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Epidemiology of Injuries in National Collegiate Athletic Association Women's Basketball: 2014–2015 Through 2018–2019

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Context: Frequent inspection of sports-related injury epidemiology among National Collegiate Athletic Association (NCAA) women's basketball student-athletes is valuable for identifying injury-related patterns.

Background: Emerging patterns in epidemiology of NCAA women's basketball injuries are unknown though general sports medicine practices, and playing rules and regulations have evolved in recent years.

Methods: Athlete exposures (AEs) and injury incidence data were reported to the NCAA Injury Surveillance Program between 2014–2015 and 2018–2019. Injury counts, rates, and proportions were used to examine injury characteristics, and injury rate ratios (IRRs) were used to assess injury rate differences.

Results: Practice and competition injury rates were 5.93 and 10.35 per 1000 AEs, respectively. Preseason injury rates were higher than regular (IRR = 1.41; 95% CI = 1.31, 1.53) and postseason (IRR = 3.12; 95% CI = 2.39, 4.07). Ankle sprains (14.3%), concussions (7.5%), and anterior cruciate ligament tears (2.5%) were the most commonly reported injuries.

Summary: Higher rates of practice and competition injuries, as well as ankle sprains, were observed relative to previous reports; continuous monitoring is necessary to identify potential contributing factors to these trends.

Key Words: descriptive, sport-related, surveillance

Key Points

- Practice and competition injury rates were higher than previously reported in NCAA women's basketball, and the competition injury rate was consistently higher than the practice injury rate across the study period.
- The preseason injury rate was higher than the regular season and postseason injury rates, and a notable increase was found in the preseason injury rate during the last year of the study period.
- The most commonly reported specific injuries were ankle sprains, concussions, and ACL tears; ankle sprain injury rates were notably elevated in the last two years of the study period.

Basketball participation is prevalent across all gender and age groups throughout the United States.[1,2] Approximately 16 500 student-athletes across 1101 National Collegiate Athletic Association (NCAA) membership teams participated in women's college basketball in 2018–2019.[2] Given the widespread participation in NCAA women's basketball, it is important to monitor injury-related patterns to ensure player safety. Importantly, gameplay in NCAA women's basketball has changed in recent years with several rule changes implemented over the past 5 years. Notably, competition in the 2015–2016 season switched from 2 20-minute halves to 4 10-minute quarters, and defenders were allowed to put their elbow-flexed forearm or open hand on the back of an offensive post player with the ball.[3] Rule changes such as these may have had a substantial effect on the incidence and outcomes of athletic injuries by allowing more frequent breaks or more player-to-player contact. Further, advancements have been made in recent years with regard to the development and adoption of injury prevention practices (for instance, those targeting lower extremity injury prevention),[4–6] and it is reasonable to posit that these changes may have had a protective effect on injury incidence. Evolving playing rules coupled with improved health care practices necessitate regular examination of injury incidence, characteristics, and outcomes in this population.

The NCAA Injury Surveillance Program (ISP) is a prospective sports injury surveillance system that captures injuries and exposures to comprehensively identify injury patterns.[7,8] Since its inception, the NCAA ISP has served a critical role in monitoring NCAA women's basketball-related injuries.[8,9] Previous NCAA women's basketball studies have identified minimal change in practice (4.0–4.1 per 1000 athlete exposures [AE]) and competition (7.7–8.1

The articles in this issue are published as accepted and have not been edited.

per 1000 AE) injury rates over the past 2 decades.[8,9] These studies have also consistently identified ankle sprains, knee sprains, and concussion as the top 3 frequent injuries in this population during competition and practice. Though injury rates and common injury diagnoses remain relatively consistent, the underlying individual injury diagnosis rates have slightly changed. For example, the concussion injury rate increased more than twofold between 1988–1989 to 2003–2004 and 2004–2005 to 2013–2014 for both practices and competitions.[8,9] Such changes in incidence rates, along with concurrent evolutions in injury management strategies, further indicate the need for continual assessment of trends to better appraise the changing landscape of injury risk as well as the effectiveness of injury prevention strategies in this population.[10] Therefore, the purpose of this study was to describe the epidemiology of sport-related injuries among NCAA women's basketball student-athletes during the 2014–2015 through 2018–2019 academic years.

METHODS

Study Data

Women's basketball exposure and injury data collected in the NCAA ISP during the 2014–2015 through 2018–2019 athletic seasons were analyzed in this study. The methods of the NCAA ISP have been reviewed and approved as an exempt study by the NCAA Research Review Board (RRB). The methods of the surveillance program are described in detail in a separate manuscript within this special issue.[11] Briefly, athletic trainers (ATs) at participating institutions contributed exposure and injury data using their clinical electronic medical record (EMR) 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 certified AT or physician, regardless of time loss. Scheduled team practices and competitions were considered reportable exposures for this analysis. Data from 30 participating programs (2.8% of all NCAA membership teams) in 2014–2015, 27 (2.5% of membership) in 2015–2016, 38 (3.4% of membership) in 2016–2017, 44 (4.0% of membership) in 2017–2018, and 136 (12.3% of membership) in 2018–2019 qualified for inclusion in analyses. Qualification criteria are detailed further in the methods paper within this special issue.[11]

Statistical Analysis

Injury counts and rates per 1000 AEs were examined by event type (practice, competition), competition level (Division I, Division II, Division III), season segment (preseason, regular season, postseason), and time loss (TL; $\geq$1 day) or non-time loss (NTL; $<$1 day). An AE was defined as 1 athlete participating in 1 exposure event (practice or competition, for this analysis). Poststratification sample weights by sport and division are established within the surveillance system to compute national estimates of injury events based on the sampled teams; weighted and unweighted rates were estimated for this study, and results are presented in terms of unweighted rates, unless otherwise specified (due to low frequencies of injury observations across levels of certain covariates). Temporal trends in injury rates across the study period were described using rate profile plots stratified by levels of exposure characteristics (event type, season segment, TL). Similarly, temporal trends in rates of most commonly reported injuries were also described across the study period. Injury counts and proportions were calculated and described by TL, body part injured, injury mechanism, injury diagnosis, player position, and activity at the time of injury. Injury rate ratios (IRRs) were used to examine differential injury rates across event types, competition levels, and season segments. Injury rate ratios with associated 95% confidence intervals (CIs) excluding 1.00 were considered statistically significant. All analyses were conducted using SAS 9.4 (SAS Institute).

RESULTS

A total of 2980 women's basketball injuries (national estimate: 66 860) from 424 916 AEs were reported to the NCAA ISP during the 2014–2015 through 2018–2019 athletic seasons, resulting in an overall injury rate of 7.01 per 1000 AEs (Table 1). Across the study period, competition injury rates were higher than practice injury rates (IRR = 1.75; 95% CI = 1.62, 1.88). Competition and practice injury rates across athletic seasons are presented in Figure A and illustrate a large decrease in competition injury rates from 2015–2016 to 2016–2017, followed by an increasing trend from 2016–2017 through 2018–2019. Practice injury rates also follow a similar trajectory during the latter years of the study, although smaller in magnitude. Injury rates by division are provided in Table 1. The overall injury rate in Division I was lower than the overall rate in Division III (IRR = 0.87; 95% CI = 0.80, 0.95). Similarly, the overall Division II injury rate was lower than the Division III injury rate (IRR = 0.81; 95% CI = 0.74, 0.88).

Injuries by Season Segment

A total of 876 preseason injuries (national estimate: 19 261), 2046 regular season injuries (national estimate: 46 013), and 58 postseason injuries (national estimate: 1586) were reported between 2014–2015 and 2018–2019 (Table 2). Preseason injury rates were significantly higher than regular season (IRR = 1.41; 95% CI = 1.31, 1.53) and postseason injury rates (IRR = 3.12; 95% CI = 2.39, 4.07). Incidence trajectories of injuries by season segment across the study period are presented in Figure B. Preseason injury rates were similar from 2014–2015 to 2015–2016, had a notable decline in 2016–2017 that was similar to 2017–2018, followed by a sharp increase during the 2018–2019 season. Regular season injury rates decreased between 2014–2015 and 2016–2017 and subsequently increased during the 2017–2018 and 2018–2019 seasons. Postseason injury rates increased between 2014–2015 and 2015–2016 and decreased thereafter over the remainder of the study period.

Time Loss Injuries

Time loss and NTL injuries accounted for comparable proportions of all reported injuries across the study period (TL: 40.7%; NTL: 39.3%); TL was not recorded for 20% of all reported injuries. Competition- and practice-related TL injury rates across athletic seasons are presented in Figure

Table 1. Reported and National Estimates of Injuries, Athlete Exposures (AEs), and Rates per 1000 AEs by Event Type Across Divisions[a]

	Number AEs Rate per 1000 AEs (95% CI)					
	Overall		Practices		Competitions	
Division	Reported	National Estimate	Reported	National Estimate	Reported	National Estimate
I	1091	20 861	677	12 955	414	7906
	159 686	3 411 128	125 061	2 682 425	34 625	728 703
	6.83 (6.43, 7.24)	6.12 (5.71, 6.52)	5.41 (5.01, 5.82)	4.83 (4.42, 5.24)	11.96 (10.80, 13.11)	10.85 (9.70, 12.00)
II	807	21 119	525	13 357	282	7763
	127 334	2 886 508	94 032	2 160 849	33 301	725 659
	6.34 (5.90, 6.77)	7.32 (6.88, 7.75)	5.58 (5.11, 6.06)	6.18 (5.70, 6.66)	8.47 (7.48, 9.46)	10.70 (9.71, 11.69)
III	1082	24 880	697	16 251	385	8628
	137 896	3 454 685	101 390	2 559 184	36 506	895 501
	7.85 (7.38, 8.31)	7.20 (6.73, 7.67)	6.87 (6.36, 7.38)	6.35 (5.84, 6.86)	10.55 (9.49, 11.60)	9.63 (8.58, 10.69)
Overall	2980	66 860	1899	42 563	1081	24 297
	424 916	9 752 321	320 484	7 402 458	104 433	2 349 863
	7.01 (6.76, 7.26)	6.86 (6.60, 7.11)	5.93 (5.66, 6.19)	5.75 (5.48, 6.02)	10.35 (9.73, 10.97)	10.34 (9.72, 10.96)

[a] 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.

C. Time loss injury rates were relatively stable across athletic seasons for practices, while competition-related TL injury rates were marginally higher in 2015–2016 relative to the other athletic seasons examined.

Injury Characteristics

Ankle (19.0%), knee (17.3%), and head/face injuries (14.2%) accounted for the largest proportions of all injuries reported during the study period. Ankle injuries, knee injuries, and head or face injuries accounted for larger proportions of competition injuries than practice injuries (Table 3). Approximately 33% of all injuries were attributed to player contact mechanisms, and 23% of all injuries were attributed to noncontact mechanisms. Player contact injuries accounted for larger proportions of competition injuries than practice injuries, while noncontact injuries accounted for larger proportions of practice injuries than competition injuries (Table 3).

Most injuries reported during the study period were sprains (28.0%), strains (12.9%), and inflammatory conditions (13.3%). Sprains accounted for greater propor-

Table 2. Reported and National Estimates of Injuries, Athlete Exposures (AEs), and Rates per 1000 AEs by Season Segment Across Divisions[a]

	Number AEs Rate per 1000 AEs (95% CI)					
	Preseason		Regular Season		Postseason	
Division	Reported	National Estimate	Reported	National Estimate	Reported	National Estimate
I	322	5845	736	14 338	33	678
	36 774	778 726	113 961	2 453 921	8951	178 481
	8.76 (7.80, 9.71)	7.51 (6.55, 8.46)	6.46 (5.99, 6.92)	5.84 (5.38, 6.31)	3.69 (2.43, 4.94)	3.80 (2.54, 5.06)
II	211	5011	586	15 616	10	492
	25 985	622 022	95 856	2 124 925	5493	139 561
	8.12 (7.02, 9.22)	8.06 (6.96, 9.15)	6.11 (5.62, 6.61)	7.35 (6.85, 7.84)	1.82 (0.69, 2.95)	3.53 (2.40, 4.65)
III	343	8405	724	16 058	15	417
	31 545	809 628	101 324	2 502 197	5027	142 859
	10.87 (9.72, 12.02)	10.38 (9.23, 11.53)	7.15 (6.62, 7.67)	6.42 (5.90, 6.94)	2.98 (1.47, 4.49)	2.92 (1.41, 4.43)
Overall	876	19 261	2046	46 013	58	1586
	94 304	2 210 376	311 141	7 081 043	19 470	460 902
	9.29 (8.67, 9.90)	8.71 (8.10, 9.33)	6.58 (6.29, 6.86)	6.50 (6.21, 6.78)	2.98 (2.21, 3.75)	3.44 (2.67, 4.21)

[a] 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 segment. 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.

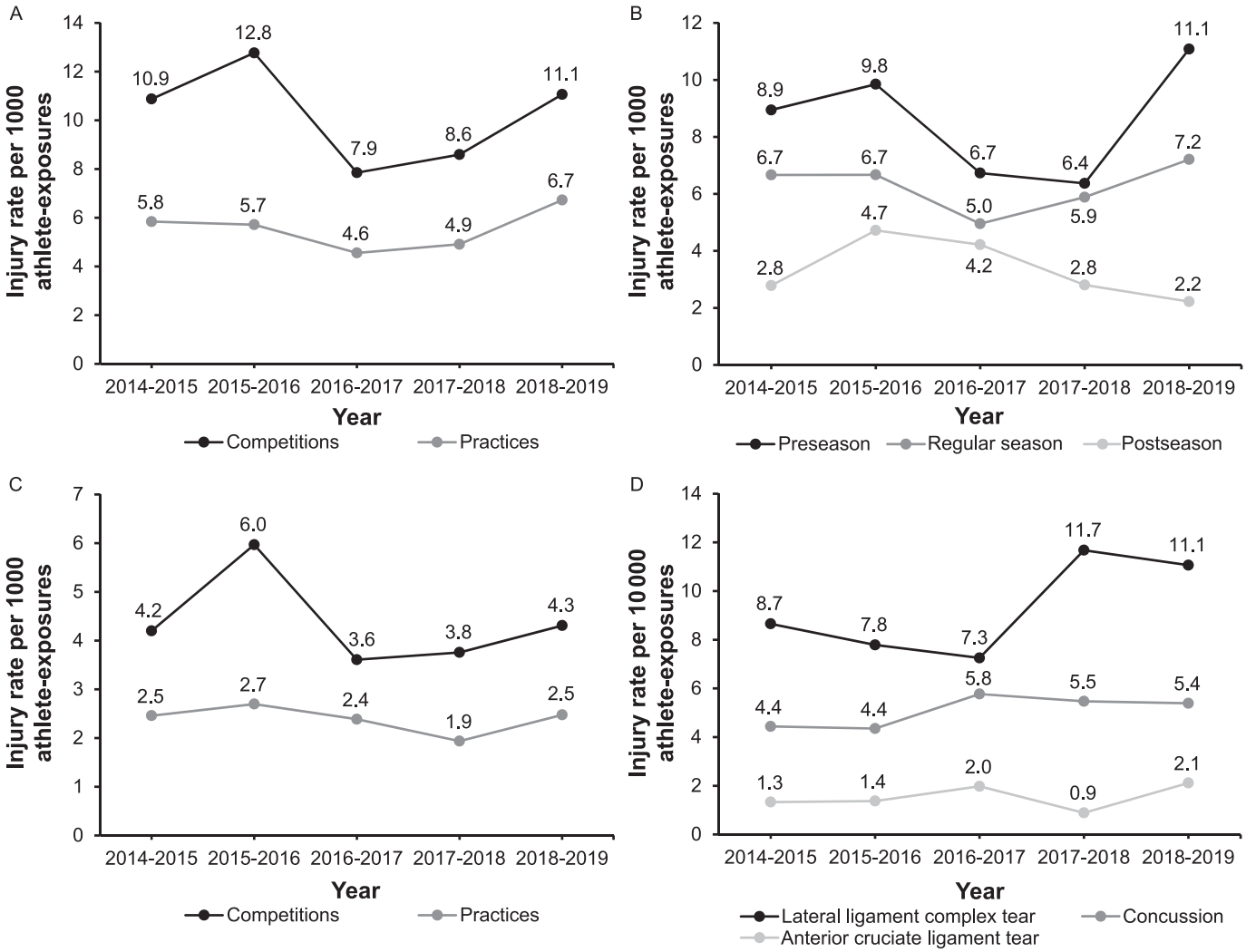

Figure. Temporal patterns in injury rates between 2014–2015 and 2018–2019. A, Overall injury rates (per 1000 athlete exposures [AEs]) stratified by event type (practices, competitions). B, Injury rates (per 1000 AEs) stratified by season segment. C, Rates of time loss injuries (per 1000 AEs) stratified by event type (practices, competitions). D, Rates (per 10 000 AEs) of most commonly reported injuries. Rates presented in all figures are unweighted and based on reported data.

tions of competition (33.6%) than practice (24.8%) injuries. Conversely, inflammatory conditions accounted for a larger proportion of practice injuries (17.0%) than competition injuries (6.9%). Strains accounted for comparable proportion of practice (14.2%) and competition (10.5%) injuries. The most commonly reported specific injuries during the study period were partial or complete lateral ligament complex tears (ankle sprain: 14.3%; most commonly player contact resultant: 43.7%), concussions (7.5%), and partial or complete anterior cruciate ligament (ACL) tears (2.5%; most commonly noncontact injuries: 67.6%); injury rates across the study period are depicted in Figure D. Ankle sprain rates slightly declined from 2014–2015 through 2016–2017, then sharply increased in 2017–2018 and remained elevated in 2018–2019 relative to prior years. Concussion rates increased marginally from 2015–2016 to 2016–2017 and remained stable for the remainder of the study period. Anterior cruciate ligament tear injury rates were relatively stable across all athletic seasons, with a slight drop in the 2017–2018 season.

Injuries by Basketball-Specific Activities and Playing Positions

During the 2014–2015 through 2018–2019 athletic seasons, injuries in NCAA women's basketball most often occurred during general play (31.3%). Rebounding (14.1%) and defending (13.5%) also accounted for notable proportions of all reported injuries. While a larger proportion of practice injuries (35.7%) than competition injuries (23.5%) were attributed to general play, rebounding accounted for larger proportions of competition injuries (18.2%) than practice injuries (11.7%; Table 4). Guards accounted for the majority (51.4%) of injuries reported among women's basketball players during the study period (Table 4).

SUMMARY

This study aimed to describe the epidemiology of injuries among NCAA women's basketball student-athletes during the 2014–2015 through 2018–2019 athletic seasons. The rate of competition injuries was 1.75 times that of practice injuries across the study period, a finding consistent with previous studies.[8,9] The cumulative practice (5.93 per 1000

Table 3. Distribution of Injuries by Body Part, Mechanism, and Injury Diagnosis Stratified by Event Type[a]

	Overall		Competitions		Practices	
	Injuries Reported (%)	National Estimate (%)	Injuries Reported (%)	National Estimate (%)	Injuries Reported (%)	National Estimate (%)
Body part						
Head/face	424 (14.23)	9634 (14.41)	184 (17.02)	3985 (16.40)	240 (12.64)	5649 (13.27)
Neck	26 (0.87)	624 (0.93)	14 (1.30)	442 (1.82)	12 (0.63)	182 (0.43)
Shoulder	137 (4.60)	2909 (4.35)	55 (5.09)	1221 (5.03)	82 (4.32)	1689 (3.97)
Arm/elbow	69 (2.32)	1685 (2.52)	37 (3.42)	919 (3.78)	32 (1.69)	766 (1.80)
Hand/wrist	241 (8.09)	5975 (8.94)	101 (9.34)	2376 (9.78)	140 (7.37)	3598 (8.45)
Trunk	193 (6.48)	4201 (6.28)	56 (5.18)	1350 (5.56)	137 (7.21)	2851 (6.70)
Hip/groin	142 (4.77)	2709 (4.05)	38 (3.52)	717 (2.95)	104 (5.48)	1992 (4.68)
Thigh	158 (5.30)	3626 (5.42)	41 (3.79)	924 (3.80)	117 (6.16)	2702 (6.35)
Knee	514 (17.25)	11 112 (16.62)	220 (20.35)	4846 (19.94)	294 (15.48)	6265 (14.72)
Lower leg	245 (8.22)	5802 (8.68)	51 (4.72)	1398 (5.75)	194 (10.22)	4405 (10.35)
Ankle	567 (19.03)	12 634 (18.90)	225 (20.81)	4867 (20.03)	342 (18.01)	7767 (18.25)
Foot	214 (7.18)	4548 (6.80)	50 (4.63)	1038 (4.27)	164 (8.64)	3510 (8.25)
Other	50 (1.68)	1402 (2.10)	9 (0.83)	215 (0.88)	41 (2.16)	1188 (2.79)
Mechanism						
Player contact	977 (32.79)	23 355 (34.93)	468 (43.29)	11 001 (45.28)	509 (26.80)	12 354 (29.03)
Surface contact	444 (14.90)	9506 (14.22)	218 (20.17)	4667 (19.21)	226 (11.90)	4839 (11.37)
Ball contact	116 (3.89)	2678 (4.01)	39 (3.61)	910 (3.75)	77 (4.05)	1768 (4.15)
Other apparatus contact	10 (0.34)	135 (0.20)	2 (0.19)	35 (0.14)	8 (0.42)	100 (0.23)
Noncontact	685 (22.99)	15 152 (22.66)	220 (20.35)	5042 (20.75)	465 (24.49)	10 110 (23.75)
Overuse	479 (16.07)	10 426 (15.59)	48 (4.44)	1007 (4.14)	431 (22.70)	9419 (22.13)
Other/unknown	269 (9.03)	5607 (8.39)	86 (7.96)	1634 (6.73)	183 (9.64)	3974 (9.34)
Diagnosis						
Abrasion/laceration	59 (1.98)	1988 (2.97)	21 (1.94)	909 (3.74)	38 (2.00)	1079 (2.54)
Concussion	223 (7.48)	4832 (7.23)	101 (9.34)	2185 (8.99)	122 (6.42)	2646 (6.22)
Contusion	311 (10.44)	7398 (11.06)	163 (15.08)	3917 (16.12)	148 (7.79)	3481 (8.18)
Dislocation/subluxation	82 (2.75)	1569 (2.35)	32 (2.96)	670 (2.76)	50 (2.63)	899 (2.11)
Fracture	116 (3.89)	2913 (4.36)	37 (3.42)	980 (4.03)	79 (4.16)	1933 (4.54)
Illness/infection	13 (0.44)	250 (0.37)	5 (0.46)	93 (0.38)	8 (0.42)	157 (0.37)
Inflammatory condition	397 (13.32)	8185 (12.24)	74 (6.85)	1504 (6.19)	323 (17.01)	6681 (15.70)
Spasm	112 (3.76)	2176 (3.25)	27 (2.50)	680 (2.80)	85 (4.48)	1496 (3.51)
Sprain	834 (27.99)	18 590 (27.80)	363 (33.58)	7826 (32.21)	471 (24.80)	10 764 (25.29)
Strain	383 (12.85)	8704 (13.02)	113 (10.45)	2594 (10.68)	270 (14.22)	6110 (14.36)
Other	450 (15.10)	10 257 (15.34)	145 (13.41)	2939 (12.10)	305 (16.06)	7318 (17.19)

[a] Data presented in the order of reported number, followed by the proportions 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. 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.

AEs) and competition (10.35 per 1000 AEs) injury rates observed in the present study were greater than the practice (4.0–4.1 per 1000 AEs) and competition (7.7–8.1 per 1000 AEs) injury rates previously reported in this group (although prevous studies have only included TL injuries in analyses).[8,9] Competition and practice injury rates (Figure A) should be closely monitored after 2018–2019 to identify if this increasing trend is maintained. While rule changes (discussed above) implemented to "increase the flow of game" may reasonably have affected injury incidence in this population,[3] it is difficult to comment further on this relationship given that the effect of rule changes are likely to fully manifest over time. As such, future work should also continue to consider the influence of the rule changes on student-athlete safety.[3]

Significantly lower injury rates were observed among Division I and II women's basketball teams than Division III. While this finding is consistent with 1 previous study,[8] it has historically been shown that injury rates in Division I are higher than in other divisions.[9] Higher injury rates among Division III programs could be a consequence of relatively smaller sports medicine programs than their Division I and II counterparts, leading to potentially smaller AT-to-student-athlete ratios.[12,13] In turn, this could be a limiting factor for opportunities to provide preventative treatments and services. Though the NCAA ISP does not collect details about AT staff, health care services, or health care practices employed, future work may consider division-level injury incidence in juxtaposition to available sports medicine resources to fully understand this relationship.

Across the study period, injury rates varied notably between season segments. The overall preseason injury rates were consistently higher than regular and postseason rates (Figure B). Interestingly, notable increases in preseason and regular season injury rates were observed during the 2018–2019 season. This result warrants further attention, particularly given that the preceding 2 years reflected the lowest preseason and regular season injury rates across the study period. Of note, ISP participation among women's basketball programs increased sharply in 2018–2019. The NCAA ISP recruitment strategies have

Table 4. Distribution of Injuries by Injury Activity and Playing Position; Stratified by Event Type[a]

	Overall		Competitions		Practices	
	Injuries Reported (%)	National Estimate (%)	Injuries Reported (%)	National Estimate (%)	Injuries Reported (%)	National Estimate (%)
Activity						
Ball handling	53 (1.78)	1423 (2.13)	35 (3.24)	908 (3.74)	18 (0.95)	515 (1.21)
Blocking shot	14 (0.47)	347 (0.52)	5 (0.46)	143 (0.59)	9 (0.47)	203 (0.48)
Conditioning	34 (1.14)	977 (1.46)	0 (0.0)	0 (0.0)	34 (1.79)	977 (2.30)
Defending	401 (13.46)	9020 (13.49)	166 (15.36)	3609 (14.85)	235 (12.37)	5411 (12.71)
General play	932 (31.28)	22 093 (33.04)	254 (23.50)	5936 (24.43)	678 (35.70)	16 157 (37.96)
Loose ball	166 (5.57)	4003 (5.99)	107 (9.90)	2803 (11.54)	59 (3.11)	1200 (2.82)
Passing	28 (0.94)	573 (0.86)	8 (0.74)	124 (0.51)	20 (1.05)	449 (1.05)
Rebounding	420 (14.09)	9841 (14.72)	197 (18.22)	4637 (19.08)	223 (11.74)	5204 (12.23)
Receiving	55 (1.85)	1194 (1.79)	18 (1.67)	340 (1.40)	37 (1.95)	854 (2.01)
Running	247 (8.29)	4929 (7.37)	75 (6.94)	1669 (6.87)	172 (9.06)	3260 (7.66)
Screening	33 (1.11)	525 (0.79)	12 (1.11)	181 (0.74)	21 (1.11)	343 (0.81)
Shooting	165 (5.54)	3629 (5.43)	78 (7.22)	1771 (7.29)	87 (4.58)	1858 (4.37)
Other/unknown	432 (14.50)	8308 (12.43)	126 (11.66)	2176 (8.96)	306 (16.11)	6131 (14.40)
Position						
Center	428 (14.36)	9310 (13.92)	140 (12.95)	3081 (12.68)	288 (15.17)	6228 (14.63)
Forward	817 (27.42)	19 253 (28.80)	303 (28.03)	7252 (29.85)	514 (27.07)	12 001 (28.20)
Guard	1531 (51.38)	33 978 (50.82)	577 (53.38)	12 713 (52.32)	954 (50.24)	21 265 (49.96)
Other/unknown	204 (6.85)	4319 (6.46)	61 (5.64)	1251 (5.15)	143 (7.53)	3069 (7.21)

[a] Data presented in the order of reported number, followed by the proportions 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. 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.

evolved over time, and the improvements in participation during the last year of the study period reflect the success of recently employed recruitment strategies (for instance, support and communication from the NCAA Sport Science Institute). With that said, injury-related patterns observed during the last year of the study may be considered a more stable representation of injury incidence in this population than previous years. Therefore, though the increases observed in 2018–2019 may indicate broader association-wide concerns related to preseason and regular season injury incidence, continued monitoring of injury incidence post-2018–2019 is needed in this population to truly reconcile temporal patterns. Future work should aim to identify if any considerable changes in women's basketball early season (preseason and early regular season) practice patterns occurred before 2018–2019 (resulting in the observed results) or if these are natural fluctuations in injury rate trends.

Time loss and NTL injuries accounted for similar proportions of all injuries across the study period. While this may be considered a promising finding, it is important to note that TL was not recorded in one-fifth of all reported injuries. As such, the prevalence of TL injuries may be higher in this population, and future studies of TL in this group should aim to minimize missingness in TL data collection. Further, it has been previously suggested that TL may be best used as a reflection of the injury recovery,[14] and future studies may also aim to examine TL more closely to identify specific determinants of injury recovery in NCAA women's basketball. Parameters such as detailed injury history, workload accumulation, and fatigue indices may be import considerations in such studies.[4] Identifying the strongest determinants of injury recovery in this population can support the development of sophisticated secondary and tertiary injury prevention strategies. The NCAA ISP in its current form does not accommodate workload monitoring or detailed athlete-specific data on injury history. Future targeted studies of injury recovery should aim to capture team- and athlete-level data to better understand injury recovery in NCAA women's basketball athletes.

The most common specific injuries in NCAA women's basketball during 2014–2015 through 2018–2019 were lateral ligament complex tears (partial or complete; ankle sprains), concussions, and (partial or complete) ACL tears. This is consistent with previous findings, although their relative prevalence in this study varied in comparison with previous reports.[8,9] Differential prevalence across time periods may be attributable to a multitude of factors such as rule changes,[3] increased awareness and prevention implementation for ACL injuries,[5,6] and improved concussion assessment and management among sports medicine professionals.[10] With that said, a closer review of the incidence trajectories of these injuries across the current study period indicates that rates of concussions and ACL tears remained relatively stable during 2014–2015 to 2018–2019. Although it is encouraging that these injury trends have remained relatively stable over the study period, their relative prevalence (in comparison with previous reports) remains a concern, as these common injuries are all associated with increased risk for long-term health outcomes such as osteoarthritic development, decreased quality of life, and neurocognitive changes.[15–17] In contrast with concussion and ACL injury rates, rates of lateral ligament complex tears (ankle sprains) sharply increased from 7.25 to 11.68 per 1000 AEs between 2016–2017 and 2017–2018 and remained at ~11 per 1000 AEs during 2018–2019. Although it is difficult to isolate a singular explanation for these temporal patterns, given these findings, it is reasonable to posit that the gameplay changes brought upon by the rule changes in

2015–2016 may have increased risk of ankle sprains in this population. However, more targeted work in this area is needed to understand these trajectories thoroughly. Nonetheless, given lateral ligament complex tears are the most common musculoskeletal injury in women's basketball,[8,9] implementing well-established external prophylactic taping or bracing protocols and preventive exercises[18] may be an appropriate direction to promote short- and long-term student-athlete health outcomes. While the NCAA ISP in its current form is not situated to examine the effect of preventive injury interventions, it may be reasonable for smaller sample studies to capture information on musculoskeletal preventive practices such that inferences can be drawn regarding their efficacy on reducing the burden of risk in this population.

Continued monitoring of NCAA women's basketball is valuable and provides critical insight into the evolving burden of injury in this population. Findings presented here indicate that injury incidence in practices and competitions is increasing and that preseason injury incidence warrants close monitoring post-2018–2019. The overall prevalence of ankle sprains in this population, as well as the sharp increase in ankle sprain rates observed during the study period, requires targeted attention. While these findings provide an update to the epidemiology of injuries in NCAA women's basketball, future, targeted work based on these findings will be important in driving nuanced injury prevention efforts.

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