

Incidence and Body Region Distribution of Reported Football (Soccer) Injuries: Insights from a National Insurance Database

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Abstract Football (soccer) is associated with a substantial risk of injury, yet population-based nationwide data covering all levels of play over extended time periods remain limited. This study aimed to describe the distribution of injuries among licensed players (≥ 15 years) within the Swedish Football Association, examine variations by age and sex, and assess whether the previously observed decline in knee injuries in Swedish football in the early 2010s has persisted over time.

All football-related injuries ($n=118,564$) reported to the Folksam Insurance Group between 2006 and 2025 were included. Injuries were analysed by sex, age, body region and type, and the proportion resulting in permanent medical impairment (PMI) was quantified. Injury incidence was examined over time and were restricted to 2006–2023 due to changes in player registration in 2024–2025.

Lower-extremity injuries dominated, accounting for 63% of all cases. Females showed a higher overall injury incidence than males and a greater likelihood that injuries resulted in PMI (18% vs 13%). Knee injuries had the highest PMI risk (29% in females; 25% in males), and knee ligament injuries represented the largest share of PMI cases. Knee injury incidence declined steadily from 2006 to 2023, indicating a sustained decline over time, although multiple factors may have contributed. Despite this encouraging trend, lower-extremity injuries, particularly knee injuries, continue to represent the greatest burden in Swedish football, underscoring the ongoing need for targeted injury-prevention strategies.

Keywords Insurance data, Lower extremity, Nationwide, Soccer players.

I. INTRODUCTION

Football (soccer) is one of the most widely played sports globally and is characterised by intermittent high-intensity actions, including accelerations, decelerations, rapid changes of direction, and frequent player-to-player contact. Previous studies consistently demonstrate that football is associated with a high risk of injury, with most injuries affecting the lower extremities [1]. Importantly, injury patterns differ between male and female players, particularly with respect to injury type and anatomical location. For example, muscle and tendon injuries are more common in males, whereas joint and ligament injuries are more frequent in females. In adolescent female football players, injuries are predominantly located in the lower extremities—especially the ankle and knee—and injury incidence has been shown to be higher under conditions of increased playing demands [2].

Lower extremities account for the majority of cases [1–5], and knee injuries, often involving the anterior cruciate ligament (ACL), are among the most severe [1][3][6]. Cruciate ligament (CL) injuries result in extensive rehabilitation with long-term absence from sport of for least six months of rehabilitation after surgery before returning to sport [7]. Many athletes will continue to have problems one to two years after an ACL reconstruction and CL injuries often result in permanent medical impairment (PMI) [8].

Given the considerable burden associated with knee injuries, various injury prevention strategies have been developed and implemented in football. In Sweden, a neuromuscular training program (the Knee Control Program, KCP) was introduced in 2005 and subsequently implemented nationwide from 2010 onwards. The program includes core and lower-limb strength training, proprioceptive exercises, and movement-control drills, and is designed to be completed within 10–15 minutes as part of regular team training sessions. Prior to national implementation, the KCP demonstrated substantial efficacy in reducing ACL injuries among adolescent female players, with a 64% reduction observed in a large cluster-randomised controlled trial [9]. At the population level, a decline in knee and CL injuries has been reported during the period 2006–2015 [4], although multiple factors may have contributed to this trend.

While knee injuries represent one of the most well-documented severe injury types in football, they represent

only one part of the overall injury burden experienced by players. Football players sustain a broad range of injuries with varying mechanisms, severity, and long-term consequences, yet relatively few studies have examined the full spectrum of injuries across different age groups and levels of play [4,6]. Moreover, the long-term impact of injuries has rarely been systematically assessed, particularly in relation to outcomes such as permanent medical impairment. In Sweden, however, all licensed football players are insured through the same insurer, providing a unique opportunity to identify injuries resulting in PMI. PMI is assigned when an injury leads to enduring functional loss and is graded on a percentage scale independent of occupation or sporting level [13]. Such grading systems have historically been used to identify injuries most likely to lead to lifelong complications and, consequently, to inform prioritisation of prevention efforts [14]. Studying football injuries, a PMI perspective is therefore essential for understanding their long-term impact and for directing prevention efforts toward those with the greatest enduring burden.

The aim of this study was to describe the distribution of injuries among licensed players (≥ 15 years) within the Swedish Football Association at a national level, and to analyse how injury patterns vary by age and sex, as well as whether the injury resulted in PMI. A further objective was to determine whether the previously observed nationwide decline in knee injuries in Swedish football has been sustained in recent years.

II. METHODS

Folksam Insurance Group (Folksam) provides comprehensive insurance coverage for all members of the Swedish Football Association—from beginners to elite players. The insurance applies during training sessions, association-related activities and competitive matches, ensuring protection throughout every aspect of participation. This 19-year retrospective study includes all football-related injury event reported to Folksam by licensed players (aged 15 years or older) within the Swedish Football Association between 1 January 2006 and 31 December 2025 ($n=118,564$ unique injury event 87,698). Of these, 74.0% involved male players and 26.0% involved female players. Individual players may contribute multiple injury events, as more than one injury could be reported by the same player during the study period. The study has been approved by the Swedish Ethical Review Authority (Dnr 2018/711-31/5). Participant consent is governed by the insurance agreement, which includes a provision requiring their consent to contribute to research. As such, individual consent from each injured participant was not required.

Registered players in the Swedish Football Association

Annual data on registered players, including age and sex, were obtained from the Swedish Football Association. The number of registered players (aged 15 years or older) increased steadily from 2006; however, a marked decline in 2024–2025 reflects a change in the registration system whereby licences were removed for players without match participation in the preceding three years (Fig. 1).

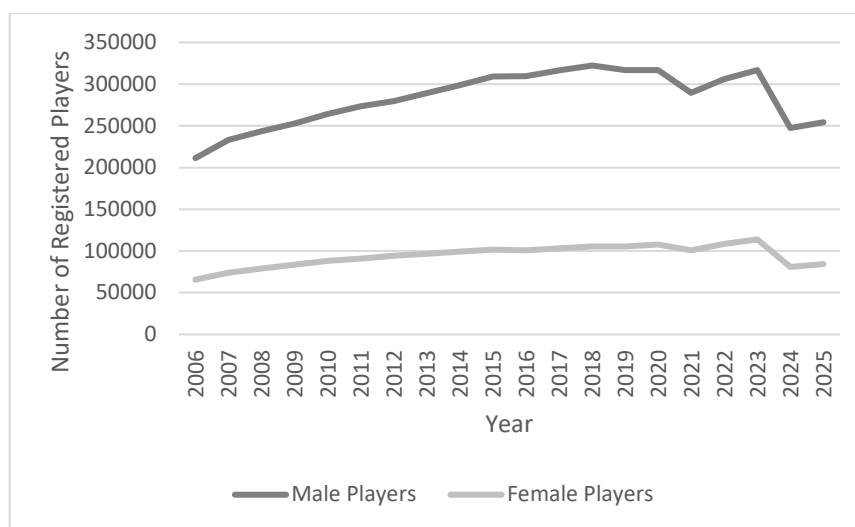


Fig. 1. Annual number of registered players (male and female) in the Swedish Football Association from 2006 to 2025

Definition of injury

A sports injury was defined as physical damage sustained by an athlete during participation in football-related activities, including training and matches, organized by the sports federation or club. Acute injuries eligible for inclusion were defined as traumatic events resulting from a single, clearly identifiable incident, in line with established consensus definitions [10]. From 1 April 2015, the insurance coverage was expanded to include overuse injuries, defined as injuries resulting from cumulative microtrauma without sufficient recovery. Prior to this date, only acute injuries were recorded in the database. At the same time, the compensation criteria for permanent medical impairment (PMI) were revised, such that only injuries resulting in a functional reduction of $\geq 15\%$ were eligible for compensation. The degree of PMI was determined by the insurance company 1–2 years after the injury and graded on a scale from 1 to 99% [11].

Injury reporting and classification

Injuries were reported to Folksam either by the athlete or, in the case of minors, by a parent or guardian, using telephone reporting or an online submission system. The insurance-based reporting system captures injuries requiring medical attention, as a medical assessment within seven days is required for a claim. The present study includes all athletes who underwent a medical assessment within seven days post the incident. As a result, all injuries were included regardless of severity level or type of healthcare provider involved. Although the majority of diagnoses were made by physicians, some assessments were completed by other qualified healthcare professionals, such as physiotherapists.

Each injury was classified according to both injury type and anatomical location. Body regions were grouped into five categories: head and neck (including facial injuries), torso, upper extremities and lower extremities. Injury types were categorised into six groups: fracture, dislocation/rupture, sprain/strain, laceration/abrasion /contusion, concussion, and multiple injury types. The latter category refers to cases in which the athlete sustained more than one distinct injury in the same event.

Statistical Analysis

Descriptive statistics, including frequencies and percentages, were conducted on all available variables using IBM SPSS Statistics version 28. The injury incidence was calculated separately by sex and age group by dividing the number of injury events by the number of registered players and multiplying by 1,000 and expressed as “injuries per 1,000 players”. Incidence calculations were restricted to the period 2006–2023 to ensure comparability over time, as changes in the player registration system affected denominator data in later years. The incidence of PMI was calculated as the proportion of all registered injuries for the period 2006–2014. Analyses were restricted to players aged <50 years to ensure stable case numbers across age groups. The Risk Ratio (RR) was calculated to compare the risk between gender, obtained by dividing the injury incidence in females by that in males [12]. Pearson’s chi-squared test was used to analyse differences in distributions for categorical variables. All analyses were two-sided, with a significance level set at $p < 0.05$.

III. RESULTS

A total of 118,564 athletes submitted insurance claims to Folksam during the 2006–2025 period (Table I). Over these 19 years, six fatalities were recorded: four related to acute medical events of cardiac or vascular origin, one resulting from a cervical spine fracture, and one involving a road-traffic accident that occurred while traveling home from a football match. In total, male players predominated, with 74% of the injured players being male. The average age of the players was 23 years (range 15–82 years), with female players being slightly younger on average (21.5 years compared with 23.6 years for male players). The proportion of injured players declines with age for both sexes, with females generally showing higher injury proportions at younger ages, while the total number of licensed players decreases across age groups and remains higher among males (see Appendix). The incidence of injured players has increased in general since the insurance coverage was expanded 2015, but the increase was higher among female players and among the age group 15–19 years (Fig. 2 and Fig. 3 (see also Appendix)). The proportion of injuries as well as the incidence were highest among the youngest age groups.

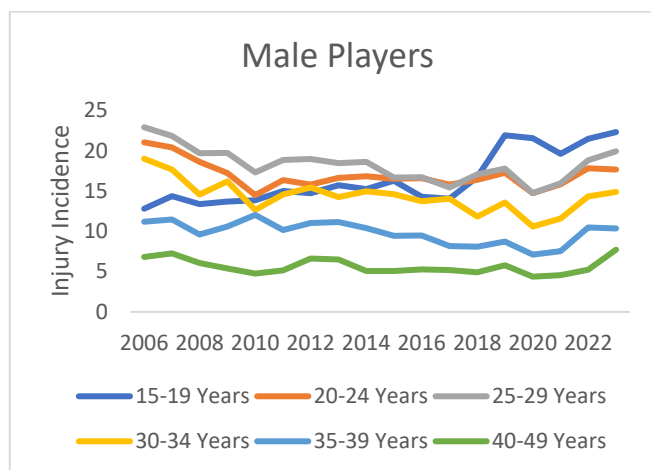


Fig. 2. Annual injury incidence among male football players from 2006 to 2023, stratified by age group (15–19, 20–24, 25–29, 30–34, 35–39 and 40–49).

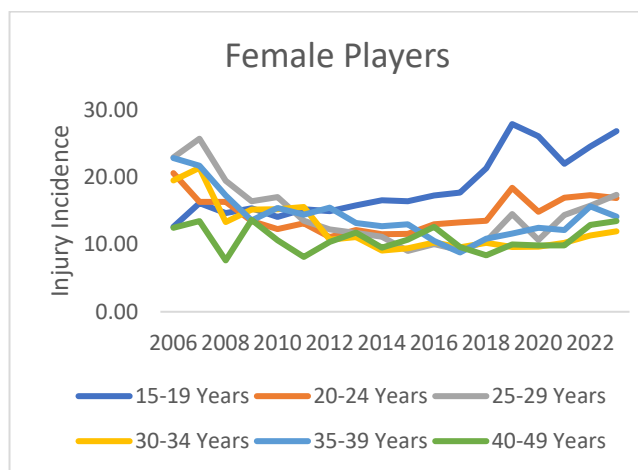


Fig. 3. Annual injury incidence among female football players from 2006 to 2023, stratified by age group (15–19, 20–24, 25–29, 30–34, 35–39 and 40–49 years).

Injury Body Region

Lower extremity injuries were the most frequently reported, accounting for 63% of all cases, followed by upper extremity injuries (18%) and head and neck injuries (15%). Within the lower extremity category, knee injuries represented the largest subgroup (55%), highlighting the predominance of knee trauma among football-related injuries. Between 2006 and 2025, a total of 40,554 knee injuries were reported. Upper extremity injuries were primarily related to the hand and fingers (43%) and the shoulder (29%). Head and neck injuries most commonly involved the face (38%), with tooth injuries (33%) and concussions (12%) also frequently reported.

TABLE I

INJURIES BY BODY REGION AND SEX. SUB-CATEGORY PERCENTAGES REFER TO THE SHARE OF INJURIES WITHIN EACH MAIN BODY REGION.

Body Region	Total	Male	Female
Head and Neck injuries	18,035 (15.2%)	14,478 (16.5%)	3557 (11.5%)
Skull/brain	3363 (18.5%)	2440 (16.9%)	896 (25.2%)
Verified Concussion*	2174 (12.1%)	1509 (10.4%)	665 (18.7%)
Face	6859 (38.0%)	5850 (40.4%)	1009 (28.4%)
Eye	751 (4.2%)	590 (4.1%)	161 (4.5%)
Tooth	5958 (33.0%)	4833 (33.4%)	1125 (31.6%)
Cervical Spine	671 (3.7%)	422 (2.9%)	249 (7.0%)
Multiple injuries	204 (1.1%)	163 (1.1%)	41 (1.2%)
Unspecified location	256 (1.4%)	180 (1.2%)	76 (2.1%)
Upper Extremity	20,764 (17.5%)	16,889 (19.2%)	3875 (12.5%)
Shoulder	5923 (28.5%)	5160 (30.6%)	763 (19.7%)
Upper Arm	273 (1.3%)	233 (1.4%)	40 (1.0%)
Elbow	966 (4.7%)	742 (4.4%)	224 (5.8%)
Forearm	971 (4.7%)	793 (4.7%)	178 (4.6%)
Wrist	3379 (16.3%)	2496 (14.8%)	883 (22.8%)
Hand/Finger	8913 (42.9%)	7201 (42.6%)	1712 (44.2%)
Multiple upper extremity injuries	65 (0.3%)	53 (0.3%)	12 (0.3%)
Unspecified location	274 (1.3%)	211 (1.2%)	63 (1.6%)
Torso	3827 (3.2%)	3015 (3.4%)	812 (2.6%)

Sternum/Ribs/Upper Back	2160 (56.4%)	1715 (56.9%)	445 (54.8%)
Abdomen incl. Organs	377 (11.0%)	336 (11.1%)	41 (5.0%)
Lower Back	409 (11.0%)	311 (10.3%)	98 (12.1%)
Spine, undefined	488 (11.0%)	351 (11.6%)	137 (16.9%)
Multiple trunk injuries	70 (11.0%)	60 (2.0%)	10 (1.2%)
Unspecified location	323 (11.0%)	242 (8.0%)	81 (10.0%)
Lower extremity	74,288 (62.5%)	52,010 (59.2%)	22,278 (71.9%)
Hip/Thigh	11,960 (16.1%)	8735 (16.8%)	3225 (14.5%)
Knee	40,554 (54.6%)	26,858 (51.6%)	13,696 (61.5%)
Lower Leg	5507 (7.4%)	4449 (8.6%)	1058 (4.7%)
Ankle	8398 (11.3%)	6106 (11.7%)	2292 (10.3%)
Foot/Toe	7341 (9.9%)	5470 (10.5%)	1871 (8.4%)
Multiple lower extremity injuries	171 (0.2%)	126 (0.2%)	45 (0.2%)
Unspecified location	357 (0.5%)	266 (0.5%)	91 (0.4%)
Unknown Body Region/ Other Type of Injury	989 (0.8%)	733 (0.8%)	256 (0.8%)
No diagnosis recorded	978 (0.8%)	776 (0.9%)	202 (0.7%)
Total Number of Injuries	118,881	87,901 (74.0%)	30,980 (26.0%)
Total Number of Footballplayer	118,564	87,698 (74.0%)	30866 (26.0%)

*Included in Skull/brain

Although the absolute number of injuries was higher in males, the injury rate per 1,000 registered players was slightly higher among females (RR=1.03, 15.42 for females compared to 14.96 for males). Females showed a higher proportion of lower limb injuries Overall, 55% of the injuries to the lower extremity were knee injuries, with corresponding proportions of 52% among males and 61% among females. However, between 2006 and 2025 knee injury rates per 1,000 players have declined over time (Fig. 4 and 5). Females were in general associated with higher risk of a knee injury (RR=1.65, 2.90 for females and 1.76 for males).

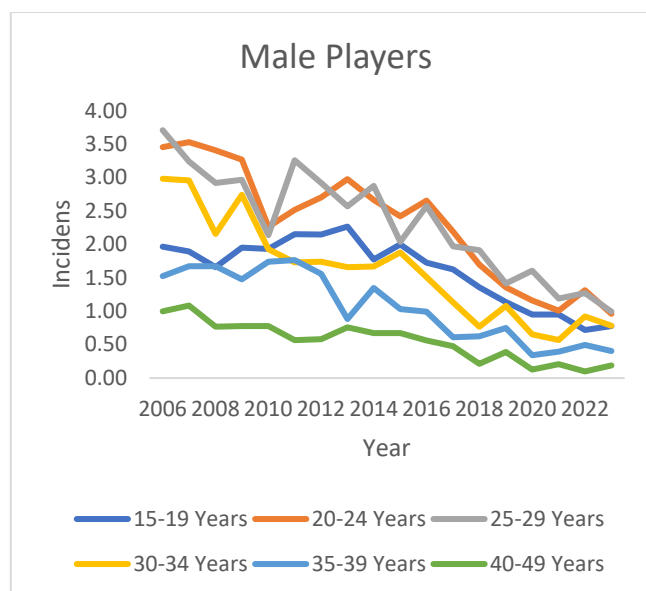


Fig. 4. Knee Incidence among Male Football Players by age group (15–19 to 50–59 years) from 2006 to 2023.

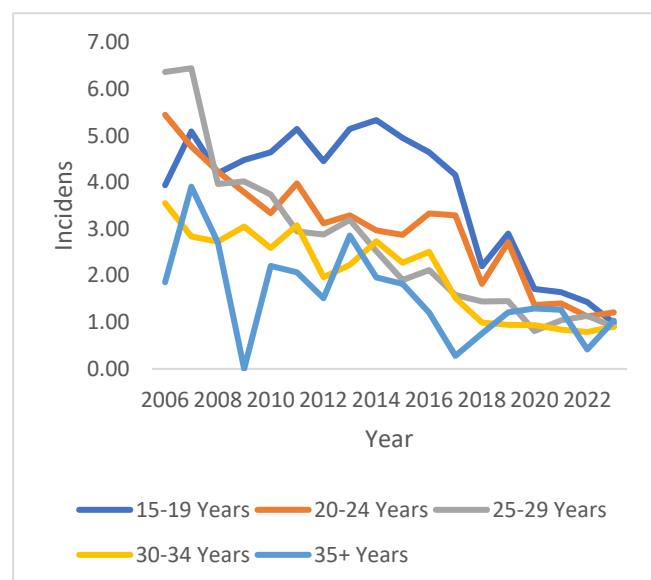


Fig. 5. Knee Incidence among Female Football Players by age group (15–19 to 35+ years) from 2006 to 2023.

Injury Type

The most frequently seen injury types were dislocation/rupture (24%) followed by sprains/strains (23%) and fracture (21%) (Table II). Fractures accounted for 21% of all cases (24,458), with a higher proportion in males (23%) compared with females (14%). A higher proportion of dislocation/rupture and sprain/strain were reported among female players. Concussions represented 2% of all injuries (2,174), with equal proportions in males and females.

TABLE II
INJURIES DIVIDED INTO INJURY TYPE AMONG MALE AND FEMALE PLAYERS

Injury Type	Total	Male	Female
Concussion	2174 (2%)	1509 (2%)	665 (2%)
Dislocation / Rupture	28,348 (24%)	20,271 (23%)	8,077 (26%)
Fracture	24,458 (21%)	20,039 (23%)	4,419 (14%)
Laceration / abrasion / contusion	21,384 (18%)	16,056 (18%)	5,328 (17%)
Multiple injury types	579 (0%)	445 (1%)	134 (0%)
Sprain / strain	26,846 (23%)	18,407 (21%)	8,439 (27%)
Other defined / unknown	13,848 (12%)	10,231 (12%)	3,617 (12%)
Death	6 (0%)	5 (0%)	1 (0%)
No information recorded	921 (1%)	735 (1%)	186 (1%)

Injuries Resulting in Permanent Medical Impairment

Between 2006 and 2014, a total of 6,623 injuries resulted in PMI, accounting for 14% of all reported injuries during this period (Table III). Among the injuries that resulted in PMI, 70% were among male players and 30% among female players. Lower extremity injuries accounted for 77% of all cases resulting in PMI, followed by upper extremity injuries at 14%. Knee ligament injuries represented 61% of all PMI cases among females and 43% among males and these injuries were associated with the highest PMI risk for both sexes (39% in female players and 38% in male players). The risk that a dislocation/rupture, regardless of body region, resulted in PMI was 30%. The corresponding figure for fractures was 12%. Furthermore, 2% of all reported concussions resulted in PMI. Overall, the risk of sustaining an injury that resulted in PMI was higher among female players compared with male players, with a total PMI risk of 18% in females and 13% in males. Compared with injured players in general, female players with injuries leading to PMI were slightly younger (20.9 vs. 21.5 years). Among male players, no difference in mean age was observed (23.7 vs 23.6 years).

TABLE III
INJURIES LEADING TO PMI DIVIDED INTO BODY REGIONS AMONG MALE AND FEMALE PLAYERS

Injured Body Region	Number of injuries leading to PMI	Male	Female	Total Number of Injuries 2006–2014	Risk of PMI (%)
Head and Neck	217	162	55	9361	2,3%
Upper Extremities	923	753	170	6309	14,6%
Trunk and Back	390	342	48	3792	10,3%
Lower Extremities	5074	3341	1733	25,494	19,9%
Spine*	6	4	2	159	3,8%
Other injuries	13	12	1	962	1,4%
Total Number of Injuries	6623	4614	2009	46,077	14,4%

I. DISCUSSION

This nationwide study provides the most comprehensive overview to date of football injuries and their long-term consequences in Sweden. Consistent with previous studies, lower extremity trauma accounted for the majority of injuries, with knee injuries representing the single most common subtype [1-3][5-6]. The observed sex

differences, higher injury incidence and higher PMI risk among female players, also align with previous studies that female athletes face elevated knee injury risk. Females tend to sustain more joint and ligament injuries, whereas males more frequently experience muscle-related injuries.

The present findings are in line with a previous nationwide registry study from higher-level athletes in Sweden, which reported that female players have more than a threefold higher incidence of ACL injury requiring reconstruction compared with male players when exposed to similar levels of participation [8]. Although the magnitude of the effect differs, the results in the present study similarly demonstrate an elevated risk of knee injury among females, supporting the notion of a consistent sex-related vulnerability to knee injuries in football (RR=1.65, 2.90 for females and 1.76 for males). The higher proportion of knee ligament injuries contributing to PMI among females further underscores this disparity. The previously documented decline in knee injuries [4], following national implementation of the Knee Control Program (KCP), appears to have persisted, although this trend may also be influenced by other factors.

The results from the present study confirm a continued downward trend in knee injury incidence at the national level across age groups and playing levels. However, the observed trend cannot be attributed to any single intervention and may reflect the influence of multiple factors. The pattern is nevertheless consistent with earlier findings suggesting potential benefits of preventive efforts such as the KCP. The dataset in the present study extends ten years beyond the previously published period and demonstrates that the downward trend identified by Åman *et al.* [4]. The incidence of knee ligament injuries continues to decrease markedly after 2015, with proportionally greater reductions among female players consistent with earlier evidence that KCP may have preventive effects in female football.

Overall, the pattern of injury demonstrates that although football injuries affect all body regions, lower extremity trauma—particularly knee injuries—dominates the injury pattern, while head/face injuries and concussions represent important clinical concerns due to their specific management implications.

Interestingly, players sustaining injuries that resulted in PMI were not older than the overall injured population. This contrasts with patterns reported in other sports, such as equestrian activities, where PMI-related injuries tend to occur more frequently among older athletes [14]. In the present study, female players with PMI-related injuries were in fact slightly younger than injured female players overall, and no age difference was observed among male players. This deviation from expected age patterns may be partly explained by the high proportion of ACL injuries within the PMI category. ACL ruptures are known to affect younger athletes at relatively high rates, particularly in competitive environments where players may progress to higher levels of play at an early age. The increased physical intensity, higher match tempo, and greater exposure to contact and cutting manoeuvres may therefore contribute to a disproportionate burden of serious knee injuries among younger players. Interestingly, [8] reported higher ACL-reconstruction incidence among second-division female athletes compared with those in the highest division, suggesting that younger or less professionally supported athletes may face greater injury vulnerability—consistent with the age patterns observed in the present study.

This study provides a unique national-level perspective on football injuries by analysing 19 years of nationwide insurance data. It offers comprehensive insights into overall injury incidence, the distribution of injuries across body regions, and gender- and age-related patterns. Knee injuries remained the most common injury type, and knee ligament injuries constituted the leading cause of PMI, accounting for 61% of all PMI-related injuries among female players and 43% among male players. Despite these differences in injury burden, the likelihood that an anterior cruciate ligament (ACL) injury resulted in PMI was comparable between sexes, with 38% of ACL injuries leading to PMI in both female and male players. Given that ACL injuries frequently result in prolonged absence from play and that many players are unable to return to their pre-injury level of performance, continued efforts to prevent these injuries remain critically important.

Limitation

A limitation related to the denominator data is the change in the player registration system during the later years of the study period, which led to the exclusion of data from 2024–2025 in the incidence analyses. Although this approach ensured comparability over time, it may have introduced some uncertainty and potentially affected the estimation of injury incidence.

A further limitation concerns changes in the insurance system in 2015, which may have influenced the identification of injuries resulting in permanent medical impairment (PMI). In particular, the later period may be affected by under-ascertainment of less severe impairment outcomes, which is why analyses of PMI were

restricted to the earlier years.

In addition, increased awareness of the insurance system and expanded coverage after 2015 may have influenced reporting behaviour over time, potentially contributing to the observed increase in injury incidence.

Finally, the insurance-based reporting system captures injuries requiring medical attention and may therefore underrepresent minor injuries that do not lead to healthcare contact.

II. CONCLUSION

Lower extremity injuries, especially knee injuries, are the predominant acute injuries in Swedish football and represent the major contributor to long-term functional impairment. Female players have a higher overall injury incidence and a higher risk of sustaining an injury resulting in permanent medical impairment. Encouragingly, knee injury incidence has continued to decline over nearly two decades, indicating a sustained decline over time. This trend coincided with the implementation of nationwide preventive efforts such as the 'Knee Control Program', although causality cannot be established. These findings underscore the importance of sustained and targeted injury-prevention strategies, particularly for young and female players.

III. ACKNOWLEDGEMENTS

The author would like to thank the Swedish Football Association for providing access to annual data on the number of registered and active players, which was essential for calculating injury incidence rates.

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V. APPENDIX

TABLE A1.

NUMBER OF LICENSED PLAYERS, NUMBER OF INJURED PLAYERS, AND INJURY INCIDENCE PER 1,000 PLAYERS BY SEX AND YEAR.

Year	Male Player	Injured Male Player	Incidence per 1000 Male Players	Female Player	Injured Female Player	Incidence per 1000 Female Players
2006	211,290	3368	15.9	65,636	1020	15.5
2007	233,136	3801	16.3	74,125	1283	17.3
2008	243,437	3595	14.8	79,145	1215	15.4
2009	252,626	3725	14.7	83,606	1249	14.9
2010	264,128	3563	13.5	87,986	1220	13.9
2011	273,558	4025	14.7	90,955	1294	14.2
2012	279,719	4118	14.7	94,369	1227	13.0
2013	289,381	4335	15.0	96,572	1306	13.5
2014	298,710	4426	14.8	99,287	1305	13.1
2015	309,186	4468	14.5	101,742	1289	12.7
2016	309,460	4327	14.0	100,768	1365	13.5
2017	316,424	4220	13.3	103,033	1364	13.2
2018	322,316	4577	14.2	105,416	1562	14.8
2019	316,860	5149	16.3	105,611	2030	19.2
2020	316,727	4497	14.2	107,844	1811	16.8
2021	289,429	4252	14.7	100,908	1723	17.1
2022	306,001	5129	16.8	108,362	2018	18.6
2023	316,694	5474	17.3	113,832	2213	19.4

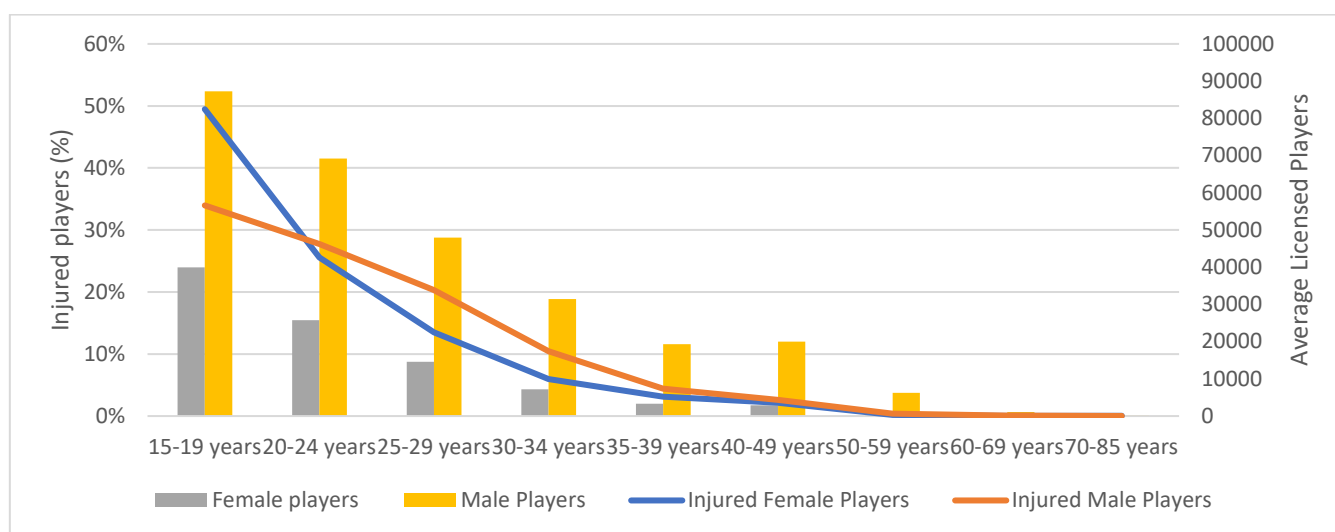


Fig A1. Proportion of injured players (%) and number of licensed players by age group and sex.

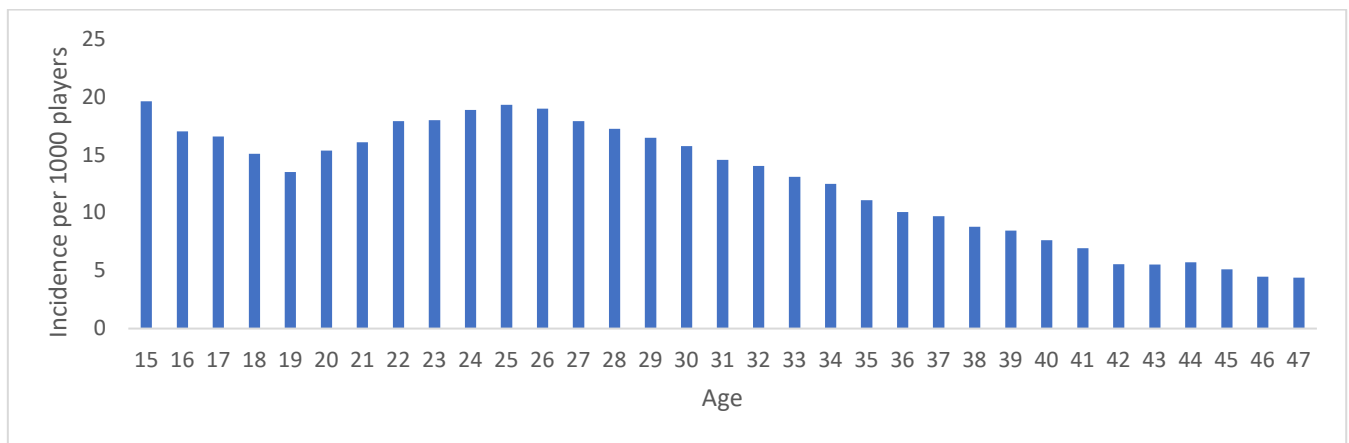


Fig A2. Incidence among Male Player by Age

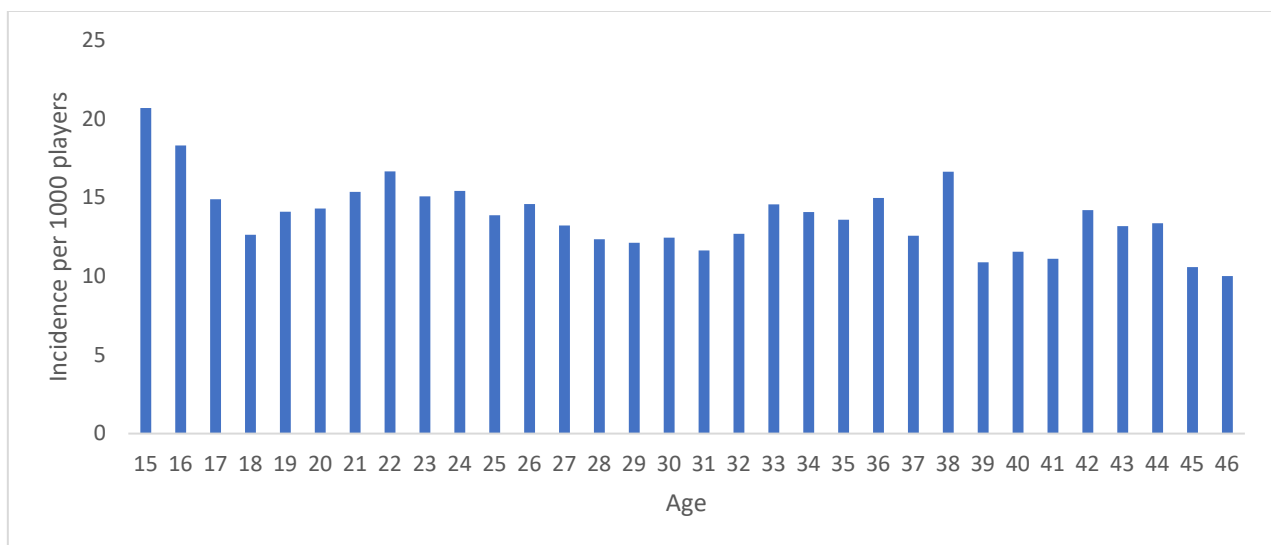


Fig A3. Incidence among Female player by Age