-year-old (probably post-PHV) ASPs, thereby supporting our findings. Nevertheless, in contrast to our sample size, this investigation included only 41 players from 1 academy and addressed only overuse injuries. Although they did not control for maturity status, researchers[13] who separated French ASPs by chronological age demonstrated that U12–U15 LDs and U16–U20 CDs and CMs incurred more match injuries than did players in other positions in their respective age groups. However, these data did not undergo statistical analysis, and a U12–U15 group is likely to contain players at various stages of maturation.[21] To circumvent the influence of maturity status on injury,[16] we assessed only post-PHV players, which removes any confounding influence of younger age groups playing with fewer players on smaller pitches that might also affect the volume and intensity of training, matches, or both[17] (and potentially injury).

Discrepancies among previous studies may have also been influenced by the different methods used to categorize playing position. Specifically, some grouped defensive and midfield ASPs by central or lateral roles[13,20] and others as defensive, midfield, or forward.[10–12] The latter represents the "traditional" method, predating literature describing the different match actions in central and lateral players from defensive and midfield positions.[17,19] This is a major limitation because of the difference between central and lateral players in their ability to perform actions that can determine match outcomes.[1,17] We examined this problem directly, performing separate analyses of ASPs, both according to their specified playing position and as CENT or LAT/FWD players. For example, when analyzed by activity profiles, our IIR data indicated a higher rate of general injuries in centrally positioned ASPs (defenders and midfielders combined), and our additional analysis according to specific positional roles provided further insight, suggesting that this finding was primarily driven by injuries to CDs. In combination with the steps taken to circumvent the influence of maturity status on injury[16] and relying on a large sample of ASPs from multiple academies and countries (thus increasing the external validity), our findings provide novel and robust evidence regarding the association of playing position with injury in ASPs.

As well as the advantages of our study, we acknowledge some limitations. First, we did not quantify the intensity of activities undertaken by ASPs, which limits our ability to explain position-specific differences in IIR. Future authors should supply detail on players' match and training loads to investigate associations between these variables and injury. Exposure records were also not available for all players in our study. However, our subsample analysis detected differences between position groups, demonstrating the importance of including exposure hours in this type of study. It should be noted that we did not analyze training and match injuries separately because these were not

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Table 3. Injury Incidence Rates (IIRs; Number of Injuries/1000 h Exposure) and 95% CIs for Each Category According to Playing Position and Activity Profile in a Sample of Academy Soccer Players With Exposure Records (N = 116)[a]

	Playing Position						Activity Profile		
	Goalkeepers (n = 12)	Central Defenders (n = 27)	Lateral Defenders (n = 18)	Central Midfielders (n = 24)	Lateral Midfielders (n = 20)	Forwards (n = 15)	Goalkeepers (n = 12)	Central Position (n = 51)	Lateral or Forward Position (n = 53)
Exposure, h	1770	4085	3592	3528	3587	3277	1770	7612	10 455
Injury category, IIR (95% CI)									
General	**3.95 (1.02, 6.88)**[b]	9.30 (6.34, 12.26)	**4.18 (2.06, 6.29)**[b]	7.94 (5.00, 10.88)	7.81 (4.91, 10.70)	6.41 (3.67, 9.15)	**3.95 (1.02, 6.88)**[c]	8.67 (6.58, 10.76)	**6.12 (4.62, 7.62)**[c]
Noncontact	3.39 (0.68, 6.10)	5.88 (3.52, 8.23)	3.62 (1.65, 5.59)	5.67 (3.18, 8.15)	5.58 (3.13, 8.02)	5.80 (3.19, 8.41)	3.39 (0.68, 6.10)	5.78 (4.07, 7.49)	4.97 (3.62, 6.33)
Soft tissue	**1.13 (0.44, 2.70)**[b]	5.14 (2.94, 7.34)	**1.95 (0.51, 3.39)**[b]	4.25 (2.10, 6.40)	4.74 (2.49, 6.99)	3.66 (1.59, 5.73)	**1.13 (0.44, 2.70)**[c]	4.73 (3.18, 6.27)	3.44 (2.32, 4.57)
Muscle	0.56 (0.05, 1.67)	2.45 (0.93, 3.97)	1.39 (0.17, 2.61)	3.12 (1.28, 4.96)	3.35 (1.45, 5.24)	2.75 (0.95, 4.54)	0.56 (0.05, 1.67)	2.76 (1.58, 3.94)	2.49 (1.53, 3.44)
Ligament/tendon	0.56 (0.05, 1.67)	2.69 (1.10, 4.28)	**0.56 (0.21, 1.33)**[b]	1.13 (0.02, 2.25)	1.67 (0.33, 3.01)	0.92 (0.12, 1.95)	0.56 (0.05, 1.67)	1.97 (0.97, 2.97)	1.05 (0.43, 1.67)
Noncontact soft tissue	3.39 (0.68, 6.10)	5.88 (3.52, 8.23)	3.62 (1.65, 5.59)	5.39 (2.96, 7.81)	5.30 (2.91, 7.68)	5.49 (2.96, 8.03)	3.39 (0.68, 6.10)	5.65 (3.96, 7.34)	4.78 (3.46, 6.11)
Growth related	0.56 (0.04, 1.67)	0.00	0.00	0.00	0.28 (0.02, 0.83)	0.31 (0.03, 0.90)	0.56 (0.04, 1.67)	0.00	0.19 (0.07, 0.46)
Low back/sacrum/pelvis	1.13 (0.44, 2.70)	1.22 (0.15, 2.30)	0.56 (0.21, 1.33)	1.42 (0.17, 2.66)	0.00	1.83 (0.37, 3.30)	1.13 (0.44, 2.70)	1.31 (0.50, 2.13)	0.77 (0.23, 1.30)
Knee	0.56 (0.05, 1.67)	0.98 (0.02, 1.94)	0.84 (0.11, 1.78)	0.57 (0.22, 1.35)	1.67 (0.33, 3.01)	0.61 (0.24, 1.46)	0.56 (0.05, 1.67)	0.79 (0.16, 1.42)	1.05 (0.43, 1.67)
Ankle	0.00	1.96 (0.60, 3.32)	0.00	0.00	0.56 (0.22, 1.33)	0.61 (0.24, 1.46)	0.00	1.05 (0.32, 1.78)	0.38 (0.01, 0.76)
Thigh	0.00	2.20 (0.76, 3.64)	2.78 (1.06, 4.51)	3.40 (1.48, 5.33)	3.62 (1.65, 5.59)	2.44 (0.75, 4.13)	0.00	2.76 (1.58, 3.94)	2.97 (1.92, 4.01)
Hamstrings muscle	0.00	0.49 (0.19, 1.17)	1.11 (0.02, 2.21)	1.70 (0.34, 3.06)	2.23 (0.68, 3.78)	0.92 (0.12, 1.95)	0.00	1.05 (0.32, 1.78)	1.43 (0.71, 2.16)

[a] Bold type indicates significant results.
[b] Lower than central defenders.
[c] Lower than central playing positions.

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categorized at the time of recording. This might have affected our ability to detect the true rate of match injuries because players spend a greater proportion of time training than playing matches, though injuries typically occur more frequently during competition.[17] To advance our analyses, future authors should record injuries and exposure hours separately for training and matches in large samples of ASPs.

CONCLUSIONS

We are the first to explore the association of playing position with injury in ASPs from multiple academies across 4 nations and 2 continents, thus demonstrating the high external validity of our findings. Although no associations were evident between playing position and IPP or days missed, IIR was higher in central players, specifically CDs, which may be linked to the greater frequency of tackles and jumping and landing in these outfield playing positions. These results have implications for playing position–specific training and recovery: centrally positioned players (particularly CDs) may benefit from additional focus on injury-prevention strategies. Importantly, the lack of difference regarding injury prevalence and days missed in the present study highlights the need to incorporate exposure minutes when evaluating position-specific injury differences in ASPs.

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