

Research Article

Impact of Lower Extremity Injuries on Performance Metrics by Position in Male Major League Soccer Players: A Position-Specific Analysis of Return to Play and Performance from 2018-2023

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Introduction

Lower extremity injuries are common in male professional soccer players, yet no known studies examine how these injuries impact return to play in these athletes.

Objective

To analyze whether lower extremity injuries affected the rate of return to play and performance in male Major League Soccer players.

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- a Symone Brown has a multidisciplinary background in clinical research, public health, and medical sciences. She holds a Bachelor's degree in Exercise Science, a Master of Public Health, a Master of Business Administration, and a Master of Science in Management. She has also completed two years of medical school. A native of Los Angeles, California, Symone also played collegiate basketball, an experience that shaped her dedication to teamwork, resilience, and service. Her research interests include neuro-oncology, sports medicine, health equity, and disparities in diagnostic pathways. In her spare time, she enjoys reading, playing with her dog Hendrix, listening to music, playing video games, and watching documentaries.

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Materials/Methods

Injury data from the 2018-2023 men's professional soccer seasons for both Major League Soccer and International Leagues were collected from FBref, Transfermarkt, and the MLS Player Availability Report. Players were included if they experienced a lower extremity injury during the 2018-2023 soccer seasons. Injuries were included if they resulted in absence from a minimum of 14 days, including games or practices. Performance metrics were analyzed across three periods: short-term, defined as within the same year of injury; medium-term, up to one-year post-injury; and long-term, up to two years post-injury. Statistical analysis comparing performance metrics before and after the injury were conducted using Microsoft excel and Julius. Paired t-tests were used to assess statistical significance.

Results

Of the 1,522 total injuries from 2018-2023, 838 (55.1%) were considered lower extremity injuries. Among all positions, the knee was the most commonly injured structure (151.18%). The Center Back was the most commonly injured position (166 injuries, 19.8%).

Conclusions

Through the data, it was found that the knee was the most injured body part. Center Backs experienced both declines and improvements in performance metrics. Forwards demonstrated a decrease in goals per game and other offensive metrics following injury. These findings can help sports medicine professionals enhance patient recovery, prolong players' career, and develop targeted injury prevention strategies by understanding the position specific impacts of lower extremity injuries on soccer performance.

INTRODUCTION

Lower extremity injuries are common in male professional soccer players, yet there are no known studies that examine how these injuries impact return to play in these athletes. A study examining injuries in Major League Soccer (MLS) players from 2014-2019, identified a total of 9,713 injuries, 7,679 of which occurred in the lower extremities (Forsythe et al. 2022). It was found that Midfielders and Forwards were more likely to suffer an injury compared to players in other positions (Forsythe et al. 2022). Another study found that player position impacts the occurrence of injury, and the specific type of injury suffered influences return to play (Hall et al. 2022). For example, players in attacking roles, such as Forwards or Wingers, predominantly occupy the attacking zone, known as the final third of the pitch closer to the opponent's goalpost. Consequently, the average number of ball interactions, or 'touches', that these players have within the final third of the pitch per match is typically higher in comparison to players in midfield and defensive roles. Attacking players are primarily responsible for creating scoring opportunities by frequently attempting shots and engaging defender's one-on-one. A study assessing the impact of high-intensity actions on injury incidence among 15 professional male soccer players found that these high-intensity actions, measured by metrics such as high-speed running and total distance covered, contribute to a higher injury risk for these players (Suarez-Arrones et al. 2020). Following an injury, attacking players may decrease their involvement in successful dribbles, one-on-one confrontations, and shots, which can adversely affect the team's performance. This effect is often more significant

than any similar performance statistic decline seen in defensive players (Verstappen et al. 2021).

Soccer requires a lot of physical contact between players, with emphasis on the lower part of the body, frequently resulting in lower extremity injuries. An evaluation of 24 professional male soccer players who underwent Achilles tendon repair found that 17 of 24 (70.8%) players were able to return to play (RTP) at a professional level after 10 months, however there was no data about how the injury affected each player's performance (Trofa et al. 2018). Another study examined the impact of Achilles tendon repair on the performance of 22 MLS players (4 Forwards, 2 Midfield, 9 Defense, 2 Goalkeeper) (Sochacki et al. 2019). The authors found that although these players were able to RTP after injury, their careers were shortened by 2.5 ± 2.2 vs 4.5 ± 3.0 seasons ($p=0.02$) and they played fewer games per season than their matched controls (13.4 ± 8.4 vs 23.2 ± 6.5 games, $p<0.001$) post-operatively (Sochacki et al. 2019). Anterior Cruciate Ligament (ACL) injuries, one of the most common knee injuries in the MLS, are known to significantly affect an athlete's career due to their extensive rehabilitation process. In a study that examined 40 MLS players who underwent ACL reconstruction between 2011-2014 (Arundale, Silvers-Granelli, and Snyder-Mackler 2018). The authors found that on average, the career length of a player who underwent surgery was 1.3 ± 1.3 years, compared to 2.5 ± 1.3 years for players who did not undergo ACL reconstruction (Arundale, Silvers-Granelli, and Snyder-Mackler 2018).

Injuries are a significant concern in professional soccer, affecting both player performance and career longevity. In another study, the medical staff of football clubs participating in the Union of European Football Association Elite Club reported a total of 22,942 injuries between the 2001

and 2017 seasons (Ekstrand et al. 2020). The authors identified the top 31 most common injury diagnoses, making up a total of 78.0% of all reported injuries, with thigh contusion (3.3%) being number one, followed closely by foot contusion (2.7%) (Ekstrand et al. 2020). Though there are numerous studies that have analyzed how injuries impact a player's overall professional career, there is limited data on how an injury affects the different positions and their performance metrics. The purpose of this study was to analyze whether lower extremity injuries had an impact on the rate of return to play and performance in male major league soccer players.

METHODS

Publicly available injury reports and player profiles were accessed to generate a list of male professional soccer players who played in either Major League Soccer (MLS) or the International Leagues during the 2018-2023 seasons. Data was collected using Transfermarkt and the MLS Player Availability Report from June 2023 to April 2024 and analyzed using Microsoft Excel and Julius, a statistical analysis program. Players who experienced a lower extremity injury during the 2018-2023 soccer seasons were included in the analysis. Specifically, this study focused on lower extremity injuries that resulted in 14 or more days of time loss from practices or matches.

Additionally, FBref, an online database that provides detailed analytics on professional male and female soccer players across various professional competitions, including major leagues and international tournaments, to obtain player statistics. The data collected included player position, role on the field, minutes played, and game participation, such as touches in the defensive and middle thirds, tackles, blocks, clearances, fouls, goals allowed, and expected goals allowed. We further quantified these statistics on a per-game basis to establish averages. We also recorded player demographics (e.g., age and position) and, when available, information on treatment received.

In this study, performance metrics were analyzed across three time periods following injury: short-term, medium-term, and long-term. Short-term refers to performance changes within the same year of the injury. Medium-term includes changes up to one-year post-injury, while long-term encompasses changes up to two years post-injury. The longer the period, the more comprehensive the data, though they are further removed from the initial injury.

Statistical analyses were conducted using Microsoft Excel and Julius, and performance metrics from before and after the injury were compared to measure the athlete's performance when returning to play. Paired t-tests were used to assess the statistical significance of changes in various performance indicators such as minutes per game, passing accuracy, and defensive actions.

RESULTS

From 2018 to 2023, 1,522 total injuries for men's professional soccer seasons for both Major League Soccer and In-

ternational Leagues were recorded, 838 (55.1%) of which were lower extremity injuries. These injuries were separated into different categories, including knee injury, hamstring injury, ankle injury, knee ligament injury, leg injury, calf injury, groin injury, thigh injury, foot injury, hip injury, meniscal injury, foot fracture, adductor problems, torn abductor, muscle, fibula fracture, ankle fracture, heel injury, tibia fracture, and patella injury. The knee was the most injured body part across all positions, consisting of 151 injuries (18.0%), followed by the hamstring (111 injuries; 13.2%). The Center Back was the most common position injured (166 injuries; 19.8%), followed by Center Midfield (162 injuries; 19.3%).

PLAYER DEMOGRAPHICS

The average age of the players was 25.5 years (range, 16 - 38 years). Goalkeepers had the highest average age at 26.9 years (range: 18-38 years), while Left/Right Backs had the lowest average age at 23.9 years (range: 16-34 years). The average ages for other positions were as follows: Central Back at 26.8 years (range: 17-38 years), Center Midfielder at 25.6 years (range: 17-36 years), Left Wing/Right Wing at 25.5 years (range: 17-35 years), Center Middle Defender at 24.9 years (range: 17-37 years), and Forwards at 24.9 years (range: 18-33 years).

GOALKEEPER

Out of 838 injuries, goalkeepers sustained 53 (6.32%), with knee injuries being the most prevalent (16.98%). Short-term analysis revealed a general decline in performance metrics, with a significant decrease in fouls drawn per game. Medium-term metrics showed slight improvements, though not statistically significant. In the long term, goalkeepers showed statistically significant improvements in saves per 90 minutes and expected goals saved, despite facing more shots on target ([Table 3](#)).

CENTER MIDDLE DEFENDER

Center Middle Defenders sustained 63 injuries (7.5%), with leg injuries being the most common (20.6%). Short-term performance metrics generally declined, with a significant decrease in fouls drawn. Medium-term analysis showed significant improvements in games started, pass percentage and tackles. In the long term, there were significant decreases in pass percentage and key passes, though minutes per game slightly increased without statistical significance ([Table 4](#)).

CENTER BACK

With 166 (19.8%) lower extremity injuries, Center Backs experienced significant short-term declines in performance, particularly in minutes per game, blocks, and clearances. There were medium-term improvements in tackles, touches, and defensive metrics. In the long term, there was a significant decrease in playing time, but defensive

Table 1. Player Position and Number of Lower Extremity Injuries

Position	Count	Percentage
Center back	166	19.8%
Center midfielder	162	19.3%
Forwards	152	18.1%
Left/Right back	125	14.9%
Left/Right wing	117	13.9%
Center middle defender	63	7.5%
Goalkeeper	53	6.3%
Total	838	100%

Table 2. Number of Lower Extremity Injuries by Body Part

Injury type	Count	Percentage
Knee injury	151	18.0%
Hamstring injury	111	13.2%
Knee ligament injury	89	10.6%
Ankle injury	87	10.4%
Leg injury	82	9.8%
Calf injury	60	7.2%
Groin injury	49	5.8%
Thigh injury	52	6.2%
Foot injury	42	5.0%
Hip injury	29	3.4%
Meniscal injury	20	2.4%
Foot fracture	17	2.0%
Torn abductor muscle	14	1.7%
Adductor problems	15	1.8%
Tibia fracture	7	0.8%
Heel injury	6	0.7%
Fibula fracture	3	0.4%
Ankle fracture	2	0.2%
Patella injury	2	0.2%
Total	838	100%

involvement improved, including touches in the defensive third and tackles ([Table 5](#)).

CENTER MIDFIELDER

Center Midfielders sustained 162 injuries (19.3%), with knee injuries accounting for 17.9%. Short-term results showed declines in several metrics, notably a significant decrease in progressive carries. Medium-term improvements included pass percentage and key passes, with intensified midfield involvement. Long-term analysis revealed a slight decrease in minutes per game but significant increases in touches, pass percentage, and tackles, indicating improved performance post-injury ([Table 6](#)).

FORWARD

Forwards experienced 152 injuries (18.1%), with the knee being the most injured body part (24.3%). In the short term, they had significant declines in minutes per game and offensive actions. Medium-term declines persisted, including in minutes per game and progressive carries. In the long term, although shots on target increased slightly, there was a significant decrease in goals per game. However, we noted improvements in dribbling and passing ([Table 7](#)).

LEFT WING / RIGHT WING

These positions accounted for 117 injuries (14.0%), with the knee being the most injured part (17.1%). Short-term analy-

Table 3. Performance Metrics for Goalkeepers

Metric	Pre-injury	Post-injury	Change	P value	Term
Minutes per game	87.6	78.7	↓ 10.1%	0.1038	Short-term
Saves per game	2.9	2.7	↓ 7.5%	0.564	Short-term
Shots on target against/game	4	3.9	↓ 1.0%	0.9355	Short-term
Goals against/game	1.2	1.3	↑ 3.8%	0.741	Short-term
Expected goals saved/game	1.1	1.1	↑ 6.2%	0.6901	Short-term
Clean sheets/game	0.3	0.2	↓ 18.2%	0.2658	Short-term
Sweeps/game	1	0.8	↓ 22.4%	0.4468	Short-term
Fouls/game	0.1	0.1	↓ 11.9%	0.8608	Short-term
Fouls drawn/game	0.3	0.1	↓ 62.1%	0.0133	Short-term
Games started	25	26.6	↑ 6.2%	0.726	Medium- term
Games played	25	26.6	↑ 6.2%	0.726	Medium- term
Minutes played	2243.3	2383	↑ 6.2%	0.7263	Medium- term
Expected goals saved/90	0.7	0.9	↑ 29.6%	0.1362	Medium- term
Expected goals saved/game	0.7	0.9	↑ 31.0%	0.1207	Medium- term
Clean sheets	6.6	6.7	↑ 1.7%	0.9388	Medium- term
Clean sheets/90	0.19	0.19	↓ 0.1%	0.9936	Medium- term
Clean sheets/game	0.19	0.19	↑ 0.4%	0.974	Medium- term
Sweeps	13.1	17.9	↑ 36.7%	0.265	Medium- term
Sweeps/90	0.4	0.5	↑ 38.7%	0.1492	Medium- term
Sweeps/game	0.4	0.5	↑ 38.4%	0.1522	Medium- term
Minutes per game	79.2	87.8	↑ 10.8%	0.0553	Long- term
Saves per game	106.4	113.5	↑ 6.7%	0.5813	Long- term
Saves per 90 minutes	2.4	3	↑ 22.3%	0.0393	Long- term
Shots on target against/90	3.9	4	↑ 2.6%	0.0071	Long- term
Goals against/90	1.3	1.4	↑ 7.7%	0.0025	Long- term
Expected goals saved/90	1.1	1.2	↑ 9.1%	0.0001	Long- term
Clean sheets/90	0.2	0.2	↓ 6.3%	0.3076	Long- term

sis indicated declines in minutes per game and blocks, with a significant decrease in fouls. There were mixed results in the medium term, with increases in dribbles and crosses but declines in goals and assists. In the long term, playing time decreased while dribbling and crossing improved significantly ([Table 8](#)).

LEFT BACK/ RIGHT BACK

Left and Right Backs sustained 125 injuries (14.9%), with the knee being the most affected (20.0%). Short-term metrics showed decreases in minutes per game, blocks, and progressive carries. In the medium term, tackles and touches increased, indicating greater involvement in defensive and midfield actions. Long-term analysis revealed reduced playing time but significant improvements in passing, tackles, and progressive carries ([Table 9](#)).

DISCUSSION

The knee was the most frequently injured body part during the 2018-2023 professional and international soccer seasons, particularly affecting performance across various positions. Center Backs experienced significant changes, including declines in blocks and clearances post-injury. Forwards saw a notable reduction in offensive performance, with a decrease in goals per game. Center Midfielders demonstrated relatively stable performance post-injury, with improvements in pass percentage and tackles, despite some declines in other areas. These position-specific changes highlight the diverse impact of lower extremity injuries on soccer performance metrics, underlining the need for tailored recovery and injury prevention strategies.

Table 4. Performance Metrics for Center Middle Defenders

Metric	Pre-injury	Post-injury	Change	P value	Term
Minutes per game	87.6	78.7	↓ 10.1%	0.1038	Short- term
Saves per game	2.9	2.7	↓ 7.5%	0.564	Short- term
Shots on target against/game	4	3.9	↓ 1.0%	0.9355	Short- term
Goals against/game	1.2	1.3	↑ 3.8%	0.741	Short- term
Expected goals saved/game	1.1	1.1	↑ 6.2%	0.6901	Short- term
Clean sheets/game	0.3	0.2	↓ 18.2%	0.2658	Short- term
Sweeps/game	1	0.8	↓ 22.4%	0.4468	Short- term
Fouls/game	0.1	0.1	↓ 11.9%	0.8608	Short- term
Fouls drawn/game	0.3	0.1	↓ 62.1%	0.0133	Short- term
Games started	32.7	34.4	↑ 5.1%	0.556	Medium- term
Games played	32.7	34.4	↑ 5.1%	0.556	Medium- term
Minutes played	2436.1	2440.8	↑ 0.2%	0.985	Medium- term
Minutes per game	69.2	65.2	↓ 5.7%	0.2468	Medium- term
Pass percentage	1523.2	2108.9	↑ 38.5%	0.0272	Medium- term
Pass percentage per game	46.4	60.1	↑ 29.5%	0.0242	Medium- term
Touches in def 3rd	237.3	316.3	↑ 33.3%	0.0998	Medium- term
Touches in def 3rd/90	9.3	11.7	↑ 25.5%	0.0876	Medium- term
Touches in mid 3rd	591.6	742.5	↑ 25.5%	0.1748	Medium- term
Touches in mid 3rd/90	22.2	27.5	↑ 23.9%	0.0842	Medium- term
Number of key passes	12.2	16.1	↑ 31.9%	0.2057	Medium- term
Tackles	36.2	43.5	↑ 20.2%	0.291	Medium- term
Tackles percentage per 90	23.4	33.1	↑ 41.5%	0.0252	Medium- term
Clearances per 90	0.7	1	↑ 35.1%	0.0507	Medium- term
Pass percentage per game	85.2	80.1	↓ 6.0%	0.0001	Long- term
Touches in def 3rd/game	45.3	38.7	↓ 14.6%	0.0036	Long- term
Key passes per game	2.1	1.5	↓ 28.6%	0.00008	Long- term
Tackles percentage per game	75.4	68.2	↓ 9.6%	0.001	Long- term
Minutes per game	78.5	80.2	↑ 2.2%	0.094	Long- term
Interceptions per game	1.8	2	↑ 11.1%	0.055	Long- term

In 2013, Hägglund et al. examined lower extremity injuries in players from 26 soccer clubs in Europe between 2001 and 2010 (Hägglund, Waldén, and Ekstrand 2013). This study focused on the major muscle groups of the lower extremity (quadriceps, hamstrings, adductors, gastrocnemius), and the authors found that these muscle groups comprise roughly 90.0% of all lower extremity injuries in professional soccer players in Europe (Hägglund, Waldén, and Ekstrand 2013). Forsythe et al. analyzed injuries in MLS players from 2014-2019 and found that hamstring injuries were the most prevalent, and the knee was the second most commonly injured joint in the lower extremity (Forsythe et al. 2022). These results align closely with the findings from the present study, with the knee being the most com-

monly injured joint and the hamstring being a close second. Furthermore, Forsythe et al. examined risk factors for injury in male Major League Soccer players and identified that sustaining a previous identical injury or an injury to the lower extremity was correlated with increased risk of injury (Forsythe et al. 2022). This finding is supported by the results from a 2018 study by Arundale et al. that examined reinjury rates in male Major League Soccer players. The authors found that among soccer players who underwent ACL reconstruction, there was a reinjury rate of 28.0% (Arundale, Silvers-Granelli, and Snyder-Mackler 2018). This highlights the need for more research in not just injury prevention but targeted rehabilitation efforts to return a soccer player to his original performance level.

Table 5. Performance Metrics for Center Back

Metric	Pre-injury	Post-injury	Change	P value	Term
Minutes per game	77.2	66.1	↓ 14.4%	<0.0001	Short-term
Touches in def 3rd/game	23	20.6	↓ 10.4%	0.0813	Short-term
Touches in Mid 3rd/game	19	17.8	↓ 6.6%	0.3286	Short-term
Tackles/game	0.9	0.9	↓ 1.4%	0.8764	Short-term
Tackles pct/game	0.30	0.29	↓ 3.8%	0.6745	Short-term
Blocks/game	0.9	0.7	↓ 22.6%	0.0126	Short-term
Clearances/game	3	2.6	↓ 14.2%	0.0328	Short-term
Fouls/game	0.9	0.7	↓ 22.3%	0.0016	Short-term
Crosses/game	0.4	0.2	↓ 38.9%	0.0515	Short-term
Successful dribbles/game	71.6	61.9	↓ 13.5%	0.0563	Short-term
Progressive carries/game	0.7	0.5	↓ 33.9%	0.0001	Short-term
Minutes per game	78	73.3	↓ 6.0%	0.0015	Medium-term
Touches in def 3rd/game	14.7	17.8	↑ 21.0%	0.0007	Medium-term
Touches in Mid 3rd/game	12.2	15.2	↑ 24.3%	0.0001	Medium-term
Tackles/game	0.6	0.8	↑ 27.2%	0.0005	Medium-term
Tackles pct/game	0.18	0.23	↑ 27.7%	0.0004	Medium-term
Blocks/game	0.5	0.7	↑ 25.1%	0.002	Medium-term
Clearances/game	2	2.3	↑ 17.7%	0.0039	Medium-term
Fouls/game	0.6	0.7	↑ 11.1%	0.0564	Medium-term
Crosses/game	0.2	0.1	↓ 22.6%	0.0379	Medium-term
Successful dribbles/game	44.1	52.9	↑ 20.0%	0.0027	Medium-term
Progressive carries/game	0.3	0.3	↑ 13.6%	0.1047	Medium-term
Interceptions/game	1.1	1	↓ 3.9%	0.4732	Medium-term
Minutes per game	79.1	74.1	↓ 6.3%	<0.001	Long-term
Touches in def 3rd/game	13.1	19.1	↑ 45.8%	<0.000001	Long-term
Tackles/game	0.6	0.8	↑ 33.3%	<0.000001	Long-term
Tackles pct/game	0.16	0.24	↑ 52.1%	<0.000001	Long-term
Interceptions/game	1.1	1.1	No change	0.932	Long-term

CLINICAL IMPLICATIONS

The consensus definition of RTP describes the point at which an athlete has achieved criteria-based medical clearance and is prepared for full participation in training or competition, with the team physician assuming primary responsibility for athlete safety and leading a shared decision-making process that includes the athlete, sports physician, physiotherapist, fitness trainer, and coach (van der Horst et al. 2017; Herring et al. 2024). In this context, the impact of lower-extremity injuries on performance is best assessed through objective metrics, which are more sensitive than patient-reported outcomes for evaluating post-injury function and treatment efficacy, as patient-reported tools often fail to detect clinically relevant perfor-

mance deficits (Zuke, Agarwalla, Go, et al. 2018). Accordingly, pre-season and in-season screenings using isokinetic strength testing, the Lower Extremity Functional Test (LEFT), and Y-balance assessments are used to identify at-risk players and detect functional asymmetries (D'Onofrio et al. 2025; Liporaci et al. 2019; Mohammadi et al. 2024; Jiménez-Rubio et al. 2023). Evidence further supports the use of multicomponent, position-tailored prevention and rehabilitation programs that integrate strength, neuromuscular control, agility, and movement quality to reduce injury incidence and burden (Gronwald, Klein, Hoenig, et al. 2022; Aiello et al. 2023; Shalaj et al. 2020). For example, interventions emphasizing eccentric hamstring strength and lumbo-pelvic stability are particularly beneficial for positions with high sprinting and kicking demands, however,

Table 6. Performance Metrics for Center Midfielder

Metric	Pre-injury	Post-injury	Change	P value	Term
Minutes per game	77.2	66.1	↓ 14.4%	<0.0001	Short-term
Touches in def 3rd/game	23	20.6	↓ 10.4%	0.0813	Short-term
Touches in mid 3rd/game	19	17.8	↓ 6.6%	0.3286	Short-term
Tackles/game	0.9	0.9	↓ 1.4%	0.8764	Short-term
Tackles pct/game	0.30	0.29	↓ 3.8%	0.6745	Short-term
Blocks/game	0.9	0.7	↓ 22.6%	0.0126	Short-term
Clearances/game	3	2.6	↓ 14.2%	0.0328	Short-term
Fouls/game	0.9	0.7	↓ 22.3%	0.0016	Short-term
Crosses/game	0.4	0.2	↓ 38.9%	0.0515	Short-term
Successful dribbles/game	71.6	61.9	↓ 13.5%	0.0563	Short-term
Progressive carries/game	0.7	0.5	↓ 33.9%	0.0001	Short-term
Pass percentage/game	0.48	0.59	↑ 23.6%	<0.001	Medium-term
Key passes/game	0.7	0.8	↑ 23.5%	0.004	Medium-term
Carries/game	16.9	19.8	↑ 17.0%	0.005	Medium-term
Touches in mid 3rd/game	15.1	17.8	↑ 17.5%	0.005	Medium-term
Touches in att 3rd/game	9	10.6	↑ 17.5%	0.007	Medium-term
Tackle pct/game	0.16	0.19	↑ 16.5%	0.008	Medium-term
Expected assists/game	0.066	0.08	↑ 21.2%	0.009	Medium-term
Minutes/game	66.4	63.2	↓ 4.8%	0.018	Medium-term
Tackles/game	0.9	1	↑ 14.1%	0.028	Medium-term
Fouls drawn/game	1	1.1	↑ 8.2%	0.059	Medium-term
Fouls committed/game	0.9	0.9	↑ 5.9%	0.153	Medium-term
assists/game	0.1	0.1	↓ 1.8%	0.74	Medium-term
Minutes per game	67.7	65.3	↓ 3.5%	0.08	Long-term
Touches in mid 3rd/game	13.9	18.8	↑ 35.3%	<0.05	Long-term
Pass percentage/game	0.43	0.62	↑ 43.1%	<0.05	Long-term
Key passes/game	0.7	0.9	↑ 28.6%	<0.05	Long-term
Tackles/game	0.8	1	↑ 25.0%	<0.05	Long-term

the predictive value of the screening tests remains limited, highlighting the need for position-specific protocols to optimize outcomes (Mohammadi et al. 2024; Aiello et al. 2023; Vereijken et al. 2022). Clinical decision-making should prioritize sport-specific, performance-based outcomes rather than patient-reported measures, which lack sensitivity in detecting residual deficits in professional soccer players. The absence of standardized, validated position-specific performance benchmarks underscores the necessity for further research to establish criteria for safe and effective RTP across positions and injury types (Zuke, Agarwalla, Go, et al. 2018; Diniz, Abreu, Lacerda, et al. 2022).

LIMITATIONS

There are several limitations to this study. First, there is no standardized database produced by Major League Soccer that compiles injury data and performance metrics. The most reliable sources for this information are websites that are used by coaches and team managers for team planning and scenario assessment, particularly integrating epidemiological data and predictive models for return-to-play timelines. There are limitations in data accuracy in data accuracy and not reliable for the use of direct clinical decision making, but as support for it. Caution is recommended in interpreting the results due to this. There were a few instances where there were discrepancies in the injury timeline between the websites used.

Table 7. Performance Metrics for Forward

Metric	Pre-injury	Post-injury	Change	P value	Term
Minutes per game	77.2	66.1	↓ 14.4%	<0.0001	Short-term
Touches in def 3rd/game	23	20.6	↓ 10.4%	0.0813	Short-term
Touches in mid 3rd/game	19	17.8	↓ 6.6%	0.3286	Short-term
Tackles/game	0.9	0.9	↓ 1.4%	0.8764	Short-term
Tackles pct/game	0.30	0.29	↓ 3.8%	0.6745	Short-term
Blocks/game	0.9	0.7	↓ 22.6%	0.0126	Short-term
Clearances/game	3	2.6	↓ 14.2%	0.0328	Short-term
Fouls/game	0.9	0.7	↓ 22.3%	0.0016	Short-term
Crosses/game	0.4	0.2	↓ 38.9%	0.0515	Short-term
Successful dribbles/game	71.6	61.9	↓ 13.5%	0.0563	Short-term
Progressive carries/game	0.7	0.5	↓ 33.9%	0.0001	Short-term
Minutes per game	77.2	66.1	↓ 14.4%	<0.0001	Medium-term
Touches in def 3rd/game	23	20.6	↓ 10.4%	0.0813	Medium-term
Touches in mid 3rd/game	19	17.8	↓ 6.6%	0.3286	Medium-term
Tackles/game	0.9	0.9	↓ 1.4%	0.8764	Medium-term
Tackles pct/game	0.30	0.29	↓ 3.8%	0.6745	Medium-term
Blocks/game	0.9	0.7	↓ 22.6%	0.0126	Medium-term
Clearances/game	3	2.6	↓ 14.2%	0.0328	Medium-term
Fouls/game	0.9	0.7	↓ 22.3%	0.0016	Medium-term
Crosses/game	0.4	0.2	↓ 38.9%	0.0515	Medium-term
Successful dribbles/game	71.6	61.9	↓ 13.5%	0.0563	Medium-term
Progressive carries/game	0.7	0.5	↓ 33.9%	0.0001	Medium-term
Minutes per game	54.9	54.5	↓ 0.7%	0.8	Long-term
Shots on target/game	0.5	0.6	↑ 12.2%	0.08	Long-term
Goals/game	0.3	0.2	↓ 14.3%	0.03	Long-term
Assists/game	0.1	0.1	No change	0.4	Long-term
Successful dribbles/game	12.8	18.7	↑ 46.1%	<0.0500	Long-term
Completed passes/game	0.2	0.3	↑ 34.8%	<0.0500	Long-term

Additionally, the available injury data did not provide full details on the type of injury sustained. For example, as opposed to stating that a player had a tear of the Anterior Talofibular Ligament, the report only noted it as an “Ankle Injury”. More detailed information regarding the type of injury could have allowed our team to more accurately analyze the injuries impacting professional soccer players. Furthermore, the sources used did not identify the specific treatments or rehabilitation protocols used for these injuries. Understanding what types of interventions, such as physical therapy, surgical procedures, or strength training, medical staff used could have provided more insight into the factors influencing players’ performance metrics post-injury.

CONCLUSION

The knee was the most injured body part during the 2018-2023 professional and international soccer seasons. Among the positions, Center Backs experienced both declines and improvements in defensive performance metrics post-injury, with significant changes observed across short-, medium-, and long-term periods. Forwards demonstrated a decrease in goals per game and other offensive metrics following injury. In contrast, Center Midfielders experienced a relatively stable level of performance post-injury, showing improvements in certain metrics despite some declines. The findings of this study can guide sports medicine professionals in enhancing patient recovery, prolonging players’ careers, and developing targeted injury prevention

Table 8. Performance Metrics for Left Wing/Right Wing

Metric	Pre-injury	Post-injury	Change	P value	Term
Minutes per game	77.2	66.1	↓ 14.4%	<0.0001	Short-term
Touches in def 3rd/game	23	20.6	↓ 10.4%	0.0813	Short-term
Touches in mid 3rd/game	19	17.8	↓ 6.6%	0.3286	Short-term
Tackles/game	0.9	0.9	↓ 1.4%	0.8764	Short-term
Tackles pct/game	0.30	0.29	↓ 3.8%	0.6745	Short-term
Blocks/game	0.9	0.7	↓ 22.6%	0.0126	Short-term
Clearances/game	3	2.6	↓ 14.2%	0.0328	Short-term
Fouls/game	0.9	0.7	↓ 22.3%	0.0016	Short-term
Crosses/game	0.4	0.2	↓ 38.9%	0.0515	Short-term
Successful dribbles/game	71.6	61.9	↓ 13.5%	0.0563	Short-term
Progressive carries/game	0.7	0.5	↓ 33.9%	0.0001	Short-term
Minutes per game	61.3	56.4	↓ 8.0%	0.0063	Medium-term
Shots on target/90	0.6	0.7	↑ 8.0%	0.114	Medium-term
Goals/90	8.5	6.6	↓ 22.7%	0.0109	Medium-term
xG/90	0.2	0.2	↑ 17.6%	0.0145	Medium-term
Crosses into penalty area/90	0.2	0.2	↑ 21.4%	0.0267	Medium-term
Progressive carries	71.8	70.9	↓ 1.3%	0.8998	Medium-term
Successful dribbles/90	69.9	81.8	↑ 17.0%	0.0052	Medium-term
Assists/90	0.2	0.2	↓ 7.5%	0.3592	Medium-term
Successful dribbles/game	47.4	51.6	↑ 8.8%	0.1928	Medium-term
Assists/game	0.1	0.1	↓ 15.2%	0.0455	Medium-term
Goals/game	0.2	0.2	↓ 10.2%	0.1655	Medium-term
Games started	42.6	39.7	↓ 6.8%	0.2238	Medium-term
Games played	42.6	39.7	↓ 6.8%	0.2238	Medium-term
Minutes	2830.4	2369.7	↓ 16.3%	0.0097	Medium-term
xG/game	0.1	0.1	↑ 8.2%	0.2364	Medium-term
Shots on target/game	23	19.6	↓ 14.6%	0.0878	Medium-term
Progressive carries/game	1.5	1.6	↑ 6.4%	0.3547	Medium-term
Crosses into penalty area/game	0.1	0.2	↑ 12.4%	0.2053	Medium-term
Progressive carries/90	2.3	2.6	↑ 13.7%	0.0296	Medium-term
Minutes per game	61.9	57.5	↓ 7.1%	0.005	Long-term
Shots on target/game	0.47	0.47	No change	NS	Long-term
Goals/game	0.18	0.17	↓ 6.8%	NS	Long-term
Assists/game	0.12	0.12	↓ 5.6%	NS	Long-term
Successful dribbles/game	45.7	54.7	↑ 19.7%	0.006	Long-term
Crosses into penalty area/game	0.14	0.17	↑ 26.7%	0.007	Long-term

strategies by understanding the position-specific impacts of lower extremity injuries on soccer performance.

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Table 9. Performance Metrics for Left Back/Right Back

Metric	Pre-injury	Post-injury	Change	P value	Term
Minutes per game	75.1	65.4	↓ 13.0%	<0.0001	Short-term
Touches in def 3rd/game	20.1	18.6	↓ 7.7%	0.0456	Short-term
Touches in mid 3rd/game	18.2	16.8	↓ 7.7%	0.0678	Short-term
Tackles/game	1.1	1	↓ 9.9%	0.1234	Short-term
Tackles pct/game	0.32	0.31	↓ 4.8%	0.2345	Short-term
Blocks/game	1.2	1	↓ 18.0%	0.0345	Short-term
Clearances/game	2.3	2.1	↓ 9.5%	0.0456	Short-term
Fouls/game	1	0.9	↓ 11.3%	0.0567	Short-term
Crosses/game	0.5	0.3	↓ 24.3%	0.0678	Short-term
Successful dribbles/game	70.1	60.6	↓ 13.6%	0.0789	Short-term
Progressive carries/game	0.8	0.7	↓ 14.0%	0.089	Short-term
Tackles pct/game	0.21	0.26	↑ 26.3%	0.0013	Medium-term
Clearances/game	0.9	1.2	↑ 30.1%	0.0013	Medium-term
Touches in mid 3rd/90	14.5	20.3	↑ 40.0%	<0.0001	Medium-term
Touches in def 3rd/90	9.7	12.9	↑ 33.0%	<0.0001	Medium-term
Successful dribbles/90	48.4	64.7	↑ 33.7%	0.0002	Medium-term
Pass pct/game	0.40	0.53	↑ 32.6%	<0.0001	Medium-term
Key passes/90	0.5	0.6	↑ 25.6%	0.0061	Medium-term
Tackles/game	0.9	1.1	↑ 24.1%	0.0076	Medium-term
Progressive carries/game	1	1.1	↑ 20.1%	0.0411	Medium-term
Blocks/game	0.5	0.6	↑ 28.7%	0.0014	Medium-term
Blocks/90	0.6	0.8	↑ 34.9%	0.0001	Medium-term
Minutes per game	72.2	66.2	↓ 8.3%	0.002	Long-term
Pass pct/game	0.36	0.55	↑ 56.1%	<0.001	Long-term
Touches in def 3rd/game	6.9	10	↑ 45.9%	<0.001	Long-term
Touches in mid 3rd/game	10.4	15.2	↑ 46.0%	<0.001	Long-term
Key passes/game	0.4	0.5	↑ 37.4%	<0.001	Long-term
Tackles/game	0.8	1.2	↑ 44.1%	<0.001	Long-term
Successful dribbles/game	35.2	49.8	↑ 41.5%	<0.001	Long-term
Progressive carries/game	0.9	1.2	↑ 33.5%	0.001	Long-term

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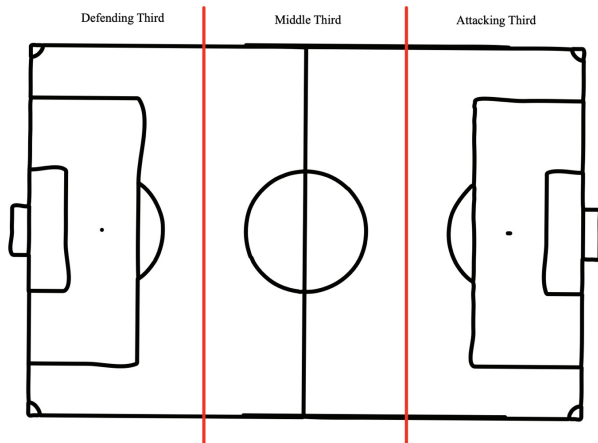


Figure 1. Location of Defending, Middle, and Attacking Third



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