Injury and Illness in Non-Football Collegiate Athletics: a Single University, 8-Year Retrospective Analysis

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Abstract

This study examines injury and illness incidence across collegiate sports to identify patterns and inform targeted interventions. Injury reports from 23 teams between 2012–2013 and 2019–2020 were stratified by gender, sport, and anatomic location. A total of 1854 athletes sustained 4937 injuries, with 2444 (49.5%) in female athletes and 2493 (50.5%) in male athletes. Across all sports, injury rates were between 0.50–1.65 injuries per athlete per year. When comparing injuries in each body region by gender, women had an 8.76% higher incidence of lower extremity injuries compared with men ($p < 0.001$). Across all sports, injuries peaked near the beginning of the season, with each week having a 4.3% lower injury rate compared with the previous. In summary, injury rates varied significantly between sports but were largely comparable between genders when accounting for sport, body region, and year. The only observed gender difference was an 8.76% higher incidence of lower extremity injuries in women, highlighting the need for continued research in this area. Perhaps more novel, the elevated injury rates at the start of training and competition seasons underscore the need to understand the balance between early-season training workloads and injury risk.

Introduction

There are approximately 8.6 million sports injuries in the US per year with about 3 million injuries being severe enough to lead to emergency room visits[1–3]. To contextualize that volume, a study of UK soccer players identified that the risk of acute injury in professional players is up to three times greater than in construction, manufacturing, and service jobs[4]. Beyond the acute injures, a related issue is the sequelae of these primary injuries. For example, retired professional soccer players, both male and female show a high prevalence of knee osteoarthritis, and male athletes in impact sports have a 2–9 times higher risk of developing hip osteoarthritis compared to controls[5,6]. Although the mortality for most sports injuries is low, morbidity, secondary injury or disease, recurrence, chronic pain, and cost all remain persistent problems associated with primary sports injuries.

To gain a deeper understanding of sports injury epidemiology, time series data in a large population of athletes is necessary. Numerous studies have been conducted to investigate injury rates within specific athlete populations; however, these studies have focused on competition injuries, not the full continuum of athletic participation. As such, they are cross-sectionally designed, with a primary focus on single large-scale sporting events such as the Olympics. For example, the first large-scale Olympic study was done in 2004 where the incidence, characteristics, and causes of injuries were compared in all team sport competitions, resulting in a standardized methodology of injury tracking to compare more directly injury rates between sports (with soccer and handball having the highest relative risk overall)[7]. Other larger scale competitions such as the FINA World Championship for aquatic sports and the World Cup have also aimed to record and analyze athletic injuries at their events[8–13]. These studies were designed to be event specific and typically include no more than short-term follow-ups with athletes (< 1 year).

Though these cross-sectional studies are valuable in identifying target areas of acute sports injuries, they lack comprehensive data that encompasses the broader landscape of sports injuries.

Understanding gender-differences in athletic injuries is also significant because the participation of women in competitive sports has increased, and previous research has primarily focused on male athletes. A 2022 systematic review of athletic research studies published in the top six sports medicine journals from 2017 to 2022 found that of the 669 total, 70.7% isolated male athletes, 8.8% isolated female athletes, and 20.5% included both genders[14]. Yet, the popular press has claimed that women are at a higher risk of suffering from the most common sports injuries than men[15–17]. This appears to be correct for some injuries in some sports. For example, multiple studies have shown gender to be a factor in ACL injury risk with the rate of ACL rupture, with incidence up to three times higher in female athletes than male athletes[18–21]. Women have also been reported to have a greater risk of stress fractures than men[22–24]. For example, a retrospective study of fractures in athletes at a division 1 institution over the course of 14 years found no difference in overall fracture risk between genders[23], but women did have twice the incidence of stress fractures specifically, compared to male athletes. The incidence of stress fractures also varied by location, with women having a higher incidence in the foot men having a higher incidence in the ankle[23]. Only one longer-term epidemiological study has been done that focuses on gender differences across sports and injury types. In 2001, Sallis et al. [25] conducted a 15-year retrospective study of gender differences at a Division III college which found no statistical differences in injury patterns between genders in any sports except swimming and water polo. Although this is a start in examining what gender-differences may exist across multiple sports, it still does not look at when injuries occur within a season or by training volume.

Another risk factor for athletic injury that has been proposed is training volume. To develop more tailored injury prevention and management strategies, an understanding of training volume's exact effect on injury risk is necessary. The data associating training volume with injury risk, however, is inconsistent; some studies have found a significant association between higher training volumes and increased injury risk, while others have found no link. This disparity is likely due to complex interactions between training volume, injury risk, sport type, and potentially other factors.[26,27]. A systematic review of injuries in professional and non-professional rugby players attempted to explore the impact of training volume as well, but found that the lack of, or varying methods of reporting training volumes limited their ability to compare studies and investigate the associations between training volume and injury incidence. Together, these studies underscore the critical need for more standardized training data across multiple sports.

The development of injury prevention programs is a key focus area among athletes, physical therapists, clinicians, and coaches. Existing programs focus on the development of broad injury prevention strategies aimed at changing physical training techniques, but the scientific evidence on the efficacy of changing these techniques remains limited[28]. A systematic review of injury prevention programs in pre-elite and professional athletes found that there is a lack of evidence-based injury prevention programs for pre-elite athletes and those that do exist have a high risk of bias and poor reporting methods[29]. All of these programs require benchmark data on injury types and rates to help target implementation strategies and prove efficacy[34].

Given the lack of inter and intra-sport injury data over time, the lack of inter-sport-gender-specific injury data, the lack of data examining training volume, and the lack of data that can be used for retrospective comparison against intervention data, we have collected and reported our injury data across sports and genders for the last 10 years.

Methods

This 10-year retrospective study was approved by the University Human Subjects Research Program and includes 5296 participants. All methods were performed in accordance with the relevant guidelines and regulations, including the Declaration of Helsinki. Written informed consent for routine injury data collection was obtained from all athletes by the Athletics department at the time of data collection, and additional IRB approval was obtained for the retrospective analysis of de-identified cases. Injury data were de-identified prior to being made available to researchers.

Athletics at UCSD

UCSD athletics is composed of the following 23 men's and women's sports: Baseball/Softball, Basketball, Cross Country, Fencing, Rowing, Soccer, Swimming & Diving, Tennis, Track & Field, Volleyball, Water Polo, and Golf (Men's only). As of July 2024 all UCSD teams are Division 1, having all been Division 2 in the years prior. UCSD athletics has a team of athletic trainers, with each trainer supporting two teams, attending all practices, training sessions, and games. Two sports medicine physicians are also available to assess athletes as needed. From the Fall of 2012 to the Spring of 2022 (10 seasons) injury data on all UCSD collegiate athletes was recorded by each team's athletic trainer. Injury assessments were recorded in Presagia for data prior to 2020 and in Smartabase from 2020 to the present, including details on the time, place, and treatment plans.

Number of Players and Exposures

This study included 5296 total athletes over the 10-year period. Athlete count is defined as the total number of unique Intercollegiate Athletics (ICA) participants in each unique competition year. Athletes participate in their sport related activities for a maximum of 20 hours/week. These 20 hours are broken down into practice hours, conditioning hours, game hours, and depending on the sport occasionally club sport hours. Team coaches and trainers were consulted to identify training and competition loads on a per week basis. All CARA (countable athletically related activities) hours are kept in the ARMS platform.

Extraction of Data

Two separate databases, Presagia and Smartabase, were used over the 10-year period. Information from these databases was compiled, de-identified, and sorted to remove any duplicate entries. Though Club Sports injuries are recorded at UCSD, here the focus is only on ICA injuries.

Calculation of Incidence

Injuries were included if: 1) they were a new event, and 2) required intervention from athletic trainers or medical staff. Recorded events include injuries incurred by the athlete at any time, both game and training injuries as well as injuries incurred outside of sports related activities. All injury types and severities were included as well. Repeated interventions for the same injury were excluded. Data were subset by gender, sport, and general anatomic location. Incidence was calculated by normalizing total injury numbers each season by the number of athletes per team. Due to the varying training hours week to week in any given year, incidence was not normalized by training hours.

Data Aggregation Methods

Data were compiled by merging and deidentifying two databases. The following columns were retained and standardized across all incidents: Injury Date, Gender, Sport, Type of Injury, Body Region, and Academic Year. The type of injury was sorted and standardized across databases owing to both the differing input methods from each database and the lack of standardization between all trainers. Data were grouped by gender, sport, academic year, and body region for analysis. Total training hours for the 2022 season were also compiled for each of the participating sports and assumed to be the same for all years examined in the study. Owing to the multi-event nature of Track and Field, training hours varied greatly between athletes thus the sport was not included in training hour analysis.

Data Analysis

Removal of COVID Years

After an initial inspection of the data, the years 2020–2021 and 2021–2022 were excluded from the analysis. This decision was made owing to the significant changes in training protocols and the increase in student illness resulting from the COVID-19 pandemic. These factors rendered the data from these years unrepresentative of the overall athletic injury incidence trends. Consequently, the data from these years were removed to focus the analysis on the desired factors. Future studies may delve deeper into these specific years to explore how various factors influenced injury rates during this period. In total, there were 6249 injuries between the 2012–2013 and 2021–2022 academic years sustained by 2168 unique athletes. After the removal of years with seasons affected by COVID (2020–2021 & 2021–2022), a total of 4937 injuries sustained by 1854 unique athletes remained.

Statistical Methods

To assess injury rate per athlete, injury count per athlete per season was modeled through generalized estimating equation (GEE) models from a Poisson family with log link function, and sandwich estimator for the variance was used to account for potential overdispersion in the data and correlated injury data from the same athlete across seasons. Injury count was assumed to be zero for athletes in the team with no recorded injuries. Owing to a lack of information on how many non-injured athletes are the same person across multiple seasons, we also assumed zero injury count data were independent. The factors of interest in this study were Gender, Sport, Body Region, Academic Year, Season Week, and Training Hours. Season week was defined to start at the first week of in-season practice.

Injury incidence was summarized as mean (standard deviation), and 95% confidence intervals stratified by gender were estimated within each sport overall and for specific body regions using a GEE model with sport, gender and sport by gender interaction as predictors. Injury incidence between sports was also assessed using a GEE model with sport as the predictor. P-values and confidence intervals were adjusted by Bonferroni correction for multiple comparison as appropriate when estimating the injury rate by body region and comparing between sports and gender. Further, GEE models were used to assess the two-way interactions between body region with gender and sport.

The percentage of athletes with a given number of injuries in a season was summarized through boxplots. Additionally, injury trends were visualized by plotting average weekly injury incidence over the entire academic year. The effects of week of season and number of training hours on the injury rate were assessed with adjustment for gender, sport, body region, and academic year, incidence rate ratios (IRR) and 95% confidence intervals were used to summarize the effects. Analyses were conducted using SPSS version 29.0.2.0 and RStudio, version 4.3.0 (R Foundation for Statistical Computing) with two-tailed $P < 0.05$ indicating significance. The R source code for statistical analysis was included in supplemental material.

Results

Over the 8-year period, a total of 4937 injuries were sustained by 1854 unique athletes. Of those, 2444 injuries were sustained by 870 unique female athletes and 2493 injuries were sustained by 984 unique male athletes. Injury data from the 2012–2013 to 2019–2020 seasons are summarized in Table 1.

Table 1
Incidence of injury for the 2012–2013 to 2019–2020 seasons combined.

Sport	Gender	Average Yearly Injury Rate	95% CI	Total No. of Injuries	Total No. of Athletes
Baseball/Softball	F	1.31 (0.34)	(1.13, 1.49)	199	152
	M	1.20 (0.32)	(1.04, 1.34)	347	292
Basketball	F	1.60 (0.52)	(1.32, 1.88)	197	123
	M	1.55 (0.67)	(1.27, 1.79)	182	119
Crew	F	1.30 (0.23)	(1.16, 1.43)	447	343
	M	1.01 (0.29)	(0.87, 1.12)	336	336
Cross Country	F	0.92 (0.31)	(0.75, 1.10)	117	126
	M	0.64 (0.23)	(0.48, 0.79)	81	128
Fencing	F	0.93 (0.36)	(0.72, 1.14)	135	145
	M	0.70 (0.17)	(0.50, 0.88)	98	142
Golf	M	0.50 (0.24)	(0.17, 0.81)	37	75
Soccer	F	1.45 (0.46)	(1.26, 1.59)	332	231
	M	1.36 (0.18)	(1.20, 1.50)	297	219
Swimming/Diving	F	1.15 (0.45)	(0.94, 1.30)	262	233
	M	0.78 (0.29)	(0.61, 0.93)	168	218
Tennis	F	0.89 (0.29)	(0.65, 1.18)	88	96
	M	0.98 (0.26)	(0.76, 1.24)	106	106

Sport	Gender	Average Yearly Injury Rate	95% CI	Total No. of Injuries	Total No. of Athletes
Track and Field	F	0.73 (0.20)	(0.60, 0.87)	301	403
	M	0.86 (0.13)	(0.71, 0.96)	340	400
Volleyball	F	1.44 (0.39)	(1.22, 1.67)	181	125
	M	1.65 (0.36)	(1.45, 1.84)	285	172
Water Polo	F	1.14 (0.29)	(0.92, 1.30)	185	166
	M	1.00 (0.21)	(0.84, 1.18)	216	214

Injury incidence (SD) was calculated by taking the yearly # of injuries and dividing by the number of participating athletes, then taking the average across all years. 95% confidence intervals are from a GEE model including the interaction between gender and sport as predictors.

When comparing injury rates between genders only, female athletes experienced injuries at a rate 10.5% higher compared to male athletes (injury rates: 1.14 vs 1.03; IRR = 1.11; 95% CI: 1.04–1.18) (Supplementary Table S1). However, when adjusting for sport, body region, and academic year, the gender association was no longer significant (Supplementary Table S2), suggesting that differences in injury rates may be more strongly influenced by other factors.

Figure 1

a) Means and 95% CI of average yearly incidence for each sport. Men's Golf and Men's Cross Country had the lowest injury rates and Men's Volleyball and Women's Basketball had the highest. b) Pairwise comparisons of sports with statistically significant differences in injury rates

When pairwise comparisons between genders were made within sports (Fig. 1a), only Crew (injury rates: 1.30 vs 1.01; IRR = 1.30; Bonferroni adjusted 95% CI: 1.08–1.52) and Swimming/Diving (injury rates: 1.14 vs 0.78; IRR = 1.35; Bonferroni adjusted 95% CI: 1.05–1.64) showed a significant difference in injury rates between genders (Bonferroni adjusted p-values < 0.01) (Supplementary Table S3). There were, additionally, significant differences in injury rates between some sports ($p < 0.05$, Fig. 1b).

Many athletes sustained multiple injuries each season, with an average of 30.0% of female athletes and 27.5% of male athletes experiencing multiple (2 or more) injuries (Figure 2). The sports with the highest average percentage of repeated injuries were Men's Volleyball (45.1%), Women's Basketball (40.1%), and Women's Soccer (39.8%). Conversely, the sports with the highest average percentage of athletes who did not experience any injuries in a season were Men’s Golf (62.5%), Women’s Track and Field (52.2%), and Men’s Fencing (50.3%) (Supplementary Figure S1).

When examining the interactions between body region with gender and sport, the lower extremity accounted for the highest percentage of injuries for both men and women followed by the upper extremity and trunk (Fig. 3). Basketball and Soccer had the highest incidence of lower extremity injuries, while baseball/softball, water polo, and volleyball had the highest incidence of upper extremity injuries, and crew, basketball, and soccer had the highest incidence of trunk injuries (Table 2).

Table 2
Incidence of injury for each body region

Sport	Gender	Lower Extremity	Upper Extremity	Trunk	Head	Spine	Misc.
Baseball/Softball	F	0.57 (0.20)	0.37 (0.18)	0.19 (0.09)	0.10 (0.06)	0.07 (0.08)	0.01 (0.03)
	M	0.37 (0.15)	0.43 (0.10)	0.25 (0.04)	0.11 (0.10)	0.03 (0.04)	0.01 (0.01)
Basketball	F	0.75 (0.35)	0.28 (0.13)	0.32 (0.14)	0.15 (0.07)	0.09 (0.07)	0.00 (0.00)
	M	0.67 (0.39)	0.19 (0.16)	0.37 (0.12)	0.22 (0.11)	0.10 (0.09)	0.01 (0.02)
Crew	F	0.43 (0.16)	0.27 (0.09)	0.41 (0.11)	0.08 (0.06)	0.07 (0.05)	0.03 (0.02)
	M	0.29 (0.16)	0.18 (0.07)	0.37 (0.12)	0.05 (0.02)	0.10 (0.04)	0.02 (0.02)
Cross Country	F	0.63 (0.29)	0.07 (0.06)	0.16 (0.04)	0.01 (0.02)	0.05 (0.06)	0.01 (0.02)
	M	0.50 (0.23)	0.04 (0.05)	0.07 (0.06)	0.02 (0.03)	0.00 (0.00)	0.01 (0.03)
Fencing	F	0.42 (0.15)	0.18 (0.13)	0.17 (0.14)	0.11 (0.09)	0.03 (0.03)	0.02 (0.03)
	M	0.38 (0.15)	0.16 (0.07)	0.08 (0.05)	0.04 (0.04)	0.01 (0.03)	0.01 (0.03)
Golf	M	0.16 (0.12)	0.13 (0.10)	0.11 (0.11)	0.06 (0.13)	0.03 (0.05)	0.00 (0.00)
Soccer	F	0.82 (0.26)	0.11 (0.08)	0.33 (0.09)	0.14 (0.08)	0.01 (0.03)	0.03 (0.04)
	M	0.70 (0.12)	0.14 (0.05)	0.33 (0.12)	0.17 (0.08)	0.02 (0.03)	0.00 (0.00)
Swimming/Diving	F	0.36 (0.18)	0.33 (0.15)	0.27 (0.11)	0.11 (0.07)	0.06 (0.07)	0.02 (0.03)
	M	0.23 (0.12)	0.33 (0.14)	0.13 (0.06)	0.07 (0.03)	0.01 (0.03)	0.00 (0.01)
Tennis	F	0.43 (0.10)	0.21 (0.15)	0.14 (0.18)	0.04 (0.06)	0.06 (0.06)	0.01 (0.02)
	M	0.34 (0.21)	0.29 (0.16)	0.26 (0.06)	0.03 (0.04)	0.05 (0.05)	0.01 (0.03)

Sport	Gender	Lower Extremity	Upper Extremity	Trunk	Head	Spine	Misc.
Track and Field	F	0.42 (0.14)	0.06 (0.03)	0.18 (0.08)	0.04 (0.03)	0.03 (0.03)	0.01 (0.01)
	M	0.47 (0.06)	0.10 (0.05)	0.22 (0.07)	0.03 (0.02)	0.03 (0.03)	0.00 (0.01)
Volleyball	F	0.57 (0.21)	0.30 (0.12)	0.30 (0.21)	0.19 (0.08)	0.08 (0.07)	0.00 (0.00)
	M	0.64 (0.18)	0.43 (0.12)	0.30 (0.10)	0.21 (0.13)	0.07 (0.03)	0.01 (0.02)
Water Polo	F	0.30 (0.14)	0.40 (0.15)	0.23 (0.12)	0.16 (0.09)	0.05 (0.03)	0.00 (0.00)
	M	0.26 (0.09)	0.41 (0.06)	0.21 (0.08)	0.09 (0.09)	0.03 (0.05)	0.00 (0.00)

Injury incidence (SD) was calculated by taking the yearly # of injuries and dividing by the number of participating athletes, then taking the average across all years.

Incidences differed depending on sport (sport x body region interaction: $p < 0.001$). Although broadly the interaction between gender and body region was not statistically significant ($p = 0.12$), subgroup analyses on individual gender comparisons by body region identified some significant differences. Women had a 8.76% higher incidence of lower extremity injuries compared with men (IRR = 1.09; Bonferroni adjusted 95% CI: 1.03–1.14) while no other statistically significant differences (all Bonferroni adjusted p-values > 0.05) were observed in the other five body regions (difference in injury incidence between women and men: Head (0.92%), Miscellaneous (0.61%), Spine (1.1%), Trunk (1.9%), and Upper Extremity (-2.2%)) (Supplementary Table S4).

In terms of the timing of injuries and training volumes, incidence was highest near the beginning of the season (Fig. 4), with each week of the season being associated with a 4.3% lower injury incidence compared to the previous week (IRR = 0.957; 95% CI: 0.955–0.959); Supplementary Table S5) Adjusting for gender, sport, and academic year, this difference was significant. Similarly, each additional hour of training (either workout, practice, or game) was associated with an 8.3% increase in injury incidence (IRR = 1.083 (1.079, 1.087)) after adjusting for gender, sport, and academic year (Supplementary Table S6).

Discussion

The primary goal of this study was to analyze 8-years of retrospective athletic injury data with the goal of finding patterns of injury across time, body area, and comparing injury patterns between genders to examine potential sex-differences. Previous studies have been unable to examine injury patterns across all these variables due to the lack of published data that contain standardized methods of reporting, recording, and treating injuries. Sallis et al. were able to complete a similar study at a single institution, but no comparisons on injury patterns across time was made[18].

Across all sports, injury rates were between 0.50–1.65 injuries per athlete per year, with men's golf (0.50 ± 0.24) and men's cross country (0.64 ± 0.23) having the lowest injury rates and men's volleyball (1.65 ± 0.36) and women's basketball (1.60 ± 0.52) having the highest. Like the Sallis et al manuscript, women had a slightly higher injury incidence rate which they found to not be statistically significant[18]. Similarly, in our study, while our unadjusted model suggested a significant gender difference in injury rate, we found that after adjusting for sport, body region of injury, and academic year, the main effect of gender was no longer significant, suggesting that other factors more strongly drove variations in observed injury rates. When looking at individual sports, these authors did find a statistically significant gender difference in injury rates in swimming and water polo, with women having a higher incidence of injury in both[18]. Though no gender differences were found in water polo within this study, differences were found in crew and swimming/diving. Within swimming/diving, the women's team (injury rate = 1.14 (95% CI: 0.94, 1.30)) experienced a higher injury rate compared to the men's team (injury rate = 0.78 (0.61, 0.93)), and this difference was statistically significant (Bonferroni adjusted $p = 0.009$).

As expected, injury rates varied greatly between sports, with lower contact sports (Golf, Track and Field, Cross Country, Fencing) having lower injury rates overall. Similar breakdowns of injuries by body area were seen in the men's and women's sports with lower extremity injuries being the most prevalent in both groups (W: 45.9%, M: 42.4%), followed by Trunk (W: 20.0%, M: 22.2%), Upper Extremity (W: 19.6%, M: 22.3%), Head (W: 8.6%, M: 8.3%), Spine (W: 4.7%, M: 3.7%), and Other (W: 1.1%, M: 1.0%). These results agree with previous studies with the lower limb being the most injured body region consistently[6,17]. Overall, injury regions were remarkably similar between the men's and women's teams of corresponding sports with no statistical difference observed for most body regions except for the lower extremity. Though this investigation does not delve deeper into the types of injuries within each body region, this finding is partially supported by previous literature documenting higher rates of knee injuries in female athletes, highlighting a potential area for further investigation.[30,31]

Adjusted analysis revealed that across all sports, injury incidence spikes occurred at the beginning of the training season and competition season with each week of the season being associated with having a 4.3% lower injury rate compared to the previous week. Each additional hour of training (either workout, practice, or game) was associated with a 8.3% increase in injury rate. Future interventions focusing on modulating training volumes and intensities at the beginning of the academic year could have a dramatic effect on overall injury rates. This analysis serves as the first step in determining what areas need to be focused on when developing injury prevention, return to sport, and athletic training programs.

Multiple limitations in this study should be noted. First, all injury types, regardless of severity counted the same towards incidence rates. Because of how injuries were logged for the 10 years, a single injury would be logged as a single incidence, regardless of the duration of the injury. Additionally, due to a lack of data on athletes without injuries across seasons, zero-count observations were assumed to be independent, affecting 1541 observations with zero injuries over the 8 seasons. This approach limits our ability to account for correlated observations, such as athletes who were injury-free for multiple seasons. Furthermore, 2022 training hour data was extrapolated across the dataset, though it is possible that not all years reflected the exact same training hours. Training volumes may have varied over time due to factors like the transition from Division 2 to Division 1, changes in coaching, or shifts in athletic department practices. These findings highlight several potential areas for practical intervention. The elevated injury rates observed early in the season suggest that modifying training workloads during this period may help reduce injury risk. Strategies such as progressive workload increases, enhanced preseason conditioning, or closer monitoring of athlete readiness could be explored as part of injury prevention programs. Additionally, the higher incidence of lower extremity injuries in female athletes points to the value of implementing targeted interventions, such as neuromuscular training or sport-specific strengthening programs, aimed at reducing these injuries. Future work should evaluate the effectiveness of these approaches in mitigating early-season and gender-specific injury patterns. This study also treated all injuries equally in calculating incidence, regardless of severity or time loss. Future research would benefit from stratifying injuries by severity to provide more detailed insights into patterns of minor versus major injuries and to better inform targeted prevention strategies.

Declarations

Additional Information:

Competing interests

The author(s) declare no competing interests.

Author Contribution

- D.G.: Data collection, data analysis and statistical evaluation, manuscript writing and revisions.- N.B.: Data aggregation, manuscript writing and revisions.- K.T. and L.L.: Data analysis and statistical evaluation, manuscript writing and revisions.- Z.W., M.K., A.M.: Manuscript writing and revisions.- S.W.: Study oversight, data analysis and statistical evaluation, manuscript writing and revisions.

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Data Availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Figures

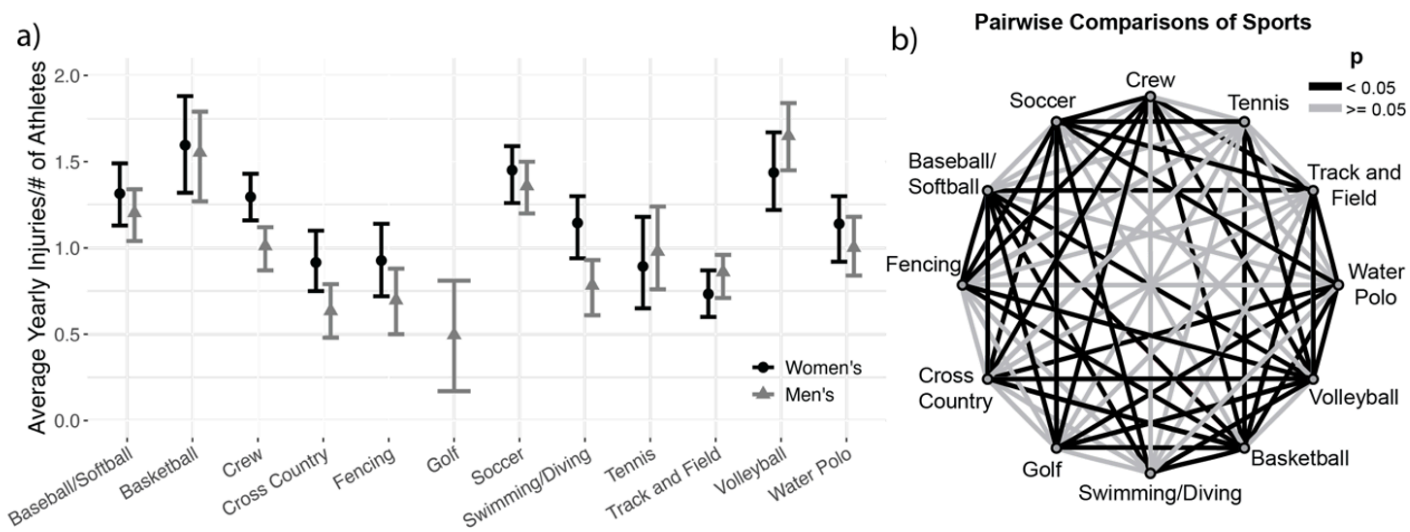

Figure 1

a) Means and 95% CI of average yearly incidence for each sport. Men’s Golf and Men’s Cross Country had the lowest injury rates and Men’s Volleyball and Women’s Basketball had the highest. b) Pairwise comparisons of sports with statistically significant differences in injury rates

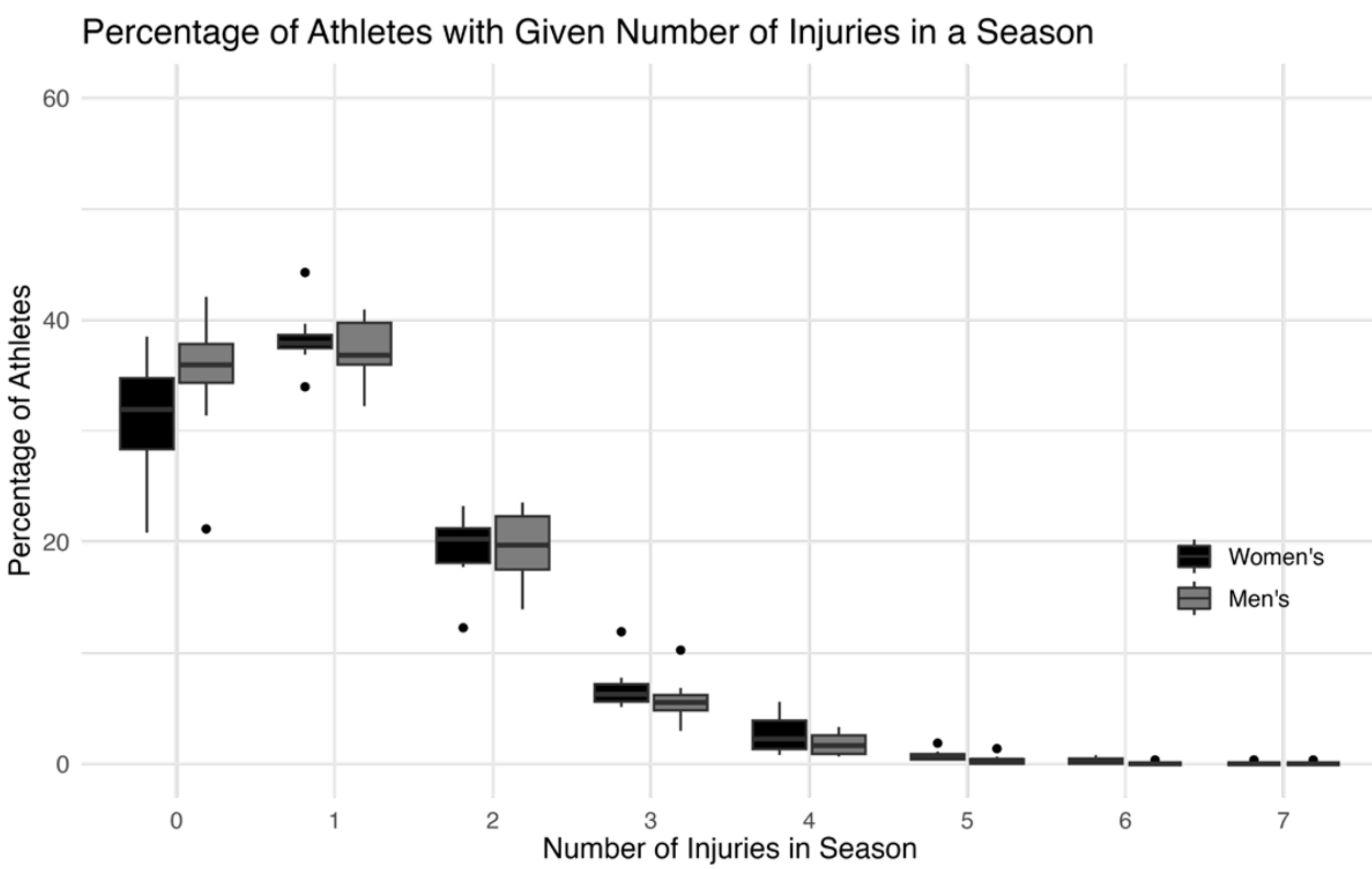

Figure 2

Average percentage of athletes who incurred a specific number of injuries per season across the eight seasons.

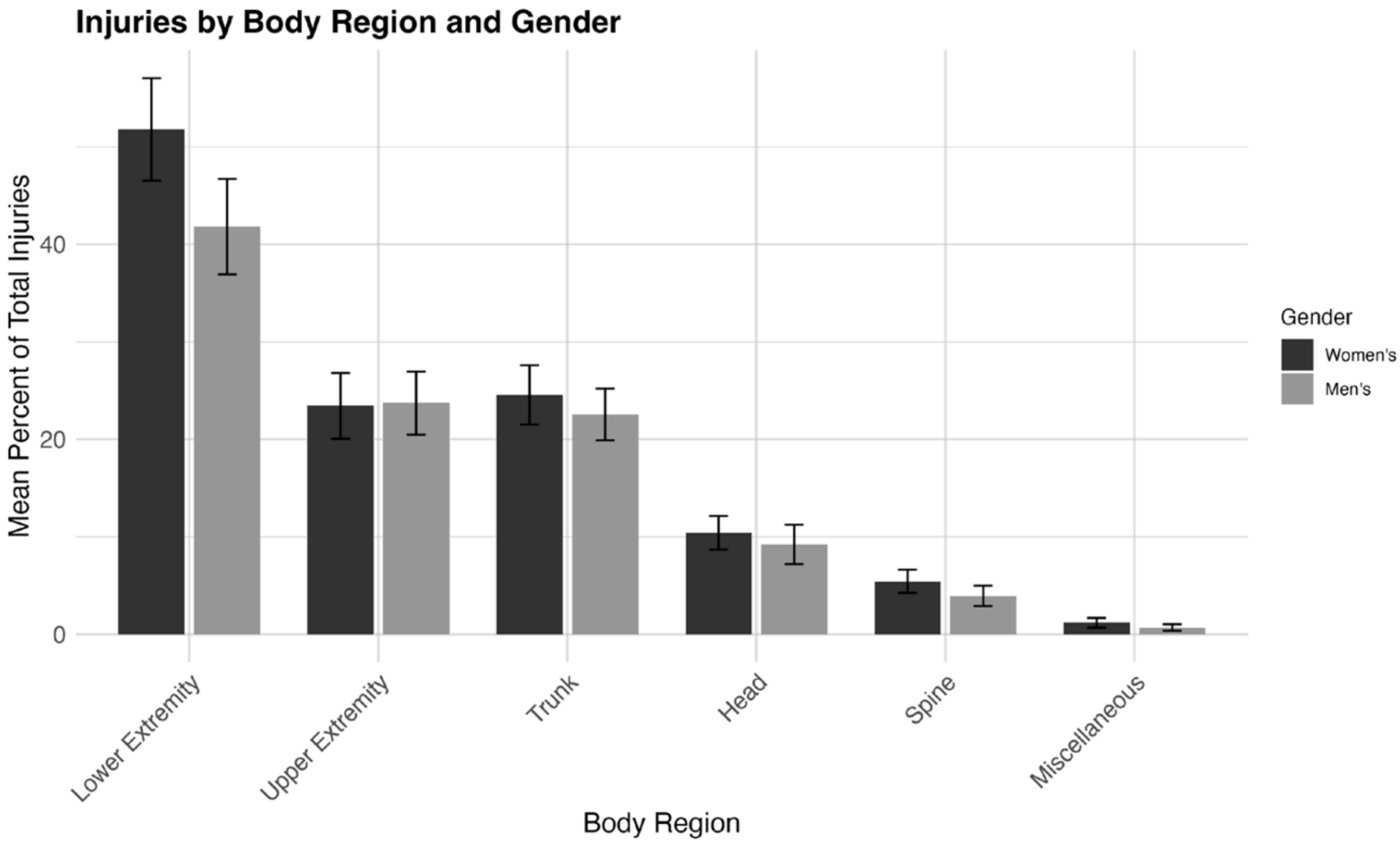

Figure 3

Mean injury incidence by anatomical location, separated by gender. Error bars represent the 95% confidence interval across academic years and sports.

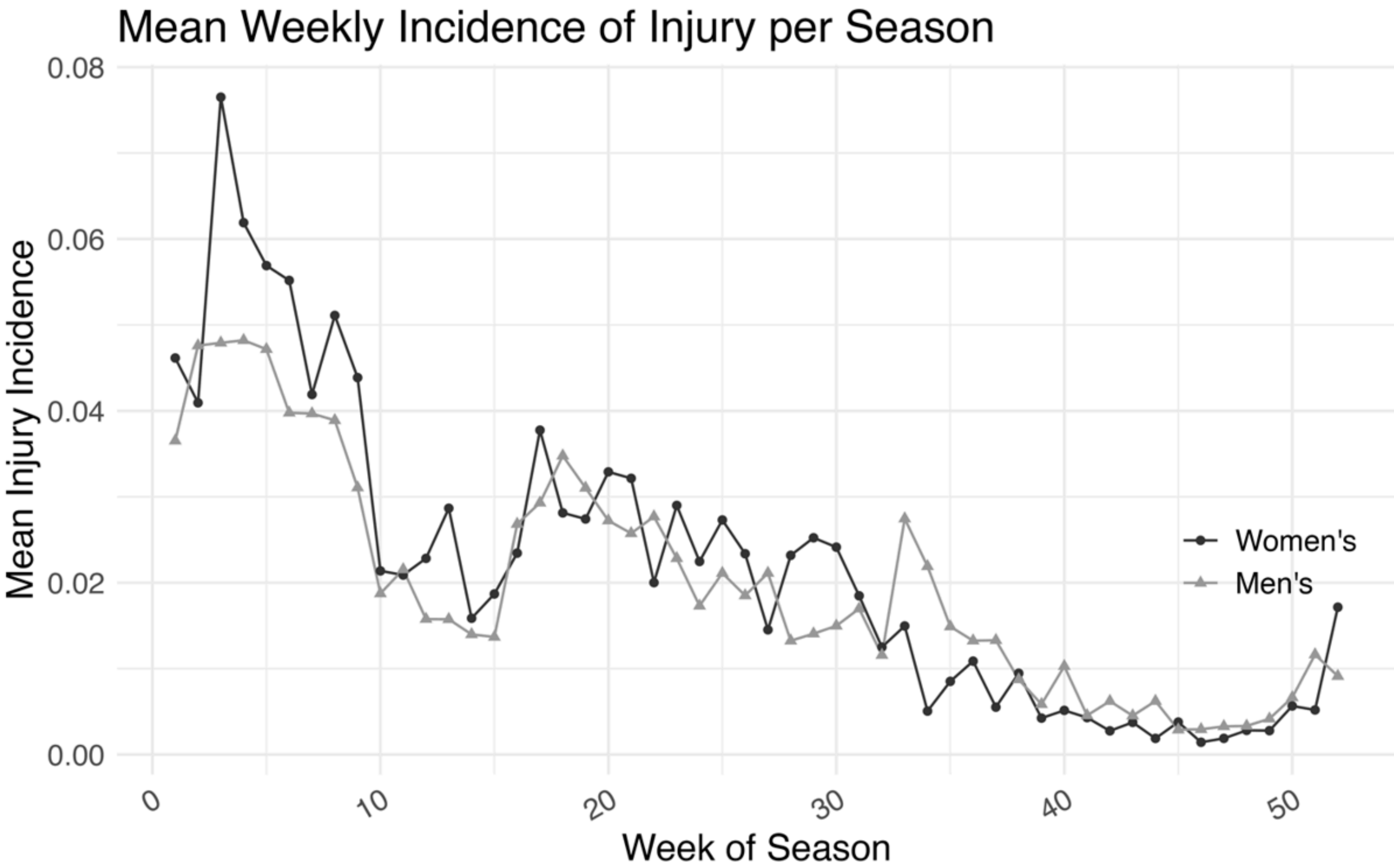

Figure 4

Mean Injury Incidence for all sports beginning at the first defined week of their training season. The decreased injury incidence around 10-15 weeks occurs around winter break.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- EpidemiologyAnalysisCode.pdf
- SupplementalFigTab.pdf
- DataFiles.zip