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Hamstring Injury Epidemiology in the National Basketball Association Over a Five-Year Period

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SUMMARY

Purpose. Professional basketball players are subject to lower extremity injuries given the physical nature of the game, which can impact career longevity. To report the epidemiology of hamstring injuries in National Basketball Association (NBA) players from 2016-2021 and to assess their effect on performance.

Methods. Online injury databases were searched to identify hamstring injuries occurring from 2016-2021 in the NBA. The primary information collected included injury location, age at injury, games missed, and performance statistics before and after the injury. Comparison of pre and post injury performance was stratified by secondary injuries and duration of games missed.

Results. 210 hamstring injuries occurred in the NBA from 2016-2021. The most common injuries were strained left hamstrings (45/210, 21.4%) and right hamstrings (45/210, 21.4%). The mean age at the time of injury was 28.0 ± 4.1 years old. Subsequent injuries occurred in 171 players in the same and/or following season (171/210, 81.4%) The most common non-hamstring subsequent injuries affected the knee (84/575, 14.61%) and the ankle (63/575, 10.96%). There was a weak negative correlation between games missed and age ($r = -0.03$). Players had statistically significant decreases in minutes played and field goal percentage following return from injury ($p < 0.05$).

Conclusions. Hamstring injuries are common in the NBA, and lead to a small but important decline in player performance. There is a high rate of reinjury of the hamstring and other areas of the body. Further study of hamstring injuries in the NBA is warranted to better understand readiness to return to play.

KEY WORDS

Hamstring; hamstring strain; injury; National Basketball Association; recovery.

INTRODUCTION

Injuries amongst professional basketball players in the National Basketball Association (NBA) are common given the evolution of a more physical and high-contact style of play since its inception in 1891 by Dr. James Naismith (11). Rapid movements, such as sprinting, can place excess pressure on the hamstring and cause strains. Limited studies have examined the effects of injuries on professional basketball players' performance, in particular those in the NBA (3, 6, 7, 9, 19, 34). Some previous studies have looked at injury risk in the NBA, National Football League (NFL), and Major League Baseball (MLB) and have identified that lower extremity injuries are the most commonly injured body area (9, 14, 21, 27). Drakos *et al.* reported a 3.3% incidence of hamstring injuries in NBA players from 1988-2005, but there is no data analyzing the effects of injury on NBA player performance (11). Additionally prior studies have demonstrated that athletes who suffer a hamstring injury may be at a higher risk for a subsequent

hamstring injury (1, 8, 27). Okoroha *et al.* found a recurrence rate of 14.6% for hamstring injuries in the MLB over a six-year period (27). The impact of secondary hamstring injuries on NBA player performance has not recently been assessed.

Understanding the impact of hamstring injuries on player performance can be advantageous for the athlete, their health care providers, the coaches, and the team. The player's health care providers may be able to more accurately estimate the recovery time, the level of performance based on advanced metrics upon return to the game, and prevent subsequent injury. Guidelines have been proposed by the Italian Society of Muscle, Ligaments, and Tendons (ISMuLT) in order to help classify, diagnose, and manage these injuries, which are broken down into non-structural and structural lesions (22).

The purpose of the present study was to identify hamstring injuries in the NBA taking place over a five-year period (2016-2021), evaluate trends in player performance following the injury, and assess the correlation of the number of games missed and player age. We hypothesized that player performance, in particular the minutes played, distance travelled, and average points, would decrease considerably following a hamstring injury.

MATERIALS AND METHODS

An online search was performed on May 27, 2021 using the Hashtag Basketball NBA Injury Database (https://hashtagbasketball.com/nba-injury) and NBA injury reports (16, 20) Study was exempt from IRB approval given that all of the information used was publically available. The following key terms were used to identify hamstring injuries taking place over a five-year period (2016-2021): "hamstring"; "left hamstring"; and "right hamstring". The date of injury, injury type, player name, and team were recorded. Subsequent injuries, define as injuries that took place in the same and/or following season, were noted for each player.

The following variables were recorded from Basketball Reference Player Game Logs (https://www.basketball-reference.com/players): age; games started; minutes started; field goals; field goal attempts; field goal percentage; 3-point field goals; 3-point field goal attempts; 3-point field goal percentage; free throws; free throw attempts; free throw percentage; offensive rebounds; defensive rebounds; total rebounds; assists; steals; blocks; turnovers; personal fools; and points (2). For each injury, two variable means were calculated: one mean for ten games before the injury and a second mean for ten games following the injury. Additional groupings were made based on the number of games missed following the injury (< 10 games missed and > 10 games missed) and secondary injuries (no secondary injuries and secondary injuries).

From NBA Advanced Stats (https://www.nba.com/stats/players/speed-distance) two variables were recorded: distance per game and average speed per game were recorded (25). For each injury, these two variables were noted for the season prior to the injury, the season which the injury took place, and the season after the injury. Overlapping injuries from both databases were removed and cross-referenced with Basketball Reference Player Game Logs (2). If players did not have data for each of the variables they were not included in the variable mean calculations.

All statistical methods were performed with (Microsoft Excel, Microsoft, Redmond, Washington, USA). Students t-test was performed to compare the pre and post-injury variable means and determine significance. The Pearson correlation coefficient (r) was used to assess the correlation between age and the number of games missed.

RESULTS

Demographics

Between 2016 and 2021, 210 hamstring injuries were identified in the NBA (**appendix 1**). Injured players represented 29 of the 30 NBA teams. The teams with the greatest number of hamstring injuries include the Utah Jazz (23/210, 11.0%), the Brooklyn Nets (17/210, 8.1%), and the Dallas Mavericks (13/210, 6.2%) (**figure 1**).

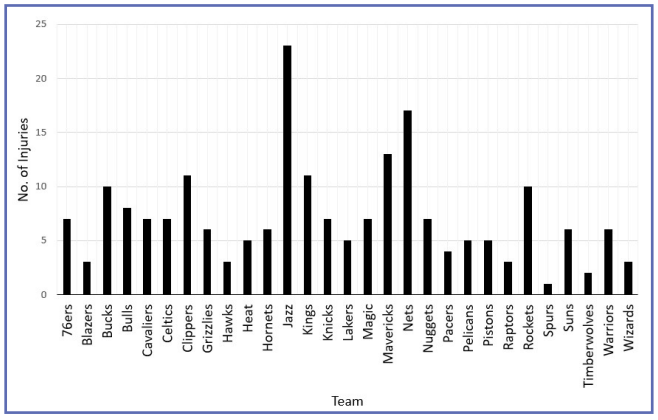

Figure 1. Distribution of hamstring injuries by team.

The mean age at the time of injury was 28.0 ± 4.1 years old (range: 19-40 years old) (**appendix 1, table I**). The most hamstring injuries took place in the 25-30 years old age group (85/210, 40.5%) (**figure 2**). Of the players injured, one was in the 15-20 years old age group (1/210, 0.48%), 45 were in the 20-25 years old age group (45/210, 21.4%), 66 were in the 30-35 years old age group (66/210, 31.4%), 12 were in 35-40 years old age group (12/210, 5.7%), and one

was in the 40-45 years old age group (1/210, 0.48%) (**figure 2**).There was a weak negative correlation between age and games missed (r = - 0.03).

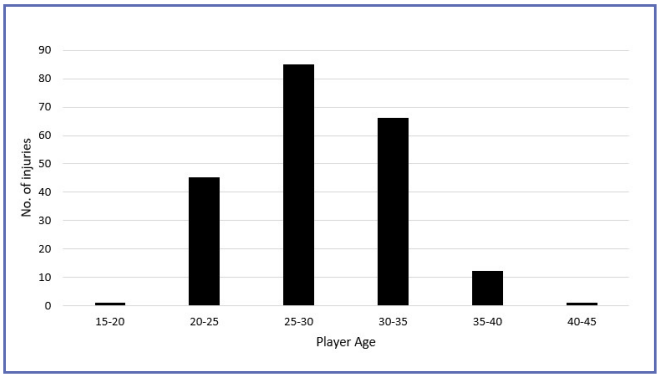

Figure 2. Distribution of hamstring injuries by player age.

Of players who were less than 30 years old, 61 had a subsequent hamstring injury (61/131, 46.56%), and 44 players who were greater than 30 years old had a secondary hamstring injury (44/79, 55.70%). The players greater than 30 years old had a 1.44 higher odds of suffering a secondary injury (95% CI 0.82-2.53).

Impact of injury on player performance

There was a decrease in all variable means except for 3-point field goals (0.9% increase), average blocks (4.1% increase), and personal fouls (1.8% increase) which saw an increase following a hamstring injury (**table II**).

The mean number of games missed was 6.3 ± 9.6 games (range: 0-73 games missed) (**appendix 1**). Players who missed less than 10 games experienced a 5.0% decrease in minutes played while those who missed more than 10 games saw a decrease of 28.6% (**table III**). In addition, average points declined by 6.8% upon return for those who missed less than 10 games and 4.2% for players who missed more than 10 games (**table III**).

Of the players injured, 171 players suffered a subsequent injury in the same and/or following season (171/210, 81.4 %). 77 players had a secondary hamstring injury (77/210,

Table I. Variable means by age.

	< 30 years old (n = 131)			> 30 years old (n = 79)		
	Before	**After**	**P-value**	**Before**	**After**	**P-value**
Games Started	0.56	0.56	0.50	0.52	0.41	0.06
Minutes Played	24.42	23.25	0.14	23.93	21.95	0.05
Field Goals	4.37	3.99	0.10	3.68	3.44	0.22
Field Goal Attempts	9.72	9.01	0.14	8.33	7.83	0.23
Field Goal %	0.45	0.43	0.01	0.44	0.43	0.24
3-Point Field Goals	1.23	1.23	0.47	1.26	1.28	0.46
3-Point Field Goal Attempts	3.47	3.41	0.43	3.40	3.41	0.49
3-Point Field Goal %	0.31	0.29	0.22	0.32	0.31	0.28
Free Throws	2.01	1.93	0.35	1.76	1.70	0.41
Free Throw Attempts	2.56	2.50	0.41	2.12	2.10	0.48
Free Throw %	0.72	0.71	0.36	0.77	0.71	0.06
Offensive Rebounds	0.79	0.78	0.45	0.65	0.50	0.05
Defensive Rebounds	3.03	2.82	0.12	2.90	2.66	0.11
Total Rebounds	3.82	3.60	0.17	3.55	3.16	0.06
Assists	2.93	2.74	0.24	3.16	2.87	0.23
Steals	0.80	0.80	0.50	0.78	0.75	0.36
Blocks	0.35	0.39	0.21	0.33	0.30	0.26
Turnovers	1.53	1.48	0.34	1.35	1.37	0.41
Personal Fouls	1.87	1.98	0.12	1.90	1.80	0.19
Points	11.97	11.05	0.14	10.37	9.86	0.29

Variable means by age. Statistics are per game.

Table II. Variable means.

	Before Injury	After Injury	P-value
Distance (miles)	1.83	1.74	0.05
Speed (mph)	4.22	4.21	0.30
Number of Games Started	0.54	0.50	0.17
Minutes Played	24.23	22.78	0.03
Field Goals	4.11	3.79	0.07
Field Goal Attempts	9.20	8.58	0.10
Field Goal Percentage	0.45	0.43	0.01
3-Point Field Goals	1.24	1.25	0.46
3-Point Field Goal Attempts	3.44	3.41	0.45
3-Point Field Goal %	0.31	0.30	0.17
Free Throws	1.92	1.85	0.33
Free Throw Attempts	2.39	2.35	0.42
Free Throw %	0.74	0.71	0.09
Offensive Rebounds	0.74	0.68	0.18
Defensive Rebounds	2.98	2.76	0.05
Total Rebounds	3.72	3.44	0.05
Assists	3.02	2.79	0.15
Steals	0.79	0.78	0.42
Blocks	0.34	0.35	0.35
Turnovers	1.46	1.44	0.40
Personal Fouls	1.88	1.91	0.32
Points	11.37	10.61	0.12

Variable means. Statistics are per game.

Table III. Variable means by number of games missed.

	< 10 games missed (n = 180)			> 10 games missed (n = 30)		
	Before	After	P-value	Before	After	P-value
Games Started	0.56	0.54	0.28	0.42	0.30	0.14
Minutes Played	25.00	23.75	0.07	19.67	17.00	0.11
Field Goals	4.36	4.02	0.07	2.58	2.46	0.38
Field Goal Attempts	9.76	9.09	0.10	5.86	5.59	0.8
Field Goal %	0.45	0.43	0.04	0.45	0.40	0.05
3-Point Field Goals	1.31	1.32	0.48	0.81	0.85	0.40
3-Point Field Goal Attempts	3.63	3.60	0.45	2.31	2.31	0.50
3-Point Field Goal %	0.31	0.30	0.15	0.31	0.31	0.48
Free Throws	2.05	1.98	0.35	1.12	1.05	0.39
Free Throw Attempts	2.53	2.52	0.47	1.53	1.38	0.31

	< 10 games missed (n = 180)			> 10 games missed (n = 30)		
	Before	After	P-value	Before	After	P-value
Free Throw %	0.76	0.72	0.03	0.63	0.66	0.29
Offensive Rebounds	0.75	0.71	0.27	0.64	0.50	0.15
Defensive Rebounds	3.06	2.85	0.08	2.56	2.25	0.18
Total Rebounds	3.81	3.55	0.09	3.20	2.74	0.13
Assists	3.10	2.88	0.18	2.53	2.25	0.30
Steals	0.79	0.80	0.42	0.76	0.63	0.32
Blocks	0.34	0.36	0.30	0.31	0.28	0.38
Turnovers	1.52	1.51	0.46	1.15	1.06	0.31
Personal Fouls	1.92	1.95	0.36	1.61	1.67	0.37
Points	12.08	11.26	0.12	7.09	6.79	0.40

All statistics are per game.

Table IV. Variable means by secondary injuries.

	No secondary injury (n = 136)			Secondary injury (n = 171)		
	Before	After	P-value	Before	After	P-value
Games Started	0.48	0.45	0.26	0.63	0.56	0.16
Minutes Played	23.23	21.87	0.09	25.67	24.37	0.13
Field Goals	3.85	3.30	0.13	4.40	4.17	0.24
Field Goal Attempts	8.78	8.22	0.18	9.95	9.47	0.25
Field Goal %	0.45	0.43	0.01	0.43	0.42	0.15
3-Point Field Goals	1.14	1.15	0.44	1.43	1.44	0.47
3-Point Field Goal Attempts	3.22	3.19	0.47	3.87	3.90	0.46
3-Point Field Goal %	0.30	0.28	0.17	0.33	0.32	0.30
Free Throws	1.80	1.75	0.41	2.22	2.14	0.38
Free Throw Attempts	2.27	2.26	0.48	2.70	2.67	0.46
Free Throw %	0.72	0.72	0.48	0.78	0.70	0.01
Offensive Rebounds	0.78	0.71	0.25	0.63	0.59	0.32
Defensive Rebounds	2.81	2.70	0.26	3.21	2.84	0.04
Total Rebounds	3.59	3.41	0.23	3.84	3.43	0.06
Assists	2.66	2.40	0.15	3.57	3.36	0.28
Steals	0.73	0.71	0.32	0.87	0.88	0.45
Blocks	0.35	0.37	0.35	0.30	0.31	0.44
Turnovers	1.38	1.32	0.30	1.60	1.65	0.34
Personal Fouls	1.79	1.85	0.27	1.96	1.99	0.40
Points	10.84	10.08	0.18	12.46	11.92	0.29

Variable means by secondary injuries. Statistics are per game.

36.7%). Players with a secondary injury had statistically significant decreases in both defensive rebounds and free throw percentage (**table IV**). The average recovery time for players with no subsequent injuries was 36.53 ± 107.33 days while that for those who had a secondary hamstring injury was 20.54 ± 40.12. days (p = 0.13).

A total of 575 secondary injuries were identified (**appendix 2**). 375 were injuries that fell into the categories listed in **table V**. The most commonly injured body areas include the knee (84/575, 14.61%), the ankle (63/575, 10.96%), and the back (38/575, 6.61%) (**table V**). The most commonly injured body areas include the knee

(84/335, 25.07%), the ankle (63/335, 18.81%), and the back (38/335, 11.34%) (**table V**).
The most common subsequent knee injuries were soreness (24/84, 28.57%) and bruises (19/84, 22.62%) (**table VI**). Ten knee injuries required surgery (10/84, 11.90%) (**table VI**). The most common subsequent ankle injury was sprains (44/63, 69.84%).

Table V. Distribution of secondary injuries by body area.

Body Area	Number of Injuries
Achilles	9
Ankle	63
Arm	4
Back	38
Foot	13
Finger	9
Hip	20
Knee	84
Illness	58
Quadricep	13
Shoulder	15
Wrist	9

Distribution of secondary injuries by body area.

Table VI. Distribution of subsequent knee injuries.

Injury Type	Number of Injuries
Bruise	12
Hyperextension	1
Effusion	2
Injury	19
Soreness	24
Sprain	6
Stiffness	1
Strain	5
Surgery	10

Distribution of subsequent knee injuries. Injury category include knee injuries which were not specified

DISCUSSION

This study identified 210 hamstring injuries taking place in the NBA from 2016-2021 (**appendix 1**). Strains have been noted to be one of the most common types of injuries in other studies relating to professional athletes. From 1997 to 2010 strains composed 27.8% of all injuries in the NBA (11). Various classification systems, such as the ISMuLT guidelines have been used to describe muscle/tendon unit injuries, which are generally broken down into non-structural (Type 1 and 2) and structural (Type 3 and 4) injuries (22-24). Jackson *et al.* noted that the hamstring was most frequently strained muscle group, constituting 23.2% of muscle strains in the NBA over a 24-year period (19). Hamstring injuries are associated with sports where there is frequent high-speed running and stretching of the muscle in extreme joint positions (28). These motions are common in professional basketball and other sports, like soccer, where hamstring injury is also common (10). Whiteley *et al.* studied professional soccer players and found that over half of the players demonstrated decrease high-speed running distances after return to play from a hamstring injury (32).
The majority of injuries took place in the 25-30 years old age group with the meanage at the time of injury being 28.0 ± 4.1 years old (**appendix 1**). This is in line with the mean age found in other studies examining injury outcomes in the NBA, which ranged from 24.8 years old to 28.2 ± 3.4 years old (3, 5, 9, 18) and is consistent with the mean age of NBA players at 26.1 years old (25).
Surprisingly, we did not identify a significant relationship between age and games missed (r = - 0.03). Those who missed less than 10 games had a mean age of 28.0 ± 4.1 years old while those who missed more than 10 games had a meanage of 27.9 ± 4.4 years old. This is an important fin - ing for NBA players and teams who are forecasting return to play from a hamstring injury. Of note, players who were over age 30 did have a 1.44 times higher odds of a secondary injury, however the 95% confidence interval spanned from 0.82 to 2.52. Drakos *et al.* similarly found no correlation between injury rates and age or NBA experience (11). Interestingly, this has not been the case in soccer, where increasing age has a positive correlation with hamstring injury (18, 29, 33). One reason for this difference may be the greater reliance on high-speed running in soccer compared to the more laterally based movements in basketball. A study of male soccer players demonstrated that both age and previous hamstring injury were associated with decreased eccentric hamstring strength, which may suggest age-related changes to the muscle increase injury risk (31). This has not been studied in professional basketball players.
The mean number of games missed was 6.3 ± 9.6 games (range: 0-73 games) (**appendix 1**). Those who missed more

than 10 games saw less of a decrease in their average field goals, average free throw percentage, average points, and average speed per game compared to those who missed less than 10 games (**table II**). A longer recovery period and this slight improvement in performance emphasizes the importance of rest time and load management. Load management has been studied in a variety of sports, with the notion that a steady return to play without acute spikes in workload is a safe way to return to play (5). Buckthorpe *et al*. describe an acute:chronic workload ratio (ACWR), where a heightened ACWR increases player risk to injury, but a progressive increase in chronic workload may build up a player's tolerance toward acute loads (5). Despite best attempts to quantify this workload needed for return to play after hamstring injury, the criteria for a safe return to play remained poorly defined (29). Our analysis is limited to the first 10 games before and after injury, so it does not assess the time at which a player might return to his pre-injury average.

Overall, a small but significant decrease in player performance was observed following a hamstring injury. The variables measuring performance that experienced a decline include average distance ($p = 0.05$), average defensive rebounds ($p = 0.05$), and average field goal percentage ($p = 0.01$). Chauhan *et al*. identified a similar decline in NBA player performance upon returning from a surgically treated complete Achilles tendon rupture (7). They found that there was a significant decline in player offensive rating ($p < 0.001$) and points ($p < 0.001$) (7). These findings suggest that players are not back to their pre-injury performance baseline, and it may be a reason for the high rate of secondary injuries and hamstring re-injuries. Further study of return to play metrics may better inform teams and coaches about when it is safe to return to play after hamstring injury.

In this study, 171 players experienced a secondary injury, of which 77 players experienced subsequent hamstring injuries. This 36.7% reinjury rate is in line with recurrence rates of hamstring injuries for athletes described in other studies (10, 17). Notably, a 36.7% reinjury rate is higher than the 12% reinjury rate noted over a 7-year period observed in European football (12). Potential explanations for this this variation may include the number of games played in a season and difference in sport characteristics. A greater frequency of games played in the NBA in comparison to professional football leagues may put athletes at an increased risk for injury. Additionally, the smaller size of a basketball court and increased amount of jumping, juking, physical contact, and changing direction may increase risk hamstring injury.

Injury has been reported to greatly increase the risk of a similar, subsequent hamstring injury in elite athletes (17). Furthermore, roughly one third of hamstring reinjury will recur within two weeks of return to sport (14). One prospective cohort of male soccer players showed that a history of prior hamstring injury leads to increased risk of sustaining a new hamstring injury by over two-fold (13). It is also interesting that the most commonly re-injured body area, excluding hamstring strains, were the knee and ankle. Furthermore, 10% of the secondary knee injuries required surgery for definitive management. This suggests that hamstring injuries may put players at risk for serious re-injury if not properly rehabilitated prior to return to play.

This study must be interpreted within the confines of its limitations. All data analyzed for this study was from publicly collected sources and is subject to limitations. As a result, it was not possible to stratify the players according to type of hamstring injury, which has important implications on treatment options and risk of reinjury. The decision to calculate variable means for 10 games before and 10 games after was an arbitrary number, and it is possible for there to be significant differences outside of 10 games. In addition, the results stem from a limited sample size of NBA players over a five-year period which may not be directly applicable to other professional basketball leagues. Each player included in this study may not be receiving identical treatment given the different team locations and care providers. Another limitation includes that newer players to the NBA, such as those who began playing in 2021, do not have as much data regarding subsequent injuries compared to athletes who have been in the league for a longer period of time.

CONCLUSIONS

Hamstring injuries are common in the NBA, and they lead to a small but significantly important decline in player performance. Following hamstring injury there is a high rate of reinjury at the hamstring as well as subsequent injury to other areas of the body, occasionally requiring surgery. Further study of hamstring injuries in the NBA is warranted to better understand readiness to return to play.

FUNDINGS

None.

DATA AVAILABILITY

All data was recorded from publicly available data bases. The following links were used for data collection: 1) https://hashtagbasketball.com/nba-injury, 2) https://www.basketball-reference.com/players, and 3) https://www.nba.com/stats/players/speed-distance. Additionally, demographic data can be seen in **appendix 1**.

CONTRIBUTIONS

All authors contributed equally to this work, from analyzing the data to drafting the manuscript.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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SUPPLEMENTS

Appendix 1. Demographic data.

	Age at Time of Injury (years-days)	Games Missed	Injury
1	24-326	9.00	Strained left hamstring
2	25-114	1.00	Left hamstring injury
3	26-002	1.00	Right hamstring injury
4	26-004	1.00	Right hamstring injury
5	22-329	6.00	Strained left hamstring
6	32-033	1.00	Tightness in hamstring
7	32-038	2.00	Sore/tight left hamstring
8	35-013	1.00	Left hamstring injury
9	32-044	6.00	Strained right hamstring
10	32-048	4.00	Strained right hamstring
11	32-063	8.00	Strained right hamstring
12	32-067	6.00	Strained right hamstring
13	21-198	1.00	Strained left hamstring
14	31-316	3.00	Strained right hamstring
15	31-131	3.00	Sore left hamstring
16	24-247	8.00	Strained left hamstring
17	25-145	5.00	Strained right hamstring
18	26-099	1.00	Hamstring injury
19	27-063	2.00	Sore right groin/hamstring
20	30-220	10.00	Left hamstring injury
21	30-252	1.00	Left hamstring injury
22	25-213	1.00	Left hamstring injury
23	27-096	1.00	Left hamstring injury
24	23-134	3.00	Right hamstring injury
25	28-097	1.00	Strained right hamstring
26	30-179	1.00	Tightness in right hamstring
27	30-326	5.00	Sore left hamstring
28	23-180	7.00	Strained left hamstring
29	27-147	24.00	Sore right hamstring
30	31-231	3.00	Strained left hamstring
31	31-238	4.00	Sore left hamstring
32	32-320	3.00	Sore left hamstring
33	33-019	2.00	Strained right hamstring
34	33-229	17.00	Strained left hamstring

	Age at Time of Injury (years-days)	Games Missed	Injury
35	35-278	1.00	Right hamstring injury
36	22-147	0.00	Tightness in hamstring
37	22-079	2.00	Right hamstring injury
38	29-357	7.00	Strained left hamstring
39	22-240	22.00	Strained right hamstring
40	22-175	20.00	Strained right hamstring
41	27-159	5.00	Strained right hamstring
42	21-074	1.00	Right hamstring injury
43	25-330	2.00	Sore right hamstring
44	22-298	1.00	Strained left hamstring
45	26-085	6.00	Left hamstring injury
46	28-180	2.00	Strained right hamstring
47	21-288	3.00	Strained right hamstring
48	31-031	3.00	Right hamstring injury
49	21-362	3.00	Strained left hamstring
50	22-033	6.00	Strained left hamstring
51	22-099	2.00	Right hamstring injury
52	24-085	4.00	Strained left hamstring
53	35-234	10.00	Strained left hamstring
54	22-056	1.00	Right hamstring injury
55	28-094	3.00	Strained left hamstring
56	36-054	5.00	Strained left/right hamstring
57	26-334	1.00	Strained right hamstring
58	27-021	6.00	Left hamstring injury
59	27-040	5.00	Left hamstring injury
60	23-241	7.00	Sore/strained left hamstring
61	23-262	1.00	Sore left hamstring
62	25-249	17.00	Strained right hamstring
63	27-003	4.00	Right hamstring injury
64	27-019	5.00	Right hamstring injury
65	23-243	3.00	Left hamstring injury
66	30-265	1.00	Strained right hamstring
67	30-316	1.00	Left hamstring injury
68	31-055	2.00	Strained right hamstring
69	25-327	0.00	Strained right hamstring
70	30-270	12.00	Torn left hamstring
71	24-116	5.00	Left hamstring injury
72	20-311	7.00	Strained right hamstring

	Age at Time of Injury (years-days)	Games Missed	Injury
73	33-271	7.00	Strained left hamstring
74	26-137	4.00	Strained right hamstring
75	26-154	1.00	Sore/strained left hamstring
76	31-247	2.00	Left hamstring injury
77	21-015	1.00	Tightness in left hamstring
78	19-283	21.00	Strained right hamstring
79	23-142	1.00	Left hamstring injury
80	40-138	9.00	Strained left hamstring
81	23-160	4.00	Left hamstring injury
82	26-290	4.00	Strained left hamstring
83	28-114	3.00	Strained right hamstring
84	28-164	10.00	Strained right hamstring
85	28-128	7.00	Strained left hamstring
86	29-060	3.00	Strained left hamstring
87	33-185	16.00	Left hamstring injury
88	30-291	0.00	Strained right hamstring
89	21-188	1.00	Strained right hamstring
90	23-132	4.00	Strained right hamstring
91	24-152	10.00	Strained left hamstring
92	26-217	3.00	Strained right hamstring
93	28-071	17.00	Strained left hamstring
94	28-126	26.00	Strained left hamstring
95	32-185	2.00	Sore left hamstring
96	33-180	2.00	Tightness in right hamstring
97	35-201	3.00	Strained left hamstring
98	35-251	5.00	Strained left hamstring
99	36-428	1.00	Right hamstring injury
100	31-347	50.00	Sore left hamstring
101	27-040	1.00	Sore right hamstring
102	27-044	3.00	Sore right hamstring
103	28-303	17.00	Strained right hamstring
104	35-068	17.00	Strained right hamstring
105	36-189	2.00	Sore left hamstring
106	22-119	6.00	Strained left hamstring
107	26-075	6.00	Right hamstring injury
108	26-130	6.00	Strained left hamstring
109	28-320	27.00	Strained left hamstring
110	29-008	2.00	Hamstring injury
111	22-205	4.00	Right hamstring injury
112	25-041	50.00	Torn left hamstring
113	29-117	1.00	Strained left hamstring

	Age at Time of Injury (years-days)	Games Missed	Injury
114	29-235	6.00	Strained right hamstring
115	24-283	3.00	Tightness in right hamstring
116	27-303	1.00	Right hamstring injury
117	25-073	4.00	Sore right hamstring
118	34-118	9.00	Sore right hamstring
119	29-127	5.00	Strained left hamstring
120	32-047	3.00	Left hamstring injury
121	32-083	2.00	Right hamstring injury
122	32-085	1.00	Right hamstring injury
123	21-042	25.00	Torn right hamstring
124	26-003	2.00	Left hamstring injury
125	27-012	0.00	Left hamstring injury
126	34-324	12.00	Strained left hamstring
127	35-001	15.00	Left hamstring injury
128	31-258	1.00	Left hamstring injury
129	31-289	6.00	Right hamstring injury
130	35-329	1.00	Right hamstring injury
131	35-364	1.00	Hamstring injury
132	25-148	5.00	Sore/strained left hamstring
133	26-113	5.00	Strained right hamstring
134	24-155	1.00	Sore left hamstring
135	32-054	5.00	Left hamstring injury
136	32-068	14.00	Left hamstring injury
137	33-118	6.00	Right hamstring injury
138	33-139	1.00	Right hamstring injury
139	33-158	1.00	Right hamstring injury
140	33-167	1.00	Right hamstring injury
141	31-067	1.00	Left hamstring injury
142	31-173	2.00	Strained left hamstring
143	21-338	1.00	Left hamstring injury
144	20-237	11.00	Left hamstring injury
145	28-066	1.00	Sore left hamstring
146	28-070	11.00	Sore left hamstring
147	27-285	6.00	Sore/strained right hamstring
148	29-247	1.00	Left hamstring injury
149	29-252	9.00	Strained left hamstring
150	29-295	1.00	Strained left hamstring
151	24-093	15.00	Strained right hamstring
152	33-289	2.00	Strained left hamstring
153	33-032	6.00	Strained hamstring

	Age at Time of Injury (years-days)	Games Missed	Injury
154	25-152	2.00	Right hamstring injury
155	25-195	2.00	Sore left hamstring
156	26-151	16.00	Right hamstring injury
157	26-285	6.00	Left hamstring injury
158	27-160	1.00	Sore left hamstring
159	27-190	5.00	Strained left hamstring
160	28-079	6.00	Strained right hamstring
161	28-130	1.00	Left hamstring injury
162	28-164	1.00	Right hamstring injury
163	21-160	7.00	Strained left hamstring
164	24-042	1.00	Strained right hamstring
165	24-048	2.00	Strained/sore right hamstring
166	28-122	7.00	Strained right hamstring
167	30-190	10.00	Sore right hamstring
168	30-238	5.00	Sore/strained left hamstring
169	30-250	15.00	Sore left hamstring
170	31-269	5.00	Strained right hamstring
171	27-069	7.00	Strained left hamstring
172	27-090	8.00	Strained/tightness in left hamstring
173	30-289	9.00	Strained/tightness in left hamstring
174	27-095	3.00	Strained right hamstring
175	27-184	1.00	Right hamstring injury
176	27-242	6.00	Right hamstring injury
177	28-115	12.00	Strained right hamstring
178	26-017	1.00	Strained left hamstring
179	26-164	69.00	Surgery to repair torn left hamstring
180	24-219	1.00	Tightness in right hamstring
181	30-252	1.00	Strained right hamstring
182	29-330	1.00	Right hamstring injury
183	34-249	15.00	Strained right hamstring
184	34-316	2.00	Left hamstring injury
185	34-318	1.00	Left hamstring injury
186	31-284	73.00	Strained right hamstring
187	26-303	1.00	Left hamstring injury
188	26-323	1.00	Hamstring injury
189	27-290	3.00	Strained left hamstring
190	34-089	3.00	Sore left hamstring
191	27-058	12.00	Hamstring injury
192	27-333	3.00	Hamstring injury
193	21-115	1.00	Left hamstring injury

	Age at Time of Injury (years-days)	Games Missed	Injury
194	24-357	37.00	Strained left hamstring
195	32-214	9.00	Sprained left hamstring
196	23-108	10.00	Strained left hamstring
197	29-292	1.00	Right hamstring injury
198	29-098	4.00	Strained left hamstring
199	26-197	6.00	Strained right hamstring
200	29-018	4.00	Strained right hamstring
201	22-032	2.00	Strained right hamstring
202	32-029	1.00	Strained left hamstring
203	32-033	3.00	Strained left hamstring
204	32-169	2.00	Strained right hamstring
205	29-181	2.00	Sore left hamstring
206	31-159	9.00	Strained left hamstring
207	31-260	1.00	Left hamstring injury
208	32-245	1.00	Left hamstring injury
209	32-249	1.00	Left hamstring injury
210	32-254	1.00	Left hamstring injury

Appendix 2. Distribution of hamstring injuries by injury type.