

# Epidemiology of Injuries in National Collegiate Athletic Association Women's Track and Field: 2014–2015 Through 2018–2019

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**Context:** Women's track and field events at the National Collegiate Athletic Association level have grown in popularity in recent years, and track and field athletes are vulnerable to a broad range of potential injuries.

**Background:** Routine examination of track and field injuries is important for identifying emerging patterns in injury incidence.

**Methods:** Exposure and injury data collected in the National Collegiate Athletic Association Injury Surveillance Program during the 2014–2015 to 2018–2019 academic years were analyzed. Injury counts, rates, and proportions were used to describe injury characteristics, and injury rate ratios were used to examine differential injury rates.

**Results:** The overall injury rate was 2.20 per 1000 athlete exposures; the competition injury rate was higher than the practice injury rate (injury rate ratio = 1.73; 95% confidence interval = 1.51, 1.97). Hamstring tears (8.9%), medial tibial stress syndrome (5.4%), and lateral ligament complex tears (4.2%) were the most reported injuries.

**Conclusions:** Given the results of this study, further attention may be directed toward factors associated with noncontact injury risk in the competitions. The changing injury rates of most reported injuries also warrant monitoring post 2018–2019.

**Key Words:** descriptive epidemiology, injury surveillance, NCAA track and field

## Key Points

- The overall competition injury rate was higher than the practice injury rate; the competition injury rate steadily decreased across the study period.
- Thigh injuries, lower leg injuries, and foot injuries accounted for the largest proportions of all reported injuries, and most reported injuries were classified as strains and inflammatory conditions.
- The most common specific injuries reported were hamstring tears, shin splints, and ankle sprains; rates of hamstring tears and ankle sprains increased during the last year of the study period.

Women's track and field events at the collegiate level have gained considerable traction in recent years. Indeed, women's track and field participation in the National Collegiate Athletic Association (NCAA) has been steadily increasing over the last 40 years, and in 2018–2019, 826 indoor teams and 928 outdoor teams participated in the NCAA national championship.<sup>1</sup> Importantly, the diverse nature of track and field events make these athletes susceptible to a broad range of both acute and chronic injury. Given the complex nature of the various events involved coupled with the growing popularity of the events, there is a need to monitor injury incidence in this context to identify injury prevention strategies and better inform clinical management.

The NCAA established an injury surveillance system in 1982 (now the NCAA Injury Surveillance Program [ISP])

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which has been used for routine monitoring of injury-related patterns among NCAA athletes of various sports.<sup>2,3</sup> Using data collected within the NCAA ISP, authors of previous studies have sporadically examined injuries among NCAA women's track and field athletes.<sup>4,5</sup> With that said, a dearth of comprehensive epidemiological studies of sport-related injuries exists in this population. In previous examinations, notably high rates of overuse injuries (15.76 per 10 000 athlete exposures [AEs]), as well as a considerable burden of severe injuries, have been reported among NCAA outdoor women's track and field athletes.<sup>4</sup> Most overuse and severe injuries in women's track and field occur to the lower leg and foot or ankle, with hamstring strains being more common in indoor track and field and hip flexor strains in outdoor track.<sup>4,5</sup> Targeted examinations such as the source of these findings are important in equipping clinicians with the requisite information to develop and implement injury prevention and management strategies tailored to this population. Routine and comprehensive epidemiological studies of sports-related

**Table 1. Reported and National Estimates of Injuries, Athlete Exposures (AEs), and Rates per 1000 AEs by Event Type Across Divisions<sup>a</sup>**

Division	Number AEs Rate/1000 AEs (95% CI)					
	Overall		Practices		Competitions	
	Reported	National Estimate	Reported	National Estimate	Reported	National Estimate
I	709	37 787	567	29 606	142	8181
	230 658	12 926 828	198 957	11 311 312	31 700	1 615 516
	3.07 (2.85, 3.30)	2.92 (2.70, 3.15)	2.85 (2.62, 3.08)	2.62 (2.38, 2.85)	4.48 (3.74, 5.22)	5.06 (4.33, 5.80)
II	309	8394	245	6417	64	1977
	194 602	5 935 230	170 466	5 194 811	24 136	740 419
	1.59 (1.41, 1.76)	1.41 (1.24, 1.59)	1.44 (1.26, 1.62)	1.24 (1.06, 1.42)	2.65 (2.00, 3.30)	2.67 (2.02, 3.32)
III	350	16 900	278	12 474	72	4426
	196 998	8 509 248	172 713	7 565 099	24 286	944 149
	1.78 (1.59, 1.96)	1.99 (1.80, 2.17)	1.61 (1.42, 1.80)	1.65 (1.46, 1.84)	2.96 (2.28, 3.65)	4.69 (4.00, 5.37)
Overall	1368	63 081	1090	48 497	278	14 585
	622 258	27 371 306	542 136	24 071 222	80 122	3 300 084
	2.20 (2.08, 2.31)	2.30 (2.19, 2.42)	2.01 (1.89, 2.13)	2.01 (1.90, 2.13)	3.47 (3.06, 3.88)	4.42 (4.01, 4.83)

<sup>a</sup> Data presented in the order of reported number, followed by AEs, estimated injury rates, and associated 95% CIs for each cross-tabulation of division and event types. Data pooled association wide are presented overall and separately for practices and competitions. National estimates were produced using sampling weights estimated based on sport, division, and year. All CIs were constructed using variance estimates calculated on the basis of reported data. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition and required medical attention by a team certified athletic trainer or physician (regardless of time loss). Only scheduled team practices and competitions were retained in this analysis.

injuries among NCAA women’s track and field athletes are needed. Accordingly, the purpose of this study was to describe the epidemiology of sports-related injuries captured among NCAA women’s track and field athletes between the 2014–2015 and 2018–2019 academic years.

**METHODS**

**Study Data**

Women’s track and field-related exposure and injury data collected in the NCAA ISP during the 2014–2015 to 2018–2019 academic years were examined in this analysis. The methods of the NCAA ISP have been reviewed and approved as an exempt study by the NCAA Research Review Board (RRB). Methods of the ISP are described separately within this special issue. Briefly, athletic trainers (ATs) at participating institutions contributed relevant injury and exposure data using their clinical electronic medical record systems. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition and required medical attention by a team AT or physician (regardless of time loss [TL]). Scheduled team practices and competitions were considered reportable exposures for this study. Data from 15 (2% of membership) participating programs in 2014–2015, 12 (1% of membership) in 2015–2016, 16 (2% of membership) in 2016–2017, 28 (3% of membership) in 2017–2018, and 61 (7% of membership) in 2018–2019 qualified for inclusion in analyses. Qualification criteria are detailed in the abovementioned methods manuscript.<sup>6</sup>

**Statistical Analysis**

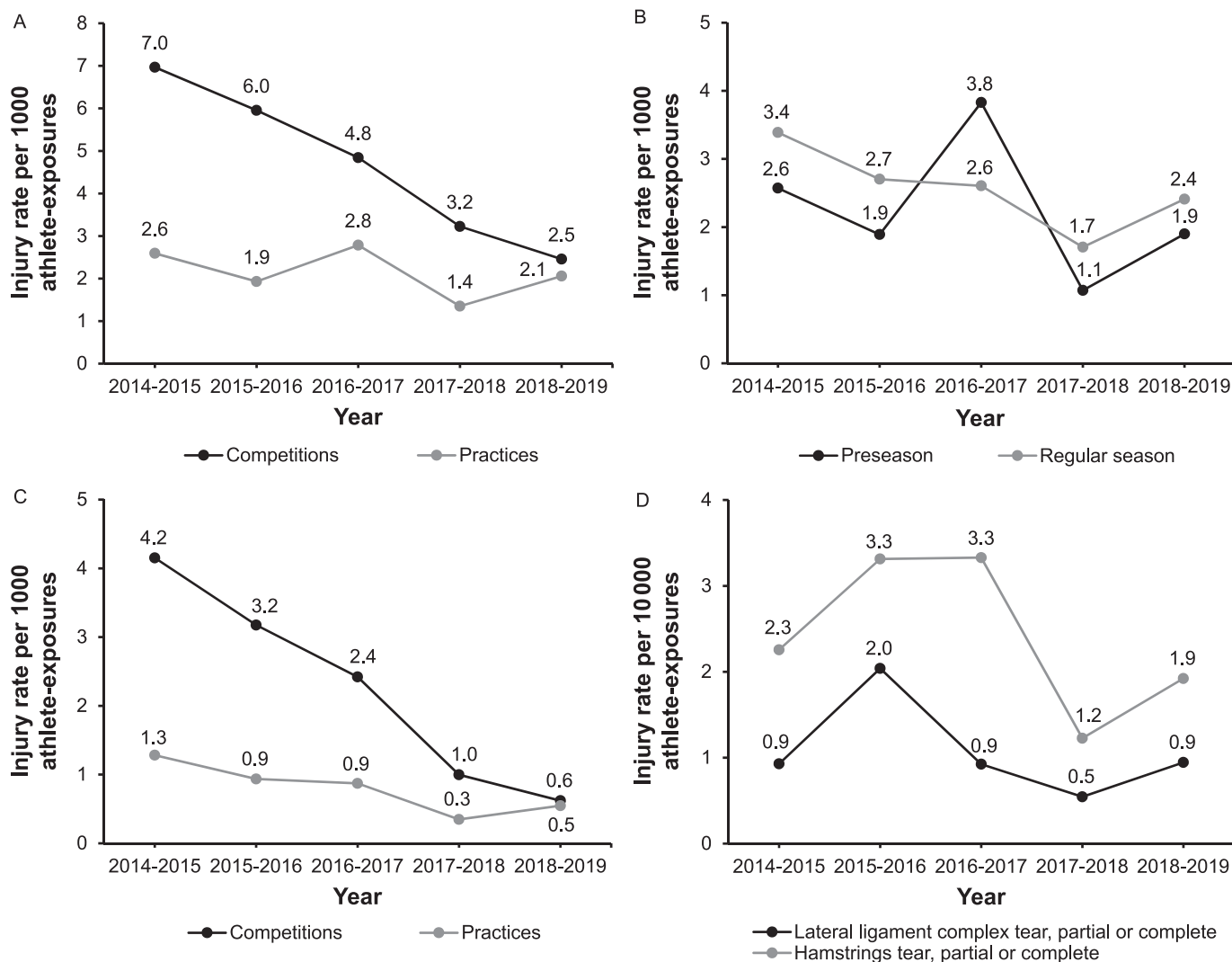
Injury counts and rates (per 1000 AEs, in which 1 AE was defined as 1 athlete participating in 1 exposure event) were examined by event type (practice, competition), competition level (Division I, Division II, Division III),

season segment (preseason, regular season, postseason), and TL or nontime loss (NTL). Weighted and unweighted rates were estimated, and unweighted estimates are presented here unless otherwise specified. Temporal patterns in injury rates (changing injury incidence over time) across the study period were evaluated using rate profile plots stratified across the aforementioned variables. Similarly, temporal trends in rates of most commonly reported injuries were also examined across the study period. Injury counts and proportions were examined by TL, body parts injured, mechanism of injury, injury diagnoses, playing positions, and activities. Injury rate ratios (IRRs) were used to examine differential injury rates across event types, competition levels, and season segments. IRRs with associated 95% confidence intervals (CIs) excluding 1.00 were considered statistically significant, and all analyses were conducted using SAS (version 9.4; SAS Institute).

**RESULTS**

A total of 1368 women’s track and field injuries from 622 258 AEs were reported to the NCAA ISP during 2014–2015 through 2018–2019 (rate = 2.20 per 1000 AEs). This equated to a national estimate of 63 081 injuries overall (Table 1). Across the study period, the competition injury rate was higher than the practice injury rate (IRR = 1.73; 95% CI = 1.51, 1.97). While competition injury rates steadily decreased during 2014–2015 through 2018–2019, practice injury rates fluctuated during this period (Figure A). Across the study period, the overall Division I injury rate (rate = 3.07 per 1000 AEs) was higher than the Division II (rate = 1.59 per 1000 AEs) and Division III (rate = 1.78 per 1000 AEs) injury rates; statistically significant differences were observed between Division I and Division II rates (IRR = 1.94; 95% CI = 1.69, 2.21), as well as between Division I and Division III rates (IRR = 1.73; 95% CI = 1.52, 1.97).

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**Figure.** Temporal patterns in injury rates between 2014–2015 and 2018–2019. **A**, Overall injury rates (per 1000 athlete exposures [AEs]) stratified by event type (competitions, practices). **B**, Injury rates (per 1000 AEs) stratified by season segment. **C**, Rates of time loss injuries (per 1000 AEs) stratified by event type (competitions, practices). **D**, Rates (per 10000 AEs) of most reported injuries. Rates presented in all figures are unweighted and based on reported data.

## Injuries by Season Segment

A total of 389 preseason injuries (national estimate: 18 582), 944 regular season injuries (national estimate: 42 839), and 35 postseason injuries (national estimate: 1660) were reported during the study period (Table 2). Statistically significant differences were observed when comparing the preseason rates with postseason injury rates (IRR = 2.60; 95% CI = 1.84, 3.68), as well as when comparing the regular season with postseason injury rates (IRR = 2.80; 95% CI = 2.00, 3.93). Although both preseason and regular season injury rates increased during the last year of the study, preseason injury rates fluctuated during 2014–2015 through 2017–2018, while regular season injury rates steadily decreased between 2014–2015 and 2017–2018 and increased during the final year of the study (Figure B). Temporal trends in postseason injury rates were not examined due to low yearly frequencies ( $n < 5$ ) of reported postseason injuries.

## Time Loss

One-third (33.4%) of all reported injuries resulted in TL of greater than or equal to 1 day (TL was not recorded in ~29% of all reported injuries). On average, TL injuries resulted in approximately 23 days lost to injury. TL injuries accounted for larger proportions of competition injuries (38.9%) than practice injuries (32%). Rates of competition-related TL injuries steadily decreased across the study period (Figure C). In comparison, while rates of practice-related TL injuries decreased between 2014–2015 and 2017–2018, the practice-related TL injury rate increased between 2017–2018 and 2018–2019 (Figure C).

## Injury Characteristics

Thigh injuries (19.3%), lower leg injuries (18.5%), and foot injuries (12.9%) accounted for the largest proportion of all injuries reported during the study period. Knee injuries and trunk injuries also accounted for notable proportions of all reported injuries (Table 3). Thigh injuries accounted for

**Table 2. Reported and National Estimates of Injuries, Athlete Exposures (AEs), and Rates per 1000 AEs by Season Segment Across Divisions.<sup>a</sup>**

Division	Number AEs Rate per 1000 AEs (95% CI)					
	Preseason		Regular Season		Post Season	
	Reported	National Estimate	Reported	National Estimate	Reported	National Estimate
I	210	11 906	491	25 176	8	705
	68 567	4 468 408	153 250	7 743 153	8840	715 268
	3.06 (2.65, 3.48)	2.66 (2.25, 3.08)	3.20 (2.92, 3.49)	3.25 (2.97, 3.53)	0.90 (0.28, 1.53)	0.99 (0.36, 1.61)
II	112	3579	193	4690	4	125
	54 110	1 878 450	128 070	3 728 757	12 422	328 024
	2.07 (1.69, 2.45)	1.91 (1.52, 2.29)	1.51 (1.29, 1.72)	1.26 (1.05, 1.47)	0.32 (0.01, 0.64)	0.38 (0.07, 0.70)
III	67	3096	260	12 973	23	830
	55 805	2 392 687	120 690	5 398 523	20 503	718 038
	1.20 (0.91, 1.49)	1.29 (1.01, 1.58)	2.15 (1.89, 2.42)	2.40 (2.14, 2.66)	1.12 (0.66, 1.58)	1.16 (0.70, 1.61)
Overall	389	18 582	944	42 839	35	1660
	178 482	8 739 545	402 011	16 870 433	41 765	1 761 329
	2.18 (1.96, 2.40)	2.13 (1.91, 2.34)	2.35 (2.20, 2.50)	2.54 (2.39, 2.69)	0.84 (0.56, 1.12)	0.94 (0.66, 1.22)

Abbreviation: AEs, athlete exposures.

<sup>a</sup> Data presented in the order of reported number, followed by AEs, estimated injury rates, and associated 95% CIs for each cross-tabulation of division and season segments. Data pooled association wide are presented overall and separately for preseason, regular season, and postseason. National estimates were produced using sampling weights estimated based on sport, division, and year. All CIs were constructed using variance estimates calculated on the basis of reported data. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition and required medical attention by a team certified athletic trainer or physician (regardless of time loss). Only scheduled team practices and competitions were retained in this analysis.

a considerably larger proportion of competition injuries (25.9%) than practice injuries (17.6%). In comparison, lower leg injuries and foot injuries accounted for larger proportions of practice injuries than competition injuries (Table 3). Most injuries reported during the study period were attributed to either overuse (35%) or noncontact (34.9%) mechanisms. While overuse injuries accounted for a larger proportion of practice injuries (38.4%) than competition injuries (21.9%), noncontact injuries accounted for a larger proportion of competition injuries (41%) than practice injuries (33.3%). Surface-contact injuries accounted for a comparable proportion of competition injuries as overuse injuries (Table 3).

Overall, most women's track and field injuries reported during 2014–2015 through 2018–2019 were strains (26.4%) and inflammatory conditions (musculoskeletal pathologies with degenerative characteristics to the tissue involved, such as bursitis, capsulitis, osteochondritis, tendinitis; 21.1%). Strains accounted for a larger proportion of competition injuries (32.7%) than practice injuries (24.8%), while inflammatory conditions accounted for a larger proportion of practice injuries (23.5%) than competition injuries (11.5%). The most common specific injuries reported during this period were partial or complete hamstring tears (9.1%), medial tibial stress syndrome (shin splints; 5.5%), and partial or complete lateral ligament complex tears (ankle; 4.2%). Rates of hamstring tears and lateral ligament complex tears fluctuated during 2014–2015 to 2018–2019 and mirrored each other across the entire study period (Figure D). Notably, rates of both injuries increased during the last year of the study (Figure D). Temporal patterns in incidence of medial tibial stress syndrome were not examined due to low frequencies ( $n < 5$ ) reported during certain years of the study.

### Injuries by Track and Field-Specific Characteristics

Most injuries in women's track and field during 2014–2015 through 2018–2019 occurred during running (57.8%) and jumping (17.3%) activities (as documented by the reporting AT). Nearly half of all reported injuries occurred during sprints (27.3%) and distance running (20.5%). A larger proportion of competition injuries (32.4%) than practice injuries (26.0%) were attributable to sprints, while a larger proportion of practice injuries (22.9%) than competition injuries (10.8%) were attributable to distance running. With regard to field activities (high jump, long jump, triple jump, pole vaulting, discus throw, javelin throw, shot put, hammer throw), pole vaulting accounted for the largest proportion of all reported injuries (Table 4). Runners (58.6%) and jumpers (14.5%) accounted for the largest proportion of injured women's track and field athletes over the study period.

### SUMMARY

We aimed to describe the epidemiology of NCAA women's track and field injuries during the 2014–2015 through 2018–2019 athletic seasons. Across the study period, the competition injury rate was higher than the practice injury rate. While it may be reasonable to anticipate differential injury rates by event type in contact sports with an inherent element of unpredictability, the differences observed in track and field are not attributable to such factors. Workload accumulation and situation-dependent emotional states, such as competitive anxiety, have been previously associated with sports injury risk.<sup>7–10</sup> The higher competition injury rate observed in this study warrants further attention to better understand the physical and psychological demands imposed by the competition setting that contribute to



**Table 3. Distribution of Injuries by Body Part, Mechanism, and Injury Diagnosis; Stratified by Event Type<sup>a</sup>**

	Overall		Competitions		Practices	
	Injuries Reported (%)	National Estimate (%)	Injuries Reported (%)	National Estimate (%)	Injuries Reported (%)	National Estimate (%)
<b>Injury site</b>						
Head/face	29 (2.12)	1098 (1.74)	8 (2.88)	498 (3.41)	21 (1.93)	600 (1.24)
Neck	14 (1.02)	671 (1.06)	2 (0.72)	168 (1.15)	12 (1.10)	503 (1.04)
Shoulder	45 (3.29)	1814 (2.88)	4 (1.44)	124 (0.85)	41 (3.76)	1690 (3.48)
Arm/elbow	13 (0.95)	375 (0.59)	2 (0.72)	70 (0.48)	11 (1.01)	306 (0.63)
Hand/wrist	24 (1.75)	898 (1.42)	3 (1.08)	55 (0.38)	21 (1.93)	843 (1.74)
Trunk	152 (11.11)	6932 (10.99)	31 (11.15)	1780 (12.20)	121 (11.10)	5152 (10.62)
Hip/groin	127 (9.28)	5846 (9.27)	32 (11.51)	1731 (11.87)	95 (8.72)	4115 (8.49)
Thigh	264 (19.30)	11 868 (18.81)	72 (25.90)	3643 (24.98)	192 (17.61)	8226 (16.96)
Knee	156 (11.40)	5678 (9.00)	33 (11.87)	1346 (9.23)	123 (11.28)	4332 (8.93)
Lower leg	253 (18.49)	14 118 (22.38)	38 (13.67)	2135 (14.64)	215 (19.72)	11 983 (24.71)
Ankle	90 (6.58)	4312 (6.84)	25 (8.99)	1440 (9.87)	65 (5.96)	2873 (5.92)
Foot	177 (12.94)	8064 (12.78)	22 (7.91)	1198 (8.21)	155 (14.22)	6866 (14.16)
Other	24 (1.75)	1405 (2.23)	6 (2.16)	396 (2.72)	18 (1.65)	1009 (2.08)
<b>Mechanism</b>						
Noncontact	477 (34.87)	22 122 (35.07)	114 (41.01)	6621 (45.40)	363 (33.30)	15 502 (31.96)
Contact with player	11 (0.80)	501 (0.79)	4 (1.44)	180 (1.23)	7 (0.64)	321 (0.66)
Contact with surface	213 (15.57)	10 817 (17.15)	61 (21.94)	2760 (18.92)	152 (13.94)	8057 (16.61)
Contact with apparatus	53 (3.87)	2102 (3.33)	14 (5.04)	692 (4.74)	39 (3.58)	1410 (2.91)
Overuse	479 (35.01)	21 578 (34.21)	61 (21.94)	3051 (20.92)	418 (38.35)	18 527 (38.20)
Other/unknown	135 (9.87)	5961 (9.45)	24 (8.63)	1281 (8.78)	111 (10.18)	4680 (9.65)
<b>Diagnosis</b>						
Abrasion/laceration	9 (0.66)	250 (0.40)	3 (1.08)	54 (0.37)	6 (0.55)	195 (0.40)
Concussion	11 (0.80)	357 (0.57)	2 (0.72)	123 (0.84)	9 (0.83)	234 (0.48)
Contusion	56 (4.09)	2395 (3.80)	16 (5.76)	734 (5.03)	40 (3.67)	1661 (3.42)
Dislocation/subluxation	4 (0.29)	278 (0.44)	0 (0)	0 (0)	4 (0.37)	278 (0.57)
Entrapment/impingement	16 (1.17)	666 (1.06)	3 (1.08)	78 (0.53)	13 (1.19)	588 (1.21)
Fracture	66 (4.82)	4615 (7.32)	8 (2.88)	506 (3.47)	58 (5.32)	4109 (8.47)
Illness/infection	4 (0.29)	231 (0.37)	0 (0)	0 (0)	4 (0.37)	231 (0.48)
Inflammatory condition	288 (21.05)	11 209 (17.77)	32 (11.51)	1405 (9.63)	256 (23.49)	9804 (20.22)
Spasm	89 (6.51)	3486 (5.53)	22 (7.91)	1127 (7.73)	67 (6.15)	2359 (4.86)
Sprain	125 (9.14)	5353 (8.49)	31 (11.15)	1594 (10.93)	94 (8.62)	3759 (7.75)
Strain	361 (26.39)	18 081 (28.66)	91 (32.73)	5151 (35.32)	270 (24.77)	12 930 (26.66)
Other	339 (24.78)	16 160 (25.62)	70 (25.18)	3812 (26.14)	269 (24.68)	12 348 (25.46)

<sup>a</sup> Data presented in the order of reported number, followed by the proportion of all injuries attributable to a given category. Data pooled across event types are presented overall and separately for practices and competitions. National estimates were produced using sampling weights estimated based on sport, division, and year. All CIs were constructed using variance estimates calculated on the basis of reported data. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition and required medical attention by a team certified athletic trainer or physician (regardless of time loss). Only scheduled team practices and competitions were retained in this analysis.

elevated injury risk in this population. Importantly, a downward trajectory was observed in competition injury incidence across the study period. Given the dearth of existing literature related to this population, it is difficult to juxtapose these findings to the expected patterns among NCAA women’s track and field athletes. Coupled with comparable trajectories observed in regular season injury rates and in competition-related TL injury rates, these are encouraging findings with regard to injury prevention and management practices employed during this period. Indeed, given that TL after sports-related injuries can be considered a reasonable reflection of the injury recovery process,<sup>11</sup> these findings indicate not only a decreasing pattern in competition-related injury risk, but also in the overall burden of competition-related injuries in this population. Close monitoring of factors such as athlete-specific injury history and the number of competition events in which athletes participate may have contributed to the observed pattern.<sup>12</sup> In comparison, practice-related injury rates as well as preseason

injury rates were notably heterogeneous throughout the study period. While it is important to examine injury incidence in these contexts more closely, authors of future studies may also consider different strategies for the measurement of at-risk exposure time when striving to estimate injury risk in track and field. The expression of at-risk exposure time in terms of AEs, albeit a reasonable approach in sports injury surveillance, may not be appropriate for individual sports such as track and field in which exposure time may vary by the specific participation event. Measures such as activity times and number of repetitions performed during activities may be critical in precisely estimating exposure burden in this population. Authors of future studies should consider the inherent variability in track and field events while estimating injury risk among track and field athletes. Further, specifically with regard to preseason injury rates, it is important to note that indoor and outdoor track seasons were combined for analysis in this study. This is an inherent limitation of the NCAA ISP data collection

**Table 4. Distribution of Injuries by Injury Activity and Playing Position; Stratified by Event Type<sup>a</sup>**

	Overall		Competitions		Practices	
	Injuries Reported (%)	National Estimate (%)	Injuries Reported (%)	National Estimate (%)	Injuries Reported (%)	National Estimate (%)
<b>Activity</b>						
Jumping	236 (17.25)	9915 (15.72)	86 (30.94)	4161 (28.53)	150 (13.76)	5755 (11.87)
High jump	57 (4.17)	2564 (4.06)	19 (6.83)	1048 (7.19)	38 (3.49)	1516 (3.13)
Long jump	59 (4.31)	2148 (3.41)	31 (11.15)	1274 (8.74)	28 (2.57)	874 (1.80)
Triple jump	37 (2.70)	1338 (2.12)	15 (5.40)	649 (4.45)	22 (2.02)	688 (1.42)
Pole vaulting	83 (6.07)	3865 (6.13)	21 (7.55)	1189 (8.15)	62 (5.69)	2677 (5.52)
Running	790 (57.75)	38994 (61.82)	156 (56.12)	8447 (57.92)	634 (58.17)	30547 (62.99)
Distance running	280 (20.47)	14438 (22.89)	30 (10.79)	2031 (13.93)	250 (22.94)	12407 (25.58)
Hurdles	118 (8.63)	5787 (9.17)	26 (9.35)	1403 (9.62)	92 (8.44)	4383 (9.04)
Sprints	373 (27.27)	17791 (28.20)	90 (32.37)	4500 (30.85)	283 (25.96)	13290 (27.40)
Relays	10 (0.73)	599 (0.95)	6 (2.16)	369 (2.53)	4 (0.37)	230 (0.47)
Steeplechase	9 (0.66)	380 (0.60)	4 (1.44)	143 (0.98)	5 (0.46)	237 (0.49)
Throwing	104 (7.60)	4337 (6.88)	12 (4.32)	730 (5.01)	92 (8.44)	3607 (7.44)
Discus	19 (1.39)	909 (1.44)	2 (0.72)	139 (0.95)	17 (1.56)	769 (1.59)
Javelin	28 (2.05)	1220 (1.93)	6 (2.16)	439 (3.01)	22 (2.02)	781 (1.61)
Shotput	36 (2.63)	1574 (2.50)	3 (1.08)	106 (0.73)	33 (3.03)	1468 (3.03)
Hammer	21 (1.54)	634 (1.01)	1 (0.36)	46 (0.32)	20 (1.83)	589 (1.21)
Weight	19 (1.39)	634 (1.01)	2 (0.72)	64 (0.44)	17 (1.56)	570 (1.18)
Conditioning	107 (7.82)	4410 (6.99)	3 (1.08)	112 (0.77)	104 (9.54)	4298 (8.86)
Other/unknown	112 (8.19)	4791 (7.59)	19 (6.83)	1071 (7.34)	93 (8.53)	3720 (7.67)
<b>Position</b>						
Decathlete	4 (0.29)	93 (0.15)	0 (0)	0 (0)	4 (0.37)	93 (0.19)
Heptathlete	45 (3.29)	2003 (3.18)	15 (5.40)	791 (5.42)	30 (2.75)	1212 (2.50)
Jumper	198 (14.47)	8215 (13.02)	63 (22.66)	3095 (21.22)	135 (12.39)	5120 (10.56)
Pentathlete	15 (1.10)	541 (0.86)	8 (2.88)	356 (2.44)	7 (0.64)	185 (0.38)
Pole vaulter	86 (6.29)	3725 (5.91)	17 (6.12)	717 (4.92)	69 (6.33)	3008 (6.20)
Runner	802 (58.63)	39607 (62.79)	147 (52.88)	8318 (57.03)	655 (60.09)	31289 (64.52)
Thrower	171 (12.50)	7302 (11.58)	17 (6.12)	991 (6.79)	154 (14.13)	6311 (13.01)
Unknown/other	47 (3.44)	1596 (2.53)	11 (3.96)	317 (2.17)	36 (3.30)	1279 (2.64)

<sup>a</sup> Data presented in the order of reported number, followed by the proportion of all injuries attributable to a given category. Data pooled across event types are presented overall and separately for practices and competitions. National estimates were produced using sampling weights estimated based on sport, division, and year. All CIs were constructed using variance estimates calculated on the basis of reported data. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition and required medical attention by a team certified athletic trainer or physician (regardless of time loss). Only scheduled team practices and competitions were retained in this analysis.

methods (ie, the consolidation of indoor and outdoor track seasons), and separate studies of indoor and outdoor track and field injuries are needed to better appraise injury risk in various season segments, while taking the natural time course of both seasons into account.

Most injuries reported among women's track and field athletes during the study period were strains and inflammatory conditions, delineated as musculoskeletal pathologies with degenerative characteristics to the tissue involved. The high prevalence of strains has been previously noted within this population,<sup>4,5</sup> though the etiology of inflammatory conditions in women's track and field athletes warrants further attention. Given that inflammatory conditions are typically chronic injuries, based on the particularly high prevalence of inflammatory conditions in practices observed here, authors of future studies may be directed toward the secondary and tertiary prevention of inflammatory conditions in practice settings. Special attention in both future research and clinical practice should also be focused on identification of inflammatory conditions of the foot, given the prevalence of foot injuries in this population and that stress injuries of the foot can be both subtle in presentation and result in long periods of TL.<sup>13–15</sup> The most reported injuries during this period were hamstring tears

and lateral ligament complex tears (ankle sprains). Authors of previous studies have indicated that hamstring injuries in this population are potentially attributable to the strain imposed during active lengthening.<sup>16,17</sup> Therefore, preventive strategies that incorporate a progressive nature of length and strain difficulty (consequently strengthening the hamstring over the course of a competitive season) may be beneficial to reducing the burden of muscular injuries in this population. Similarly, given the observed burden of lateral ligament complex strains in this population, the effectiveness of existing support- and exercise-based strategies for preventing ankle sprains may be examined more closely in this context.<sup>18–22</sup> Importantly, it has also been previously noted that a history of ankle injury is associated with the frequency of hamstring injuries in elite running athletes.<sup>23</sup> With that said, further attention directed toward ankle injury prevention in women's track and field athletes may also have downstream implications on other prevalent muscular injuries in this population. The incidence trajectories of both injuries were comparable through the study period, with notable decreases in injury incidence observed between 2015–2016 and 2017–2018, before an upward trajectory observed in the rates of both injuries during the final year of the study. Coupled with the above-described trajectories of overall injury rates and TL

injury rates, these findings indicate that policies and practices implemented during 2015–2016 through 2017–2018 may have been effective in reducing the burden of the most prevalently reported injuries during the overall study period. As these commonly observed injuries are almost entirely biomechanically induced, rules changes, such as the move to penalize obstruction of competitors in running events (in 2015–2016)<sup>24</sup> or technological advancements in footwear during this time, may have contributed to the observed results. However, it is still important to continue monitoring the incidence of hamstring tears and lateral ligament complex tears in this population, given the findings during the final year of the study. It is important to note that participation in the NCAA ISP among women's track and field programs sharply increased during 2018–2019, after the implementation of additional recruitment strategies (for instance, support and communication from the NCAA Sport Science Institute). As such, it is reasonable to suggest that the estimates associated with the final year of the study are more representative of injury patterns in this population as compared with prior years. Therefore, continued monitoring is also needed to determine the stability of the findings from 2018–2019 and better appraise the burden of these injuries to this population.

Routine injury surveillance accompanied by healthy participation in surveillance programs is important in identifying the changing dynamics of injury incidence and outcomes among women's track and field athletes. Such surveillance should also involve monitoring the trajectories of most commonly reported injuries in this population. Surveillance-based findings with robust external validity are important in identifying emerging patterns and can be useful in informing targeted studies needed to reconcile the injury etiology in this population.

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