

# Lower Extremity Injury Rates on Turf versus Natural Grass Surfaces: An Analysis of Professional Football Athletes

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## INTRODUCTION:

As emphasis on player safety in the National Football League (NFL) has increased in recent years, multiple variables have been closely scrutinized for their roles in placing players at increased risk for injury. One such factor, the use of artificial turf playing surfaces, has become a controversial topic, with many current and former players stating that turf fields place players at higher risk for injury while alternative sources have suggested there is no significant in injury rate between artificial and natural grass surfaces. The purpose of this study was to quantify the rate of lower extremity injuries occurring in NFL players on artificial turf compared to natural grass surfaces and to characterize the degree of time missed with injury and proportion of injuries requiring surgery. We hypothesized that major lower extremity injuries requiring surgical intervention occurred on artificial turf surfaces at a higher rate than natural grass.

## METHODS:

Lower extremity injury data for the 2021 and 2022 NFL seasons was obtained using public available records from the internet. Data collected included player position and age, playing surface of field on which injury occurred, injury type, weeks missed with injury, and whether patient underwent season-ending or minor surgery. Multivariable logistic regression was performed to determine the influence of field type on risk of major surgery.

## RESULTS:

During the 2021 and 2022 NFL regular seasons, a total of 386 games were played on turf (16 NFL stadiums) and 332 games played on natural grass (14 NFL stadiums). Within the study period, 718 lower extremity injuries were reported and identified, of which 133 required surgery. Grouped by position, defensive secondary players (cornerback, safety) had the highest number of recorded lower extremity injuries, followed by running back/fullback/tight end positions and offensive line player positions (Table 1). Combining the 2021/2022 seasons, the incidence rate of lower extremity injury on natural grass surfaces was 1.22 injuries/game while for turf surfaces, the incidence rate was 1.42 injuries/game (Table 2). Injury severity was stratified by weeks missed, as illustrated in figure 1. Odds of season-ending surgery was found to significantly higher on turf surfaces compared to natural grass surfaces (OR 1.60, 95% CI 1.28-1.99), while additional variables, including weather, age, position, and week of injury occurrence and history of prior injury were not found to influence the odds of season-ending surgery.

## DISCUSSION AND CONCLUSION:

As efforts to improve player safety in professional sports including football heighten, it has been increasingly important to consider potential risk factors, including playing surfaces. Our analysis of the 2021 and 2022 NFL seasons demonstrates a higher incidence rate of injuries on artificial turf surfaces (1.42 injuries/game) compared to natural grass surfaces (1.22 injuries/game). In addition, the odds of more serious injury requiring season-ending surgery was found to be significantly higher on artificial turf compared to natural grass. This study certainly carries limitations in the possibility that the methods of data collection did not capture all sustained injuries and the inability to account for alternative factors which could influence injury rates including injuries occurring in practice environments. Despite these limitations, this study still suggests that risk of injury, particularly serious lower extremity requiring surgical intervention, is elevated on artificial playing surfaces. Additional research is needed in this topic prior to more widespread adoption of turf surfaces in all age groups of football, from professional to youth age football.

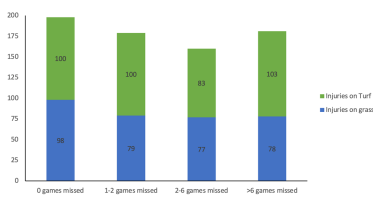


Figure 1: Number of Injuries on Turf Versus Grass Playing Surfaces Stratified by Games Missed During the 2021/2022 NFL Seasons

Total Injuries	718
Injuries By Year	
2021	327
2022	391
Position	
Control (Quarterback, Kicker, Punter)	22
Defensive Line	82
Offensive Line	127
Running Back, Fullback, Tight End	134
Secondary (Cornerback, Safety)	151
Wide Receiver	96
Average Age	26.29
Range	[20, 38]
Field	
Total games played on Turf	386
Total games played on grass	332
Players with history of previous injury at time of injury within the same season	100

	Total	0 games missed	1-2 games missed	2-6 games missed	>6 games missed	Surgeries	
2021	Injuries on grass	171	54	35	46	36	24
	Incidence (injuries/game)	1.248	0.394	0.255	0.336	0.263	0.175
	Injuries on Turf	156	41	36	39	40	36
2022	Injuries on grass	1151	0.304	0.267	0.289	0.298	0.287
	Incidence (injuries/game)	1.193	0.326	0.326	0.207	0.333	0.193
	Injuries on Turf	230	59	64	44	63	47
Combined	Incidence (injuries/game)	1.679	0.431	0.467	0.343	0.438	0.343
	Injuries on grass	332	96	79	77	78	50
	Incidence (injuries/game)	1.221	0.360	0.290	0.283	0.287	0.184
Combined	Injuries on Turf	386	100	100	83	103	83
	Incidence (injuries/game)	1.419	0.368	0.368	0.305	0.379	0.305