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Playing Position is Associated with Injury Incidence Rate in Male Academy Soccer Players

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Playing position is associated with injury incidence rate in male academy soccer players

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1 **Abstract**

2 **Context:** It is unclear whether playing position influences injury in male academy soccer
3 players (ASP).

4 **Objective:** To determine if playing position is associated with injury in ASP.

5 **Design:** Descriptive Epidemiology Study.

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

7 **Participants:** 369 ASP from Under 14 (U14) to U23 age groups, classified as ‘post-peak height
8 velocity’ using maturity offset, and grouped as goalkeepers (GK), lateral defenders (LD),
9 central defenders (CD), lateral midfielders (LM), central midfielders (CM) and forwards
10 (FWD). Additional analysis compared central (CENT) with lateral/forward (LAT/FWD)
11 positions.

12 **Main Outcome Measures:** Injuries were recorded prospectively over one season. Injury
13 prevalence proportion (IPP), days missed and injury incidence rate (IIR, injuries per 1000
14 training/match hours, $n=116$) were analysed according to playing position.

15 **Results:** No association with playing position was observed for any injury type/location
16 regarding IPP ($P \geq 0.089$) or days missed ($P \geq 0.235$). The IIR was higher in CD than LD for
17 general (9.30 vs. 4.18 injuries/1000h, $P=0.009$), soft-tissue (5.14 vs. 1.95 injuries/1000h,
18 $P=0.026$) and ligament/tendon injuries (2.69 vs. 0.56 injuries/1000h, $P=0.040$). Regarding
19 CENT vs. LAT/FWD, there were no associations with IPP ($P \geq 0.051$) or days missed
20 ($P \geq 0.083$), but general IIR was greater in CENT than LAT/FWD (8.67 vs. 6.12 injuries/1000h,
21 $P=0.047$).

22 **Conclusions:** ASP playing position was not associated with IPP or days missed but the higher
23 general, soft-tissue and ligament/tendon IIR in CD suggests this position warrants specific
24 attention regarding injury prevention strategies. These novel findings highlight the importance

25 of including training/match exposure when investigating the influence of playing position on
26 injury in ASP.

27

28 **Abstract word count: 250**

29

30 **Body of manuscript word count: 3,284**

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32 **Key words:** football; adolescence; development; epidemiology; soft-tissue

33

34 **Key points:**

- 35 1. The incidence rates of general injuries (all injuries combined) were greater for centrally-
36 positioned players (particularly defenders) compared to those players occupying lateral and
37 forward positions.
- 38 2. Injury prevalence and days missed due to injury do not appear to be influenced by playing
39 position in male academy soccer players.
- 40 3. This study highlights the importance of accounting for training and match exposure when
41 investigating the influence of playing position on injury in academy soccer players, and
42 suggests that injury prevention strategies in this population should focus on central playing
43 positions.

44 A soccer team comprises eleven players occupying different playing positions, which reflect
45 their location on the pitch and different tactical roles during matches. During the development
46 of academy soccer players (ASP), specific skills or physical qualities may lead to players being
47 selected to occupy certain playing positions due to variation within the tactical and
48 physiological requirements of those positions.^{1,2} In professional soccer, goalkeepers perform
49 the greatest proportion of low-intensity actions, which differ from outfield players who exhibit
50 more running, ball possession and high-intensity activity.³ However, the distance covered and
51 frequency of in-game playing actions vary between outfield positions, and may contribute to
52 different physical demands experienced by outfield ASP.⁴ Knowledge of whether these
53 differences relate to injury in ASP could inform position-specific training and recovery
54 strategies, in an attempt to mitigate injury risk in this under-researched population.

55 Playing position is linked to injury incidence rate (IIR) in professional soccer⁵, with
56 wide midfielders having the highest match IIR, and central defenders the highest training IIR.
57 Other team sports, such as American football and rugby union also demonstrate a playing
58 position association with injury.^{6,7} Whilst the collision-based nature of these sports accounted
59 for much of the variance in contact injuries, rugby union positions performing more sprints and
60 high-speed running demonstrated a greater number of non-contact thigh and hamstring
61 injuries.⁷ High-speed running is one of several playing demands in professional soccer that
62 induce fatigue and muscle damage,⁸ and may affect the risk of non-contact injury in certain
63 playing positions. Similarly, players in positions who tackle more frequently might be at higher
64 risk of contact injury, whilst those who regularly jump and land may suffer more injuries to the
65 ankle or knee ligaments.⁹ Accordingly, different quantities, intensities and durations of playing
66 actions may underpin the positional differences in injury reported in some studies of
67 professional and academy soccer.^{5,12}

68 The few studies of ASP that have reported injuries according to playing position are
69 limited by sample size,^{12,13} variable categorisation of playing positions¹²⁻¹⁶ and lack of
70 information regarding maturity status,^{12,14-17} which is an important risk factor in ASP.¹⁸
71 However, it is unclear if different approaches to categorising playing positions affect whether
72 or not associations with injury are detected. For example, grouping defenders as one playing
73 position overlooks evidence from professional soccer that a greater number of sprints are
74 performed by lateral than central defenders.¹ Further, grouping lateral and central midfielders
75 together does not account for differences in low- and high-speed running distances reported in
76 youth players, where lateral players have exhibited higher high-speed running distances.¹⁹ In
77 addition, lateral players perform more accelerations and decelerations than central players in
78 both professional and youth soccer,²⁰ which has implications for fatigue and acute muscle
79 damage.⁸ Consequently, segregating ‘lateral’ and ‘central’ players may better reflect their
80 distinct activity profiles, and may be more appropriate for detecting differences in injuries
81 suffered as a consequence of playing position.² High-speed running and sprint activities are
82 similar in forward- and laterally-positioned ASP,¹⁰ suggesting there may also be similarities in
83 the non-contact injuries they experience. However, previous investigations of injury and
84 playing position in ASP did not account for these differences,^{12,14,16,17} while those that did
85 lacked robust statistical analyses.^{11,15} Thorough investigation is required to determine the
86 whether different playing positions can influence injury risk in ASP.

87 The aim of this study was to investigate whether playing position is associated with
88 injury in a large cohort of physically mature, male ASP from eight academies in four countries.
89 Outfield players were grouped by specific playing positions (according to documented activity
90 profiles), in order to investigate whether different approaches for categorising playing position
91 affected the ability to detect associations with injury. We hypothesised that a greater proportion
92 of lateral and forward positions (typically associated with more high-intensity activities) would

93 exhibit soft tissue injuries compared to central positions. We also hypothesised that this would
94 be reflected in a greater soft tissue IIR in lateral and forward positions. Due to their unique
95 activity profile characterised by few high-intensity actions, we hypothesised a lower proportion
96 of injured goalkeepers than outfield players (and, similarly, a lower IIR in goalkeepers). We
97 therefore performed all analyses with and without goalkeepers.

98

99 **Materials and methods**

100 *Participants and study period*

101 This study recruited 369 high-level male ASP (age: 17.8 ± 1.9 years, height: 1.78 ± 0.07 m,
102 body mass: 72.8 ± 8.5 kg) registered with the academies of one of eight professional soccer
103 clubs from England, Spain, Uruguay and Brazil. Of the five English academies, two were
104 categorised under the Premier League's Elite Player Performance Plan (EPPP) as Category 1
105 and two were Category 2. One English academy operated independently of the EPPP and
106 competed regularly with Category 1 academies (Under 23 level). The Uruguayan academy was
107 of the highest national category (Category A). No classification system exists for soccer
108 academies in Spain or Brazil, however, the Spanish and Brazilian academies in this study are
109 recognised as among the most successful in their respective countries for producing
110 professional players. To control for the influence of maturity status on injury,¹⁸ only ASP
111 classified as post-peak height velocity (PHV) were included. Participants' maturity status was
112 calculated via non-invasive methods, using a previously validated regression equation, which
113 included player age, body mass, standing height and sitting height.²¹ This allowed calculation
114 of maturity offset, providing a prediction of years from PHV. To account for the error in the
115 equation (~ 0.5 years),²¹ players with a maturity offset greater than +1.0 years were categorised
116 as post-PHV. One season's injury record per player was included for analysis, with 142 players
117 for season 2014-15, 17 for 2016-17, and 210 for 2017-18. All players participated in regular

118 soccer training and competitive match-play, which was in accordance with the Premier
119 League's EPPP for the English clubs. Written informed consent was obtained from club
120 officials and players, with parental consent and player assent collected for all participants less
121 than 16 years of age. The study received approval from the University Research Ethics
122 Committee and was performed in accordance with the Declaration of Helsinki.

123

124 *Playing position*

125 Each player self-recorded their playing position via questionnaire. Players were grouped as
126 goalkeepers (GK, $n=34$), central defenders (CD, $n=66$), lateral defenders (LD, $n=56$), central
127 midfielders (CM, $n=97$), lateral midfielders (LM, $n=59$) and forwards (FWD, $n=57$). Based on
128 previous literature describing differences in match activity between central and lateral
129 positions^{1,19,20}, further analysis was performed comparing central players (CENT; central
130 defenders and central midfielders, $n=163$) with lateral/forward players (LAT/FWD; lateral
131 defenders, lateral midfielders and forwards, $n=172$).

132

133 *Injury recording and definitions*

134 Injuries were diagnosed and recorded by medical personnel at each club following published
135 guidelines.²² Injuries were recorded if they had taken place during soccer-related activity and
136 resulted in a player being unable to participate in training or competition for a minimum of 24
137 hours following the occurrence or onset of injury. Players were considered injured until
138 approved by club medics to return to training and availability for match selection. 'Days
139 missed' were calculated as the difference between the date of injury and the date of return to
140 full training and selection availability. Only injuries sustained during the investigated season
141 were analysed, meaning that if players began the season injured, existing injuries were not
142 recorded. Injury history was unavailable for this study, with no players excluded on the basis

143 of previous injury. Injuries were categorised based on those most frequently recorded in a
144 previous injury audit for this cohort.²³ Non-contact injuries were those without a clear incident
145 involving contact with another player, the ball or another object, with each injury category
146 including contact and non-contact injuries unless stated. Muscle and ligament/tendon injuries
147 were investigated collectively as ‘soft-tissue injuries’ and also as separate categories due to
148 different tissue structures and injury aetiology.²⁴

149

150 *Statistical analyses*

151 Prevalence, days missed and incidence were analysed for each injury category. Injury
152 prevalence proportions (IPP)²⁵ were calculated with 95% confidence intervals and compared
153 between groups using binomial regression to determine whether the proportions (%) of players
154 suffering at least one injury or remaining injury-free during the season differed between groups.
155 Comparison of days missed between groups was conducted by Kruskal-Wallis H test of
156 variance or Mann-Whitney U test (data not normally distributed, presented as median and
157 interquartile range), including only players who had suffered at least one injury for each
158 respective category. Individual exposure minutes from training and matches were available for
159 116 ASP from England, Spain and Brazil (age: 18.2 ± 1.9 years, height: 1.80 ± 0.07 m, body
160 mass: 73.6 ± 8.5 kg). Injury incidence rates (IIR) for these players are presented as number of
161 injuries/1000 hours with 95% confidence intervals.²⁶ IIRs were calculated relative to total
162 exposure (the sum of training exposure plus match exposure combined), because not all injury
163 records specified whether an injury had occurred in training or a match. A generalised linear
164 model assuming a Poisson distribution, with exposure hours as an offset representing time at
165 risk, was used to derive rate ratios (RR) with 95% confidence intervals for each injury category.
166 Statistical significance was accepted at $p < 0.05$. Statistical analyses were performed using R

167 (version 3.5.1) for comparisons of IPP and IIR. Comparisons of days missed were performed
168 using IBM SPSS version 25.0 (Armonk, NY, USA).

169

170 **Results**

171 *Total injuries and days missed*

172 A total of 261 injuries were recorded resulting in 7,149 days missed (19.5 ± 42.3 per injury).

173 As expected, more than half (61.0%) were non-contact. The most common types of injury were
174 muscle (36.4%) and ligament/tendon (30.3%), whilst the most common locations were the
175 thigh (29.9%), knee (20.7%) and ankle (15.3%).

176

177 *Injury prevalence proportion (IPP)*

178 Details of IPP when ASP were grouped according to individual playing position, and by CENT
179 and LAT/FWD positions are presented in Table 1. No difference in IPP was observed
180 according to playing position for any injury category, with or without GK ($P \geq 0.104$ and $P \geq$
181 0.089 , respectively). No differences in IPP were observed when segregating ASP by activity
182 profile for any injury category with GK included ($P \geq 0.210$) or excluded ($P \geq 0.212$), although
183 there was a non-significant tendency for thigh injury IPP to be higher in LAT/FWD players
184 than GK (18.7% vs. 2.9%, $P = 0.051$).

185

186 *TABLE 1 AROUND HERE*

187

188 *Days missed*

189 Details of days missed for each category are presented in Table 2. The cumulative days missed
190 per player due to injury in any category did not differ by playing position, with or without GK
191 ($P \geq 0.235$ and $P \geq 0.239$, respectively). Similarly, cumulative days missed for any injury

192 category did not differ between CENT, LAT/FWD and GK ($P \geq 0.083$). With GK excluded,
193 there was a tendency for CENT to have missed more days from ankle injuries than LAT/FWD
194 (median (interquartile range) = 41.5 (48.0) vs. 18.0 (26.5), $P = 0.053$). No further differences
195 in days missed were observed for any other injury category ($P > 0.05$).

196

197 *TABLE 2 AROUND HERE*

198

199 *Injury incidence rates (IIR)*

200 Incidence rates for a large sub-sample of ASP with exposure records available ($n=116$) are
201 presented in Table 3. For specific positional roles, general IIR was lower for LD (RR = 0.45
202 (0.24 – 0.80), $P = 0.009$) and GK (RR = 0.43 (0.17 – 0.89), $P = 0.038$) compared to CD.
203 Similarly, soft-tissue IIR was lower for LD (RR = 0.38 (0.15 – 0.85) $P = 0.026$) and GK (RR
204 = 0.22 (0.04 – 0.75) $P = 0.041$) compared to CD. The IIR of ligament/tendon injuries was lower
205 for LD than CD (RR = 0.21 (0.03 – 0.77) $P = 0.040$). No other differences were observed
206 between playing positions. When segregating ASP based on activity profile, general IIR was
207 lower for LAT/FWD (RR = 0.71 (0.50 – 1.00) $P = 0.047$) and GK (RR = 0.46 (0.19 – 0.93) P
208 = 0.048) compared to CENT, with soft-tissue IIR lower for GK than CENT (RR = 0.24 (0.04
209 – 0.78) $P = 0.049$). No other differences were observed between activity profiles.

210

211 *TABLE 3 AROUND HERE*

212

213 **Discussion**

214 This study is the first to comprehensively investigate the potential influence of playing position
215 on injury in male academy soccer players (ASP), accounting for the confounding effect of
216 maturation in a large cohort ($n=369$) recruited from numerous academies in multiple countries.

217 The main findings were that, when exposure records were considered in a large sub-sample of
218 ASP ($n=116$), the injury incidence rate (IIR) of all injuries from one season was higher for
219 CENT than LAT/FWD and GK (8.67 *vs.* 6.12 and 3.95 injuries per 1000 hours, respectively).
220 Analysis of specific positional roles suggests the differences between outfield players were
221 primarily driven by higher IIR in CD *versus* LD for general injuries, soft-tissue injuries and
222 ligament/tendon injuries. With a lack of difference in injury *prevalence* between positions, the
223 position-dependent differences in injury *incidence* highlight the importance of recording
224 exposure when investigating injury risk according to playing position in this population, and
225 indicate that injury prevention strategies should be a focus in ASP employing central positions.

226 Based on activity profile data,^{3,19} we hypothesised that relatively more LAT/FWD
227 would be injured than CENT, and that relatively fewer GK would be injured than outfield
228 positions. The LAT/FWD players in this study tended to suffer relatively more thigh muscle
229 injuries than GK, potentially due to more sprints involving high-intensity eccentric contractions
230 of the hamstrings and the quadriceps.⁸ These actions lead to indicators of muscle damage,²⁷
231 which could increase the susceptibility to muscle strain injuries. Other studies of ASP report
232 fewer injuries for GK than outfield positions using odds ratios,¹² incidence rates,^{11,14} and
233 percentages of players injured,¹⁵ but without statistical comparison of those data. In studies
234 with statistical analyses, GK suffered more hand and upper body injuries, and fewer ankle
235 injuries, than outfield positions in a study of 14- to 16- year old players.¹³ However, our
236 statistical analysis of IPP across all playing positions, with and without GK, suggests that the
237 proportion of ASP who suffer injuries during a season is unaffected by playing position.

238 Days missed through injury did not differ according to playing position either, although
239 CENT tended to miss more days across the season from ankle injuries than LAT/FWD (41.5
240 *vs.* 18.0 median days). This could be a consequence of more tackles occurring in central
241 positions or more jumping and landing by CD,¹⁰ potentially leading to more severe injuries.

242 When exposure minutes were accounted for, however, the IIR for all injuries was greater in
243 CENT compared to LAT/FWD and GK, suggesting ASP in central positions are at greater risk
244 of injury in general. Comparison of specific outfield roles revealed that the rate of all injuries,
245 soft-tissue injuries and ligament/tendon injuries were statistically higher for CD than LD (Table
246 3). A greater frequency of tackling and blocking could increase the risk of contact injury in
247 CD, with the requirement to jump and land regularly from heading the ball potentially
248 increasing their risk of ligament and/or tendon injury⁹. Although no specific injury location
249 was associated with playing position, ankle IIR appeared to be higher in CD compared to other
250 positions (Table 3), thus perhaps lending some support to the aforementioned hypothesis.
251 However, this finding was not significant, likely due to the relatively low prevalence of ankle
252 injuries. A lack of difference between outfield positions in non-contact and non-contact soft-
253 tissue injuries suggests that the differences we report could be influenced by actions involving
254 physical contact, and it is possible that the lack of difference for more specific injury categories
255 is due to the relatively low number of injuries recorded. Further investigation in larger cohorts
256 is required to explain these apparent playing position-specific differences in the IIR of injuries
257 in ASP. However, our data highlight that it is important to account for exposure when
258 investigating position-specific injury risk in ASP.

259 Previously in English academy research, defenders and midfielders were most
260 commonly injured in 9-19 year-olds,¹⁴ with more thigh muscle injuries for midfielders than
261 defenders and GK in another cohort aged 8-16 years¹⁶. However, none of these studies
262 accounted for maturation, which has been shown to influence injury risk in ASP¹⁸. One recent
263 study reported a higher IIR for central midfielders than other positions in 18 to 21 year old
264 (most probably post-PHV) ASP¹¹, thereby supporting our findings. However, in contrast to our
265 sample size, this study included only 41 players from just one academy, and investigated solely
266 overuse injuries. Whilst not controlling for maturity status, another study separated French

267 ASP by chronological age,¹⁵ reporting that U12-U15 LD and U16-U20 CD and CM suffered
268 more match injuries than other positions in their respective age groups. However, these data
269 did not undergo statistical analyses, and an U12-U15 group is likely to contain players at
270 various stages of maturation²¹. To circumvent the influence of maturity status on injury,¹⁸ we
271 only investigated post-PHV players, which also removes any confounding influence of younger
272 age groups playing with fewer players on smaller pitches that might also affect training and/or
273 match volume and intensity¹⁹ (and potentially injury).

274 Discrepancy amongst previous studies may also be influenced by different methods
275 used to categorise playing position. Specifically, some have grouped defensive and midfield
276 ASP by central or lateral roles,^{11,15} and others as defensive, midfield or forwards.¹²⁻¹⁴ The latter
277 represents the ‘traditional’ method, predating literature describing different match actions in
278 lateral and central players from defensive and midfield positions.^{10,19} This is a major limitation
279 due to the difference between central and lateral players in the ability to perform actions that
280 can determine match outcome^{1,19}. We addressed this problem directly, performing separate
281 analyses of ASP according to their specified playing position *and* as central or lateral/forward
282 players. For example, when analysed by activity profiles, our IIR data indicated a higher rate
283 of general injuries in centrally-positioned ASP (defenders and midfielders combined), and our
284 additional analysis according to specific positional roles provided further insight, suggesting
285 that this finding was primarily driven by injuries to central defenders. In combination with the
286 steps taken to circumvent the influence of maturity status on injury¹⁸ and using a large sample
287 of ASP from multiple academies and countries (thus, increasing external validity), the present
288 study provides novel and robust evidence regarding the association of playing position with
289 injury in ASP.

290 As well as the advantages of our study, we acknowledge some limitations. Firstly, we
291 did not quantify the intensity of activities undertaken by ASP, which limits our ability to

292 explain position-specific differences in IIR. Future studies should seek to include detail on
293 players' match/training load to investigate associations between these variables and injury.
294 Exposure records were also not available for all players in our study. However, our sub-sample
295 detected differences between position groups, demonstrating the importance of including
296 exposure hours in this type of study. It should be noted that we did not analyse training and
297 match injuries separately due to a lack of distinction at the point of recording. This might affect
298 the ability to detect the true rate of match injuries, because players spend a greater proportion
299 of time training than they do playing matches, though injuries typically occur more frequently
300 during competition¹⁸. To advance our analyses, future studies should seek to record injuries
301 and exposure hours separately for training and matches in large samples of ASP.

302

303 **Conclusion**

304 This study is the first to investigate the association of playing position with injury in ASP from
305 multiple academies across four nations and two continents, thus demonstrating high external
306 validity of our findings. While there was no association between playing position and injury
307 prevalence proportion, or days missed, injury incidence rate was higher in central players,
308 specifically central defenders, which may be linked to the greater frequency of tackles and
309 jumping and landing in these outfield playing positions. These findings have implications for
310 playing position-specific training and recovery, where centrally-positioned players
311 (particularly central defenders) may benefit from additional focus on injury prevention
312 strategies. Importantly, the lack of difference regarding injury prevalence and days missed in
313 the present study highlights the need to incorporate exposure minutes when investigating
314 position-specific injury differences in ASP.

315

316 **Conflict of Interest**

317 None declared.

318

319 **Ethical Approval**

320 The study received approval from the University Research Ethics Committee and was

321 performed in accordance with the Declaration of Helsinki. Written informed consent to

322 participate in this study was provided by club officials and players, with parental consent and

323 player assent collected for all participants less than 16 years of age.

324

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Table 1. Injury Prevalence Proportion (IPP, %) and 95% Confidence Intervals (CIs) for Each Injury Category According to Playing Position and Activity Profile.

| | Playing position | | | | | | Activity profile | | |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | GK | CD | LD | CM | LM | FWD | GK | CENT | LAT/FWD |
| | <i>n</i> = 34 | <i>n</i> = 66 | <i>n</i> = 56 | <i>n</i> = 97 | <i>n</i> = 59 | <i>n</i> = 57 | <i>n</i> = 34 | <i>n</i> = 163 | <i>n</i> = 172 |
| Injury category | IPP (95% CIs) | | | | | | IPP (95% CIs) | | |
| 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) |
| Non-contact | 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/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) |
| Non-contact 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/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) |
| Hamstring 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) |

GK, goalkeeper; *CD*, central defender; *LD*, lateral defender; *CM*, central midfielder; *LM*, lateral midfielder; *FWD*, centre-forward; *CENT*, central playing positions; *LAT/FWD*, lateral and forward playing positions.

Table 2. Number of Days Absent Per Injured Player for Each Injury Category According to Playing Position and Activity Profile. Data Are Median and Interquartile Range (IQR).

| | Playing position | | | | | | Activity profile | | |
|-------------------------|------------------|---------------|---------------|---------------|---------------|---------------|------------------|----------------|----------------|
| | GK | CD | LD | CM | LM | FWD | GK | CENT | LAT/FWD |
| Injury category | <i>n</i> = 34 | <i>n</i> = 66 | <i>n</i> = 56 | <i>n</i> = 97 | <i>n</i> = 59 | <i>n</i> = 57 | <i>n</i> = 34 | <i>n</i> = 163 | <i>n</i> = 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) |
| Non-contact | 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/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) |
| Non-contact 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 | - | - | - | - | 10.0 (4.0) | - | - | - | 8.0 (-) |
| Low back/sacrum/pelvis | - | 95.0 (193.3) | 88.0 (-) | 14.0 (-) | - | 9.0 (14.3) | - | 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 | - | 40.0 (63.0) | 28.0 (35.0) | 43.0 (59.0) | 17.0 (30.0) | 10.0 (22.5) | - | 41.5 (48.0) | 18.0 (26.5) |
| Thigh | - | 21.0 (22.5) | 19.5 (29.3) | 17.5 (20.5) | 12.0 (34.8) | 21.0 (30.5) | - | 18.0 (19.0) | 17.0 (30.5) |
| Hamstring muscle | - | 21.0 (-) | 6.0 (-) | 18.0 (37.0) | 16.0 (43.8) | 22.0 (35.8) | - | 19.5 (22.8) | 12.0(35.0) |

GK, goalkeeper; *CD*, central defender; *LD*, lateral defender; *CM*, central midfielder; *LM*, lateral midfielder; *FWD*, centre-forward; *CENT*, central playing positions; *LAT/FWD*, lateral and forward playing positions.

Table 3. Injury Incidence Rates (IIR, Number of Injuries per 1000 Hours' Exposure) and 95% Confidence Intervals (CIs) for Each Category According to Playing Position and Activity Profile in a Sample of ASP with Exposure Records (N = 116)

| | Playing position | | | | | | Activity profile | | |
|-------------------------|---|------------------------|---|------------------------|------------------------|-----------------------|--------------------------------------|------------------------|--------------------------------------|
| | GK | CD | LD | CM | LM | FWD | GK | CENT | LAT/FWD |
| | <i>n</i> = 12 | <i>n</i> = 27 | <i>n</i> = 18 | <i>n</i> = 24 | <i>n</i> = 20 | <i>n</i> = 15 | <i>n</i> = 12 | <i>n</i> = 51 | <i>n</i> = 53 |
| Exposure (hours) | 1,770 | 4,085 | 3,592 | 3,528 | 3,587 | 3,277 | 1,770 | 7,612 | 10,455 |
| Injury category | IIR (95% CI) | | | | | | IIR (95% CI) | | |
| General | 3.95[†] (1.02 – 6.88) | 9.30 (6.34 – 12.26) | 4.18[†] (2.06 – 6.29) | 7.94 (5.00 – 10.88) | 7.81 (4.91 – 10.70) | 6.41 (3.67 – 9.15) | 3.95* (1.02 – 6.88) | 8.67 (6.58 – 10.76) | 6.12* (4.62 – 7.62) |
| Non-contact | 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) | 5.14 (2.94 – 7.34) | 1.95[†] (0.51 – 3.39) | 4.25 (2.10 – 6.40) | 4.74 (2.49 – 6.99) | 3.66 (1.59 – 5.73) | 1.13* (0.44 - 2.70) | 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) | 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) |
| Non-contact 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) |
| Hamstring 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) |

*Lower compared to CENT; †lower compared to CD; GK, goalkeeper; CD, central defender; LD, lateral defender; CM, central midfielder; LM, lateral midfielder; FWD, centre-forward; CENT, central playing positions; LAT/FWD, lateral and forward playing positions.