



Article

Post-Prime Football Player Valuations: Depreciation Difference Between the English Premier League and the Top European Leagues

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Abstract: This study explores market value depreciation among soccer players across the top five European leagues, addressing a critical gap in the sports finance literature by focusing on post-prime valuation dynamics. Leveraging a dataset from the 2023/2024 season, player market values and attributes sourced from Transfermarkt and Sportmonks were analyzed using league-specific multilinear regression models. The findings reveal a consistent decline in market values beginning at age 27, with notable variation across leagues. The German Bundesliga demonstrates the steepest depreciation rates, suggesting shorter career peaks or distinct market dynamics. In contrast, the Italian Serie A and Spanish La Liga exhibit the slowest depreciation rates, preserving player value for older athletes longer than other leagues. The English Premier League and French Ligue 1 show moderate depreciation, with the Premier League's decline closely aligning with Ligue 1 and diverging less from other leagues than traditionally assumed. These results challenge preconceived narratives about league-specific player valuations and offer empirical insights into the transfer market. By providing a nuanced understanding of depreciation trends, this study can inform strategic decisions for agents, managers, and clubs, particularly in optimizing contract negotiations, transfer strategies, and long-term asset management in professional football.



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JEL Classification: Z20; Z22; Z23

1. Introduction

Elite European soccer has long grappled with the issue of player concentration within a few dominant leagues. The English Premier League (EPL), in particular, has faced criticism for leveraging its financial superiority to consolidate elite talent, a practice highlighted by media coverage (Mctague, 2023). Similarly, other leagues, such as Spain's La Liga, have expressed concerns regarding financial imbalances that contribute to talent migration, even lodging formal complaints with the Union of European Football Associations (UEFA), European football's governing body (Reuters, 2023). These dynamics have spurred proposals for structural reforms, such as the controversial concept of a European Super League.

Such concerns invite critical examination of the underlying market dynamics. A key question emerges: Are players in leagues outside the EPL subject to steeper market value depreciation as they age beyond their prime? Conventional wisdom suggests that players performing into their 30s, particularly those maintaining high performance levels, would be drawn to the EPL, given its financial clout and visibility. If this phenomenon holds, it

raises further questions: Does the migration of prime-aged talent into the EPL create a measurable disparity in the rate of market value depreciation for players over 27 in other European leagues? Moreover, to what extent is the EPL characterized by a disproportionate concentration of high-value players during their peak years? Addressing these questions is crucial to understanding the transfer market's valuation mechanisms and the broader implications for talent distribution and competitive balance across Europe's top leagues.

This study utilizes player market values sourced from the Transfermarkt database, combined with player attribute data from the Sportmonks database, to conduct a comprehensive analysis of market value depreciation among post-prime players across Europe's top leagues. By integrating these datasets, we provide a robust framework for examining the relationship between age and market valuation in the context of league-specific dynamics.

The findings of this study contribute to a deeper understanding of transfer market behavior and offer critical insights into the overall health and efficiency of the European soccer player market. These insights hold significance for stakeholders, including clubs, agents, and policymakers, by highlighting age-related valuation patterns that can influence strategic decision-making in contracts, transfers, and talent development strategies.

2. Literature Review

While prior research has extensively analyzed the determinants of player market values, studies specifically examining market value depreciation across leagues and comparing these trends to understand transfer dynamics remain scarce. Most of the existing literature focuses on factors such as individual performance metrics (e.g., goals and assists), team-related variables (e.g., club revenue), timing, contract length, and player position. For instance, [Metelski \(2021\)](#) in the *International Journal of Sports Finance* examined the determinants of transfer values for players moving from the Polish league to stronger European leagues. The study identified position, age, and year of transfer as significant factors influencing transfer value. Similarly, [Campa \(2021\)](#) in the *Journal of Sports Economics* conducted a broader analysis of the European transfer market, emphasizing the role of contract length in influencing the discrepancy between estimated transfer value and actual transfer fees paid. Notably, Campa also found that for players over the age of 28, the delta between the estimated and actual fees diminished, indicating unique valuation dynamics for older players. However, while Campa's meta-analysis provided valuable insights into overall market trends across European leagues, it did not delve into league-specific market behaviors or the implications of these dynamics for inter-league comparisons.

Furthermore, research on market value depreciation is notably underrepresented in sports academia. One of the few studies addressing this area is [Amir and Livne \(2005\)](#) in the *Journal of Business Finance & Accounting*, which found little to no association between a player's remaining contract value and their market value. Amir and Livne argued that traditional accounting methods, such as amortization, are unsuitable for evaluating player contracts, proposing instead that such contracts should be treated as intangible assets rather than tangible ones. Supporting this perspective, [Leifheit and Follert \(2021\)](#) in *Managing Sport and Leisure* echoed the view that player contracts require a distinct valuation framework. Together, these two studies form a nascent but limited body of research focused on market value decline rather than on predictive valuation models, highlighting a significant gap in understanding the depreciation dynamics of professional athletes.

Overall, the existing literature reveals a striking lack of focus on the dynamics of market value decay and depreciation among professional soccer players. Few, if any, studies explore the depreciation of market values or the differences in valuation trends between

age categories. This gap can be attributed to several factors. First, media and scholarly discourse around soccer tends to prioritize high-profile transfers and the determinants of peak market values, overshadowing the study of declining valuations. The natural progression of market value decay, culminating in retirement and an eventual valuation of zero, is often taken as a given, receiving little attention in academic or popular discussions.

However, examining the speed and patterns of market value depreciation, particularly across top European leagues, offers valuable insights into player movement dynamics and league-specific market behaviors. A closer analysis of depreciation trends in the EPL compared to other tier-one leagues—such as the French Ligue 1, Spanish La Liga, Italian Serie A, and German Bundesliga—can illuminate critical transfer market patterns. Moreover, understanding these dynamics holds practical implications for club management and player agents. For instance, the findings of this study indicate that most players begin to experience market value depreciation at age 26 or 27. This insight underscores the importance of negotiating long-term contracts at this juncture to maximize financial security and career earnings. By addressing these gaps, this study contributes to a more comprehensive understanding of market value dynamics in professional soccer.

This study significantly contributes to the limited body of research on market value decay in professional soccer. By analyzing the patterns of market value depreciation across the top European leagues, we provide players, agents, and club management with valuable insights to enhance strategic decision-making. Understanding how each league values players beyond their prime can guide transfer strategies and help optimize career trajectories. Furthermore, these findings offer practical tools for financial decision-makers to maximize the value of their assets at critical points in their lifecycle. In doing so, this study bridges a crucial gap in the sports finance literature, shedding light on the nuanced dynamics of player valuation and market efficiency.

3. Materials and Methods

3.1. Overview

This study employed a two-step methodology to analyze market value decay by age across the top European football leagues. The first step involved identifying the mean market value peak for each league by calculating the average market value for players within each age group. This process required comprehensive data collection and compilation across leagues, yielding a total sample size of 638 players for Serie A (IT1), 613 for La Liga (ES1), 535 for Ligue 1 (FR1), 516 for the Bundesliga (DE1), and 589 for the Premier League (EN1).

The dataset was constructed using player market values for the 2023/2024 European season, focusing on end-of-season values for 2024 rather than beginning-of-season values for 2023 to better capture final valuation trends. Data for the analysis were sourced from the Sportmonks and Transfermarkt databases ([Sportmonks, n.d.](#); [Transfermarkt, n.d.](#)), both of which provided comprehensive and reliable coverage of the leagues included in this study: the EPL, French Ligue 1, German Bundesliga, Italian Serie A, and Spanish La Liga.

Data mining and collection involved a combination of automated and manual techniques. For Sportmonks, we utilized Python-based scripts to extract player data efficiently. Transfermarkt data, due to their structure, were manually recorded to ensure accuracy and completeness. This hybrid approach enabled the creation of a robust dataset capable of supporting detailed analysis of market value depreciation trends across leagues.

The analysis revealed that player market valuations generally peaked at age 26 across all leagues, with minor variances of plus or minus one year. Following this finding, the second step involved conducting a league-specific multilinear regression analysis to determine the effect of age on market value. In this regression model, market value served

as the dependent variable, while age was treated as an independent variable. To enhance the robustness and reliability of the results, we incorporated additional player metadata as independent variables. These included height, weight, total minutes played, and number of appearances, providing a more comprehensive framework to account for variations in player valuation across different contexts. This approach allowed for a more generalizable understanding of the relationship between age and market value within each league.

3.2. Mean, Samples, and Median Market Values for Each League

This section presents the mean market value, sample size, and median market value of players in each league, categorized by age. The analysis highlights that players across the top European leagues typically achieve their market value prime at age 26, with depreciation observed in subsequent years.

Notable variances between leagues were also identified. For instance, the Bundesliga exhibited relatively high market values for players around age 23, a trend likely influenced by the presence of highly valued young talents. These star players often transition to higher-profile leagues, such as the EPL or La Liga, with frequent destinations including clubs like Real Madrid and Barcelona. Such dynamics reflect the interconnected nature of player valuation and transfer trends, emphasizing how younger talent in some leagues serves as a feeder pipeline for others.

Figures 1–5 shows the market value samples as a line chart for each league, and Tables 1–5 describes the population’s mean and median market values by age.

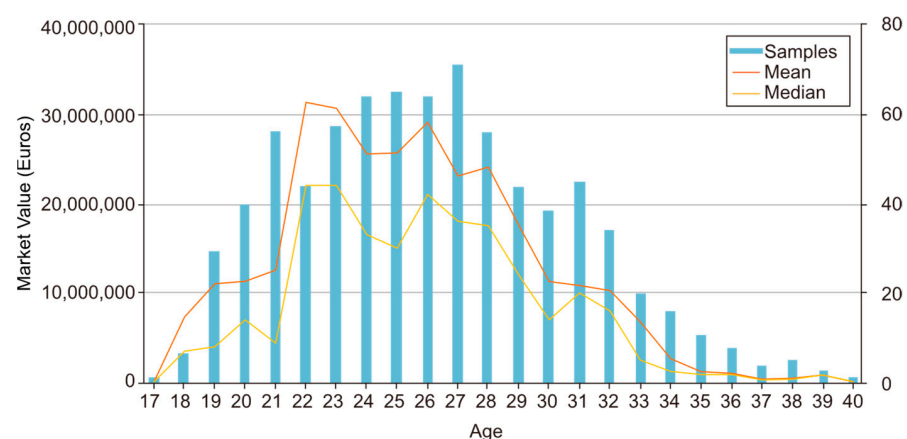


Figure 1. English Premier League market values as a line chart.

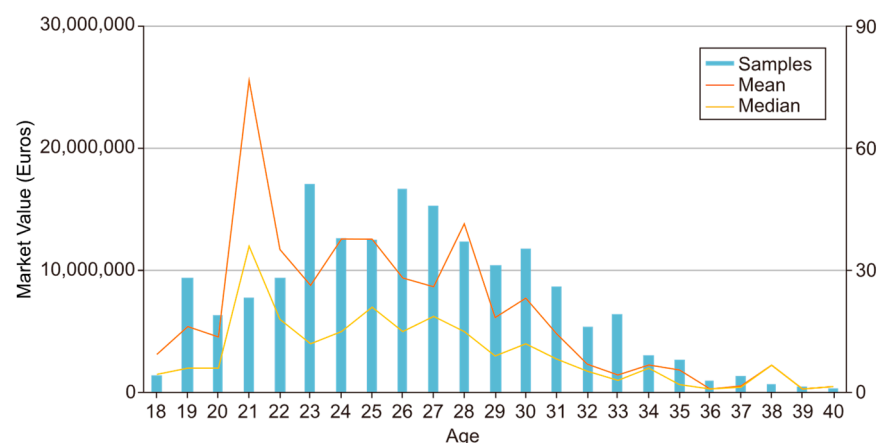


Figure 2. German Bundesliga market values as a line chart.

Table 1. English Premier League market values (EN1).

Age	Samples	Mean	Median
17	1	100,000	100,000
18	5	7,320,000	3,500,000
19	22	11,027,273	4,000,000.00
20	30	11,296,667	7,000,000.00
21	42	12,548,214	4,400,000.00
22	33	31,259,091	22,000,000
23	43	30,602,326	22,000,000
24	48	25,508,333	16,500,000.00
25	49	25,614,286	15,000,000
26	48	29,031,250	21,000,000.00
27	53	23,043,396	18,000,000
28	42	24,035,714	17,500,000.00
29	33	17,539,394	12,000,000
30	29	11,279,310	7,000,000
31	34	10,835,294	10,000,000.00
32	26	10,265,385	8,000,000.00
33	15	6,773,333	2,500,000
34	12	2,658,333	1,250,000.00
35	8	1,225,000	900,000.00
36	6	1,033,333	900,000.00
37	3	383,333	300,000
38	4	487,500	375,000.00
39	2	850,000	850,000.00
40	1	100,000	100,000

Table 2. German Bundesliga market values (DE1).

Age	Samples	Mean	Median
18	4	3,125,000	1,500,000.00
19	28	5,400,000	2,000,000.00
20	19	4,550,000	2,000,000
21	23	25,575,000	12,000,000
22	28	11,707,143	6,000,000.00
23	51	8,778,431	4,000,000
24	38	12,577,632	5,000,000.00
25	37	12,571,622	7,000,000
26	50	9,393,000	5,000,000.00
27	46	8,667,391	6,250,000.00
28	37	13,827,027	5,000,000
29	31	6,151,613	3,000,000
30	35	7,728,571	4,000,000
31	26	4,836,538	2,750,000.00
32	16	2,325,000	1,750,000.00
33	19	1,439,474	1,000,000
34	9	2,255,556	2,000,000
35	8	1,850,000	650,000.00
36	3	300,000	300,000
37	4	550,000	450,000.00
38	2	2,250,000	2,250,000.00
39	1	300,000	300,000
40	1	500,000	500,000

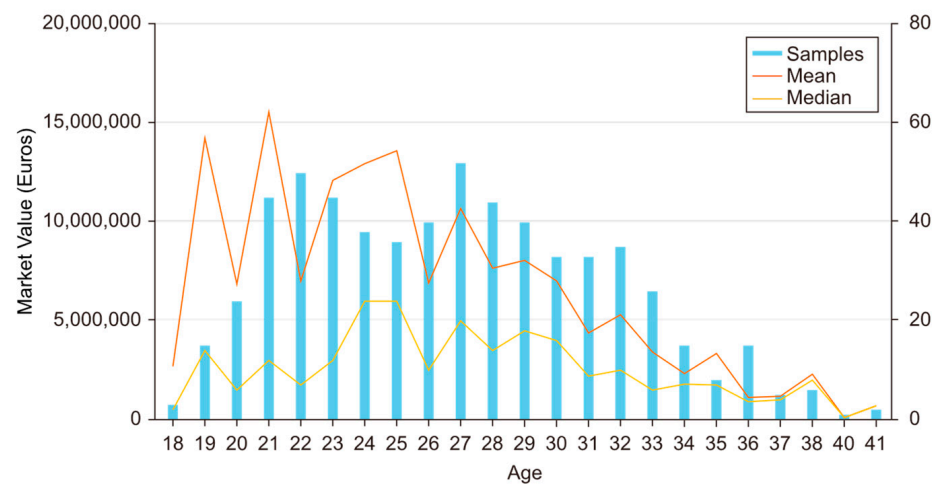


Figure 3. Spanish La Liga market values as a line chart.

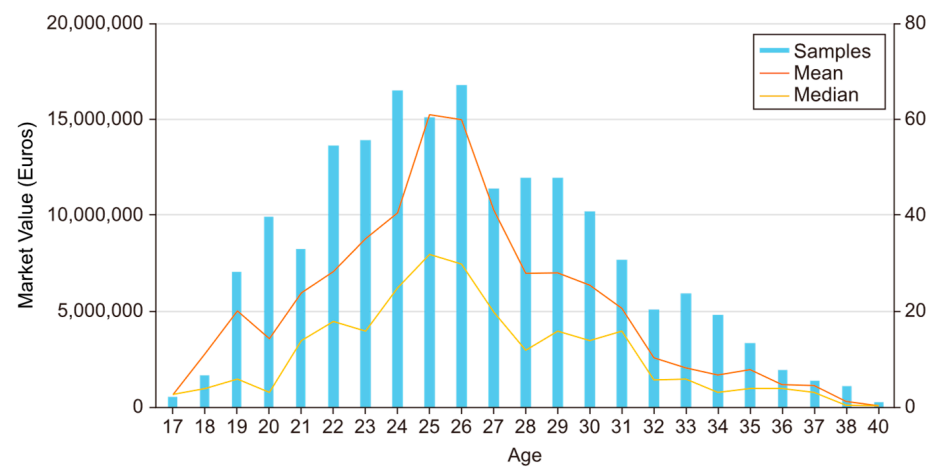


Figure 4. Italian Serie A market values as a line chart.

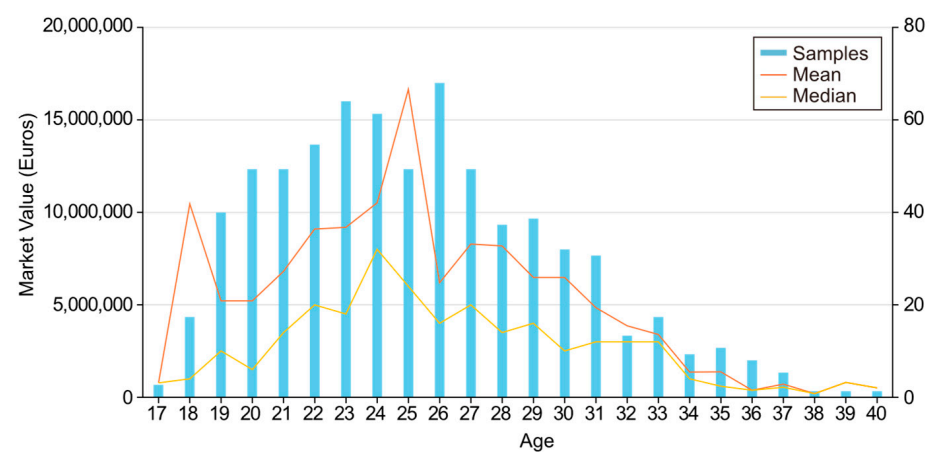


Figure 5. French Ligue 1 market values as a line chart.

Table 3. Spanish La Liga market values (ES1).

Age	Samples	Mean	Median
18	3	2,700,000	500,000
19	15	14,273,333	3,500,000
20	24	6,870,833	1,500,000.00
21	45	15,588,333	3,000,000
22	50	7,020,000	1,750,000.00
23	45	12,126,667	3,000,000
24	38	12,973,684	6,000,000.00
25	36	13,630,556	6,000,000.00
26	40	6,920,000	2,500,000.00
27	52	10,701,923	5,000,000.00
28	44	7,675,000	3,500,000.00
29	40	8,070,000	4,500,000.00
30	33	7,030,303	4,000,000
31	33	4,387,879	2,200,000
32	35	5,314,286	2,500,000
33	26	3,425,000	1,500,000.00
34	15	2,336,667	1,800,000
35	8	3,350,000	1,750,000.00
36	15	1,116,667	900,000
37	5	1,180,000	1,000,000
38	6	2,300,000	2,000,000.00
40	1	100,000	100,000
41	2	700,000	700,000.00

Table 4. Italian Serie A market values (IT1).

Age	Samples	Mean	Median
17	2	700,000	700,000.00
18	6	2,833,333	1,000,000.00
19	25	5,057,000	1,500,000
20	35	3,607,143	800,000
21	29	6,000,000	3,500,000
22	48	7,102,083	4,500,000.00
23	49	8,817,857	4,000,000
24	58	10,173,276	6,250,000.00
25	53	15,300,000	8,000,000
26	59	15,038,983	7,500,000
27	40	10,330,000	5,000,000.00
28	42	7,020,238	3,000,000.00
29	42	7,038,095	4,000,000.00
30	36	6,400,000	3,500,000.00
31	27	5,185,185	4,000,000
32	18	2,608,333	1,450,000.00
33	21	2,083,333	1,500,000
34	17	1,708,824	800,000
35	12	1,991,667	1,000,000.00
36	7	1,200,000	1,000,000
37	5	1,160,000	800,000
38	4	331,250	125,000.00
40	1	100,000	100,000

Table 5. French Ligue 1 market values (FR1).

Age	Samples	Mean	Median
17	2	775,000	775,000.00
18	13	10,457,692	1,000,000
19	30	5,211,667	2,500,000.00
20	37	5,210,811	1,500,000
21	37	6,814,865	3,500,000
22	41	9,098,780	5,000,000
23	48	9,185,417	4,500,000.00
24	46	10,516,304	8,000,000.00
25	37	16,654,054	6,000,000
26	51	6,194,118	4,000,000
27	37	8,287,838	5,000,000
28	28	8,185,714	3,500,000.00
29	29	6,484,483	4,000,000
30	24	6,483,333	2,500,000.00
31	23	4,843,478	3,000,000
32	10	3,870,000	3,000,000.00
33	13	3,396,154	3,000,000
34	7	1,357,143	1,000,000
35	8	1,375,000	600,000.00
36	6	383,333	375,000.00
37	4	706,250	537,500.00
38	1	200,000	200,000
39	1	800,000	800,000
40	1	500,000	500,000

3.3. Regression Analysis

The line charts indicate that market value depreciation begins at age 27 in three of the five leagues, while the remaining two leagues experience depreciation starting at age 28. Based on these observations, the regression analysis was filtered to include only players aged 27 and above. This approach allowed me to focus on the critical age range where market value decay becomes apparent and to determine the coefficient for player age within this subset. As anticipated, the coefficient for age was negative across all leagues, reflecting the expected inverse relationship between age and market value once players surpass their peak years.

For this analysis, the natural logarithm (log) of each player's 2024 market value was used as the dependent variable to address potential skewness in the data distribution and better capture proportional changes in market value. Additional dependent variables were incorporated into the regression model to improve its robustness and reliability. These included player attributes such as height, weight, and total minutes played during the season. These variables were selected based on their relevance to player performance and the valuation metrics.

The complete list of variables used in the regression analysis is as follows:

The regression analysis employed a multilinear regression model to examine the relationship between player market values and various independent variables. The model is expressed as follows:

$$y = b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

In this model, y is the market value as of 2024 (dependent variable), and the independent variables are defined in Table 6. This model structure allows for a detailed examination of how these factors collectively influence market value, providing a nuanced understanding of market value depreciation trends across the top European leagues.

Table 6. Regression analysis variables.

Variable Name	Type	Definition
market value (EUR)	Dependent	The market value of the player at the end of the 2023/2024 season, in EUR
age	Independent	The age in years of the player
height	Independent	The height of the player in centimeters
weight	Independent	The weight of the player in kilograms
minutes_played	Independent	The number of minutes the player was on the pitch in the 2023/2024 season
goals	Independent	The number of goals scored by the player in the 2023/2024 season
appearances	Independent	The number of matches participated in by the player in the 2023/2024 season
clean_sheets	Independent	The number of clean sheets that the player's team kept in the 2023/2024 season
conceded	Independent	The number of goals the player's team conceded in the 2023/2024 season
assists	Independent	The number of assists by the player in the 2023/2024 season
penalty_goals	Independent	The number of penalties scored by the player in the 2023/2024 season
cards	Independent	The number of yellow and red cards the player received in the 2023/2024 season

3.4. Player Inclusion

The market value data for this study were sourced from the following leagues: The EPL (EN1), French Ligue 1 (FR1), German Bundesliga (DE1), Italian Serie A (IT1), and Spanish La Liga (ES1). We utilized player attributes from the 2023/2024 season and conducted a regression analysis using market values recorded at the end of the season. This specific time point was chosen to ensure alignment between the most recent market value data and the latest available player attributes (e.g., age, height, and weight).

The study followed a two-step methodology. The first step involved calculating the mean and median market values for each age category across the leagues, providing a baseline understanding of market value trends. The second step focused on regression analysis, filtering for players aged 27 and above to analyze market value depreciation specifically within the post-prime age group.

Due to the differing scopes of each step, the sample sizes for players varied accordingly. For the first step, all age categories were included, while the second step exclusively analyzed players in the selected age range, resulting in different sample sizes across the two analytical stages. This structured approach allowed for both broad and targeted insights into player market value trends across Europe's top leagues.

Table 7 shows the number of players that were included in our initial market value sample and in our subsequent regression sample. A total of 2891 players were in the overall sample. For the final regression analysis using players who are aged 27 or over, a total of 1296 players were included.

Table 7. Players included in study from each league.

Code	Country	League	Players in Overall Sample	Players Aged 27 or Above
EN1	England	Premier League	589	270
FR1	France	Ligue 1	535	194
DE1	Germany	Bundesliga	516	240
IT1	Italy	Serie A	638	275
ES1	Spain	La Liga	613	317
		Total	2891	1296

3.5. Descriptive Statistics

Tables 8–13 provide the descriptive statistics for the sample population used in the regression analysis, offering an overview of the variables analyzed across all five leagues.

The dataset includes a total of $N = 2891$ players, representing the combined player population from the EPL, French Ligue 1, German Bundesliga, Italian Serie A, and Spanish La Liga. The following highlights were observed from the overall population:

- The median age of the players was 27 years, aligning with the age threshold used to filter players for the regression analysis.
- The median number of minutes played across the season was 1303 min, approximately one-third of the total minutes in a typical top-league season.
- Market value was transformed using the natural logarithm (log base e) to address the disparity in magnitude between market value and other variables, ensuring that the regression coefficients were appropriately scaled.

These summary statistics provide a foundation for interpreting the regression results, highlighting key characteristics of the sample population and the methodological adjustments made to enhance analytical accuracy. For further granularity, league-specific descriptive statistics are detailed in Tables 9–12, providing insight into the unique characteristics of each league's player population.

Table 8. Summary statistics: overall population for all leagues.

Variable	N	Mean	Median	Minimum	Maximum	SD
market_value	2258	11,427,170.06	4,500,000.0	0.0	180,000,000.0	17,984,437.88
age	2258	27.38	27.0	17.0	44.0	4.3
height	2258	182.86	183.0	160.0	205.0	6.83
weight	2258	75.27	75.0	50.0	100.0	7.2
minutes_played	2258	1303.39	1251.0	0.0	3420.0	975.03
goals	2258	1.85	0.0	0.0	36.0	3.36
appearances	2258	19.97	22.0	0.0	38.0	11.73
clean_sheets	2258	5.19	4.0	0.0	21.0	4.41
conceded	2258	18.84	17.0	0.0	81.0	15.22
assists	2258	1.33	0.0	0.0	13.0	2.06
penalty_goals	2258	0.18	0.0	0.0	10.0	0.78
cards	2258	2.98	2.0	0.0	17.0	2.92

The summary statistics for EPL (EN1) players aged 27 and above highlight key patterns in the dataset. Similar to other leagues, many variables have a minimum value of 0. This is because certain players may have made appearances without registering any measurable actions such as shots, passes, or tackles during their time on the pitch.

For instance, players substituted onto the field for only a few minutes at the end of a match may not have had the opportunity to contribute statistically, despite being recorded

as participants. This phenomenon is consistent across all leagues, reflecting the varied levels of player involvement and contribution during a season.

These observations underscore the heterogeneity within the dataset, emphasizing the importance of controlling for such variations in the regression analysis to ensure accurate and meaningful results.

Table 9. Summary statistics: regression population (age 27 and over) for EN1.

Variable	N	Mean	Median	Minimum	Maximum	SD
market_value	270	14,682,962.96	10,000,000.0	100,000.0	130,000,000.0	17,217,107.84
age	270	30.26	30.0	27.0	40.0	2.9
height	270	183.73	184.5	166.0	201.0	7.12
weight	270	75.96	75.0	61.0	98.0	8.85
minutes_played	270	1355.92	1314.0	0.0	3420.0	1045.35
goals	270	1.88	0.0	0.0	19.0	3.33
appearances	270	19.85	21.0	0.0	38.0	12.12
clean_sheets	270	4.1	3.0	0.0	16.0	3.66
conceded	270	22.24	20.5	0.0	80.0	18.35
assists	270	1.46	0.0	0.0	13.0	2.33
penalty_goals	270	0.13	0.0	0.0	5.0	0.6
cards	270	3.09	2.0	0.0	13.0	2.99

A summary for German Bundesliga data of players aged 27 or over is given below.

Table 10. Summary statistics: regression population (age 27 and over) for DE1.

Variable	N	Mean	Median	Minimum	Maximum	SD
market_value	240	6,696,041.67	3,000,000.0	0.0	100,000,000.0	11,665,858.08
age	240	30.16	30.0	27.0	40.0	2.76
height	240	185.24	186.0	170.0	200.0	6.5
weight	240	77.03	78.0	63.0	99.0	14.22
minutes_played	240	1350.48	1347.0	0.0	3060.0	934.22
goals	240	1.98	1.0	0.0	36.0	3.91
appearances	240	19.98	23.0	0.0	34.0	10.62
clean_sheets	240	4.15	3.0	0.0	16.0	3.45
conceded	240	22.6	21.0	0.0	71.0	16.81
assists	240	1.5	1.0	0.0	13.0	2.37
penalty_goals	240	0.24	0.0	0.0	6.0	0.91
cards	240	2.92	2.0	0.0	15.0	2.92

A summary for French Ligue 1 data of players aged 27 or over is given below.

Table 11. Summary statistics: regression population (age 27 and over) for FR1.

Variable	N	Mean	Median	Minimum	Maximum	SD
market_value	194	5,659,922.68	3,000,000.0	0.0	60,000,000.0	7,993,899.58
age	194	30.22	30.0	27.0	40.0	2.9
height	194	182.47	183.0	164.0	196.0	6.62
weight	194	73.76	75.0	56.0	93.0	12.68
minutes_played	194	1377.84	1487.0	0.0	3060.0	950.09
goals	194	1.64	1.0	0.0	19.0	2.76
appearances	194	19.7	24.0	0.0	34.0	11.26
clean_sheets	194	5.49	5.0	0.0	17.0	4.27

Table 11. *Cont.*

Variable	N	Mean	Median	Minimum	Maximum	SD
conceded	194	19.19	18.0	0.0	58.0	13.91
assists	194	1.11	0.0	0.0	8.0	1.74
penalty_goals	194	0.23	0.0	0.0	7.0	0.93
cards	194	2.86	2.0	0.0	13.0	2.82

A summary for Italian Serie A data of players aged 27 or over is given below.

Table 12. Summary statistics: regression population (age 27 and over) for IT1.

Variable	N	Mean	Median	Minimum	Maximum	SD
market_value	275	5,617,545.45	2,700,000.0	0.0	80,000,000.0	9,185,847.51
age	275	30.56	30.0	27.0	44.0	3.09
height	275	183.4	185.0	167.0	202.0	12.73
weight	275	75.22	76.0	62.0	96.0	11.97
minutes_played	275	1337.59	1199.0	0.0	3420.0	1008.48
goals	275	1.52	0.0	0.0	15.0	2.64
appearances	275	20.31	23.0	0.0	38.0	12.24
clean_sheets	275	5.83	5.0	0.0	20.0	4.93
conceded	275	17.11	17.0	0.0	62.0	13.35
assists	275	1.15	0.0	0.0	9.0	1.69
penalty_goals	275	0.25	0.0	0.0	10.0	1.0
cards	275	3.01	2.0	0.0	17.0	3.09

A summary for Spanish La Liga data of players aged 27 or over is given below.

Table 13. Summary statistics: regression population (age 27 and over) for ES1.

Variable	N	Mean	Median	Minimum	Maximum	SD
market_value	317	6,163,249.21	2,500,000.0	0.0	70,000,000.0	9,217,927.49
age	317	30.66	30.0	27.0	41.0	3.06
height	317	180.5	182.0	166.0	200.0	15.86
weight	317	74.85	75.0	58.0	96.0	9.01
minutes_played	317	1394.89	1339.0	0.0	3420.0	975.45
goals	317	1.87	0.0	0.0	24.0	3.55
appearances	317	21.45	24.0	0.0	38.0	11.64
clean_sheets	317	6.3	6.0	0.0	19.0	4.56
conceded	317	18.33	17.0	0.0	66.0	13.94
assists	317	1.22	0.0	0.0	10.0	1.83
penalty_goals	317	0.2	0.0	0.0	7.0	0.75
cards	317	3.72	3.0	0.0	17.0	3.14

4. Results

This section outlines the findings from the regression analyses conducted for each of the five European leagues. The primary objective was to examine the relationship between a player's market value and age, particularly focusing on players beyond their prime years.

A total of five regression analyses were performed, one for each league: the English Premier League (EN1), French Ligue 1 (FR1), German Bundesliga (DE1), Italian Serie A (IT1), and Spanish La Liga (ES1). The regression models were run separately for each league to account for league-specific dynamics. The analysis primarily centered on the

relationship between market value (log-transformed) and age, with a particular focus on players aged 27 and above. The results revealed the following key insights:

1. Statistical significance: All regression models yielded significant results, with R-squared values exceeding 0.6 for each league, indicating that the models explain a substantial portion of the variance in market value.
2. Negative correlation with age: Across all leagues, age was consistently found to have a negative relationship with market value for players aged 27 and above.
3. League-specific variations: The degree of negative correlation varied between leagues, reflecting distinct market dynamics and valuation practices within each league.

The regression analyses were executed using a Python script, with data imported as a CSV file containing player attributes and market values for the 2023/2024 season. Each league was analyzed independently to isolate its unique patterns. The tables below present the detailed regression results for each league, providing coefficients, significance levels, and other key statistics. This league-specific approach allows for a nuanced understanding of how market value depreciation manifests across different competitive environments, offering insights into the broader trends governing player valuation in European football.

The regression analysis for Premier League players aged 27 and above reveals significant insights into market value dynamics. Age was found to strongly correlate with a decline in market value, with a coefficient of -0.2811 , indicating a negative relationship. This result is consistent with findings from the other four leagues, placing the Premier League's depreciation rate in the middle of the spectrum when compared to its counterparts.

Other variables, such as minutes played and weight, exhibited positive coefficients, suggesting that increased playing time and certain physical attributes contribute to higher market valuations. These results align with the narrative that players who play more frequently tend to be valued higher due to their on-field contributions and reliability. The inclusion of these variables adds depth to the analysis, demonstrating that while age is a primary factor in valuation decline, other attributes also play a role in shaping market values. Overall, the Premier League results highlight the nuanced interplay of age and performance metrics in determining player market values.

For purposes of readability, the following non-significant variables were removed from the tables below: height, weight, appearances, clean_sheets, conceded, assists, penalty_goals, and cards. These variables were included in the regression for completeness. Tables including non-significant variables are included in the Appendix A under Tables A1–A6. In all five leagues, the non-significant variables did not consistently show a contribution. On the other hand, goals and minutes_played showed significant p -values in several leagues alongside the age variable.

Table 14's global regression analysis involving 2258 players show the general expectation and baseline metric for all 5 leagues. The negative coefficient for age (-0.36) highlights a significant depreciation in market value as players grow older, emphasizing the universal decline in valuation with age beyond the peak years. Minutes_played exhibits a minimal coefficient, while goals scored (0.07) is the most impactful variable in this table, showcasing a meaningful contribution to market value, as players who score frequently tend to retain higher valuations in general. The statistical significance ($p < 0.01$) for all variables underscores the reliability of the results.

Table 14. Regression results for all 2258 players globally.

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.36	0.02	−18.322	0.000 ***	−0.406	−0.327
minutes_played	0.00	0.00	3.848	0.000 ***	0.001	0.001
goals	0.07	0.02	3.178	0.002 **	0.003	0.127
R-squared	0.359					
Adj. R-squared	0.353					
F-statistic	66.71					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 15 below shows our results from the Premier League players whose age is 27 or over. The dependent variable is market value. Age strongly correlated with negative market value, and we found that this result is consistent with all other 4 leagues that we did regression on. Premier League showed a −0.2811 coefficient which is middle of the spectrum compared to other leagues' coefficients. Other variables such as minutes_played and weight also had a positive coefficient with market values which makes some sense in terms of narrative—the more you play, the more you're typically worth.

Table 15. Regression results by league: EN1.

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.28	0.01	−15.741	0.000 ***	−0.316	−0.246
minutes_played	0.00	0.00	4.641	0.000 ***	0.001	0.001
goals	0.05	0.02	2.599	0.010 **	0.013	0.097
R-squared	0.697					
Adj. R-squared	0.684					
F-statistic	53.88					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 16 shows our results for the French Ligue 1 players whose age is 27 or over. Market value depreciation for the French league showed a similar curve to that of the English Premier League.

Table 16. Regression results by league: FR1.

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.25	0.03	−7.754	0.000 ***	−0.325	−0.193
minutes_played	0.00	0.00	3.053	0.003 ***	0.000	0.002
goals	0.05	0.04	1.272	0.205	−0.033	0.153
R-squared	0.464					
Adj. R-squared	0.432					
F-statistic	14.32					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 17 shows our results for the German Bundesliga players whose age is 27 or over. Market value depreciation speed for the German league was the highest among the top five leagues. The negative coefficient for age was 53% higher than that of the Premier League.

Table 17. Regression results by league: DE1.

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.43	0.05	−7.935	0.000 ***	−0.546	−0.329
minutes_played	0.00	0.00	2.216	0.028 *	0.000	0.003
goals	0.03	0.05	0.551	0.582	−0.079	0.141
R-squared	0.403					
Adj. R-squared	0.374					
F-statistic	13.99					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 18 below shows our results for the Italian Serie A players whose age is 27 or over. Market value depreciation speed for the Italian Serie A was the lowest among all five European leagues, suggesting a slower decline for players that play in this league or the league's ability to retain top talents into older age. The Italian Serie A, as well as the Spanish La Liga, had the lowest decline coefficients due to age.

Table 18. Regression results by league: IT1.

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.20	0.02	−7.541	0.000 ***	−0.261	−0.153
minutes_played	0.00	0.00	2.184	0.030 **	7.42×10^{-5}	0.001
goals	0.08	0.04	1.682	0.094	−0.014	0.176
R-squared	0.452					
Adj. R-squared	0.429					
F-statistic	19.75					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 19 below shows our results for the Spanish La Liga players whose age is 27 or over. Along with the Italian Serie A, this league had the lowest negative coefficient relating to age and market value decline. Similar to all other European leagues, minutes_played had a positive relationship with market value, with a low p -value.

Table 19. Regression results by league: ES1.

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.20	0.02	−7.836	0.000 ***	−0.252	−0.151
minutes_played	0.00	0.00	2.050	0.041 **	2.57×10^{-5}	0.001
goals	0.10	0.03	3.112	0.002 ***	0.037	0.166
R-squared	0.330					
Adj. R-squared	0.306					
F-statistic	13.69					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

In Table 20, we display the aggregated results of the regression analysis from each league. The R-squared values for the regression analyses ranged from 0.33 to 0.7 across all five leagues, indicating varying levels of explanatory power for the models. Age emerged as a consistent factor in market value depreciation across all leagues, with a negative relationship observed in every case. However, the speed of depreciation varied significantly between leagues, highlighting distinct market dynamics.

Table 20. Regression results comparison (age only).

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
EN1	−0.28	0.01	−15.741	0.000 ***	−0.316	−0.246
FR1	−0.25	0.03	−7.754	0.000 ***	−0.325	−0.193
DE1	−0.43	0.05	−7.935	0.000 ***	−0.546	−0.329
IT1	−0.20	0.02	−7.541	0.000	−0.261	−0.153
ES1	−0.20	0.02	−7.836	0.000 ***	−0.252	−0.151

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

The English Premier League exhibited the second fastest rate of depreciation, closely aligning with the French Ligue 1. These two leagues demonstrated similar patterns in how players' market values decline beyond their prime years. In contrast, the German Bundesliga recorded the highest rate of depreciation, suggesting a more rapid valuation decline for players over 27. Meanwhile, the Spanish La Liga and Italian Serie A exhibited the slowest rates of depreciation, indicating a tendency to maintain player value for older athletes for a longer period.

5. Discussion

This study aimed to examine the differences in market value depreciation among players in Europe's top football leagues, focusing on players aged 27 and above. The initial hypothesis proposed that the English Premier League (EPL) would exhibit the steepest decline in market value, while the Italian Serie A would show the slowest. However, the findings challenge this assumption.

The German Bundesliga exhibited the most pronounced rate of market value depreciation, significantly higher than for the other leagues analyzed. This trend could potentially be explained by league-specific factors, such as players retiring earlier or distinct valuation considerations. The English Premier League showed the second fastest rate of decline, closely aligned with the depreciation observed in the French Ligue 1, suggesting comparable dynamics between these two leagues.

On the other hand, the Italian Serie A and Spanish La Liga experienced the slowest rates of decline for players past the age of 27. These results are consistent with media narratives suggesting that these leagues tend to retain and value players who perform well into their 30s. Such findings provide empirical support for these widely held perceptions and shed light on how different leagues manage and value aging players.

These findings hold significant implications for stakeholders. Club management, agents, and players can leverage this nuanced understanding of depreciation trends to optimize contract negotiations and transfer strategies. For example, players in leagues with slower depreciation may secure longer-term contracts or maintain higher valuation stability, enhancing their career earnings and longevity.

Future Research

While this study offers valuable insights, it also highlights the need for further research to fully understand the mechanisms driving market value progression and depreciation in professional soccer. Future research should consider the following:

- **Longitudinal Player Tracking:** examining player market values across multiple years to capture dynamic trends and shifts in valuation.
- **Market Inflation Adjustment:** incorporating adjustments for general market inflation to better contextualize historical valuations.
- **Performance vs. Age Depreciation:** differentiating between declines in market value caused by poorer performance and organic depreciation due to aging.

Such refinements in methodology could provide a more comprehensive understanding of market value trends and better inform stakeholders about player valuation processes. This study underscores the importance of further investigation into the complexities of market value progression in professional football, contributing to more strategic decision-making in the global transfer market.

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Data Availability Statement: The original data presented in the study are openly available at https://drive.google.com/drive/folders/14dCy7iaacGdoU0h9iX7_PihDqTI_nNXM?usp=drive_link (accessed on 5 July 2024).

Conflicts of Interest: The author declares no conflicts of interest.

Appendix A

Regression Results with Non-Significant Variables

Table A1. Regression results for all 2258 players globally (including non-significant variables).

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.36	0.02	−18.322	0.000 ***	−0.406	−0.327
height	0.00	0.00	0.492	0.623	−0.009	0.015
weight	0.00	0.00	1.016	0.310	−0.006	0.018
minutes_played	0.00	0.00	3.848	0.000 ***	0.000	0.001
goals	0.07	0.02	3.178	0.002 **	0.030	0.127
appearances	0.00	0.01	0.099	0.921	−0.029	0.033
clean_sheets	0.04	0.03	1.433	0.152	−0.017	0.108
conceded	−0.02	0.01	−1.543	0.123	−0.045	0.005
assists	0.08	0.03	2.206	0.028	0.009	0.156
penalty_goals	−0.06	0.08	−0.794	0.427	−0.242	0.103
cards	0.01	0.02	0.578	0.563	−0.034	0.062
R-squared	0.359					
Adj. R-squared	0.353					
F-statistic	66.71					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table A2. Regression results by league: EN1 (including non-significant variables).

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.28	0.01	−15.741	0.000 ***	−0.316	−0.246
height	−0.00	0.00	−0.514	0.608	−0.023	0.013
weight	0.00	0.00	0.791	0.429	−0.008	0.019
minutes_played	0.00	0.00	4.641	0.000 ***	0.001	0.001
goals	0.05	0.02	2.599	0.010 **	0.013	0.097
appearances	−0.01	0.01	−0.824	0.411	−0.038	0.015
clean_sheets	0.06	0.03	1.902	0.058	−0.002	0.123
conceded	−0.03	0.01	−3.392	0.001 ***	−0.056	−0.015
assists	0.03	0.02	1.025	0.306	−0.028	0.088
penalty_goals	−0.02	0.09	−0.302	0.763	−0.221	0.162
cards	0.00	0.02	0.207	0.836	−0.040	0.049

Table A2. *Cont.*

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
R-squared	0.697					
Adj. R-squared	0.684					
F-statistic	53.88					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.**Table A3.** Regression results by league: FR1 (including non-significant variables).

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.25	0.03	−7.754	0.000 ***	−0.325	−0.193
height	−0.01	0.01	−0.679	0.498	−0.042	0.021
weight	0.01	0.00	1.385	0.168	−0.005	0.026
minutes_played	0.00	0.00	3.053	0.003 ***	0.000	0.002
goals	0.05	0.04	1.272	0.205	−0.033	0.153
appearances	−0.00	0.02	−0.164	0.870	−0.056	0.048
clean_sheets	0.03	0.05	0.745	0.457	−0.062	0.137
conceded	−0.05	0.02	−2.233	0.027 *	−0.108	−0.007
assists	0.06	0.07	0.855	0.394	−0.084	0.212
penalty_goals	−0.04	0.12	−0.347	0.729	−0.297	0.208
cards	0.00	0.04	0.230	0.819	−0.069	0.087
R-squared	0.464					
Adj. R-squared	0.432					
F-statistic	14.32					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.**Table A4.** Regression results by league: DE1 (including non-significant variables).

Variable	Coef	Std Err	t	$p > t $	[0.025	0.975]
age	−0.43	0.05	−7.935	0.000 ***	−0.546	−0.329
height	0.00	0.02	0.078	0.938	−0.048	0.052
weight	0.01	0.01	1.098	0.273	−0.010	0.036
minutes_played	0.00	0.00	2.216	0.028 *	0.000	0.003
goals	0.03	0.05	0.551	0.582	−0.079	0.141
appearances	0.02	0.04	0.526	0.599	−0.058	0.101
clean_sheets	0.03	0.09	0.358	0.721	−0.149	0.215
conceded	−0.04	0.03	−1.513	0.132	−0.109	0.014
assists	0.07	0.08	0.850	0.396	−0.094	0.235
penalty_goals	0.07	0.21	0.343	0.732	−0.346	0.493
cards	0.00	0.06	0.064	0.949	−0.122	0.131
R-squared	0.403					
Adj. R-squared	0.374					
F-statistic	13.99					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table A5. Regression results by league: IT1 (including non-significant variables).

Variable	Coef	Std Err	t	p > t	[0.025	0.975]
age	−0.20	0.02	−7.541	0.000 ***	−0.261	−0.153
height	0.00	0.00	0.808	0.420	−0.009	0.022
weight	−0.00	0.00	−0.261	0.795	−0.019	0.014
minutes_played	0.00	0.00	2.184	0.030 **	7.42×10^{-5}	0.001
goals	0.08	0.04	1.682	0.094	−0.014	0.176
appearances	0.02	0.02	0.873	0.384	−0.025	0.065
clean_sheets	0.03	0.04	0.774	0.440	−0.051	0.118
conceded	−0.03	0.02	−1.325	0.186	−0.075	0.015
assists	0.04	0.06	0.734	0.464	−0.080	0.175
penalty_goals	0.01	0.11	0.167	0.867	−0.203	0.241
cards	0.01	0.03	0.556	0.579	−0.048	0.087
R-squared	0.452					
Adj. R-squared	0.429					
F-statistic	19.75					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.**Table A6.** Regression results by league: ES1 (including non-significant variables).

Variable	Coef	Std Err	t	p > t	[0.025	0.975]
age	−0.20	0.02	−7.836	0.000 ***	−0.252	−0.151
height	0.00	0.00	0.292	0.771	−0.015	0.020
weight	0.00	0.01	0.315	0.753	−0.027	0.037
minutes_played	0.00	0.00	2.050	0.041 **	2.57×10^{-5}	0.001
goals	0.10	0.03	3.112	0.002 ***	0.037	0.166
appearances	−0.03	0.02	−1.486	0.138	−0.072	0.010
clean_sheets	0.07	0.04	1.770	0.078	−0.008	0.158
conceded	−0.01	0.01	−0.574	0.566	−0.049	0.027
assists	−0.03	0.05	−0.718	0.473	−0.149	0.069
penalty_goals	0.00	0.13	0.050	0.961	−0.266	0.280
cards	0.03	0.03	0.996	0.320	−0.031	0.094
R-squared	0.330					
Adj. R-squared	0.306					
F-statistic	13.69					

Significance: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

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