# Attacking Intensity and Discipline in Football: A Statistical Analysis of Match Outcomes Over a Full Season

# Introduction

This report focuses on the relationship between attacking intensity, discipline, and match outcomes over the Ligue 1 2023/24 season. The analysis uses match statistics, such as goals, shots, fouls, and cards, to investigate the influence these factors have on the outcome of a match.

# Data and Methodology

The dataset used includes all matches in the Ligue 1 23/24 season and their statistics. The following statistics have been used in this investigation for each team:

* Attacking metrics: Goals, shots, and shots on target
* Disciplinary metrics: Fouls committed, total yellow cards, and total red cards
* Match outcome: Categorised as H (home win), A (away win), or D (draw)

The data used has been taken from <https://www.football-data.co.uk>, the raw data included match statistics used as well as other statistics such as offsides, free kicks conceded, and betting odds. I downloaded the data and imported the raw data into Microsoft Excel for cleaning and processing. This involved:

* Removing irrelevant records, such as betting odds
* Creating a match ID to have a unique identifier for each match, this was done by combining the first three letters of the home and away teams in corresponding order

The raw dataset was then converted into a CSV file and imported into MySQL Workbench. All SQL queries used throughout this analysis are provided in the appendix for reference.

Results

Please see the appendix for summary tables and visualisations.

## Attacking Intensity

* Games that were won had higher average total shots and shots on target than games that were drawn or lost
* Although the differences were small, the average number of shots across all matches won was 13.31 compared to matches that were drawn with an average of 12.75 and games that were lost with an average of 12.23
* Shot accuracy was also higher in wins, indicating that the quality of attacking is also vital in winning matches
  + Average shots on target are as follows:
    - Matches won had an average of 5.63 shots on target
    - Matches drawn had an average of 4.13 shots on target
    - Matches lost had an average of 3.82 shots on target
* These statistics suggest that attacking pressure and accuracy increases the probability of winning a match
* Comparing statistics by team to the team’s total wins further shows that more attacking pressure increases the probability of winning a match
* The graph below shows that the 5 teams with the most shots across the season typically won more matches than the 5 teams with the least number of shots across the season
* This further suggests that an increase in attacking intensity increases the chance of a match win

Discipline

* Across the season, games that were won more often had fewer cards (both yellow and red) per match
  + A win averaged 1.809 yellow cards, a loss averaged 2.004 yellow cards, and a draw averaged 2.056 yellow cards
  + This suggests that more disciplined teams had higher chances of success
* Further analysis showed that games that were won had less fouls committed than games that were drawn or lost
  + A win averaged 12.1600 fouls, a loss averaged 12.6000 fouls, and a draw averaged 12.7099 fouls
  + This suggests that disciple within teams often lead to better results

Correlation Summary

|  |  |
| --- | --- |
| Metric | Relationship with Match Result |
| Goals | Positive |
| Shots | Positive |
| Shots on Target | Positive |
| Fouls | Negative |
| Cards | Negative |

Conclusion

This analysis shows that attacking metrics positively correlated with match wins, and poor discipline can negatively affect team performance. Examples of uses of this analysis are player and team evaluation and strategic planning.

Contact

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Appendix

Appendix A: SQL Queries

A1. Query for Match Outcomes by Team

|  |
| --- |
| SELECT  team,  SUM(wins) AS total\_wins,  SUM(draws) AS total\_draws,  SUM(losses) AS total\_losses  FROM  (  SELECT  homeTeam AS team,  CASE WHEN FTR = 'H' THEN 1 ELSE 0 END AS wins,  CASE WHEN FTR = 'D' THEN 1 ELSE 0 END AS draws,  CASE WHEN FTR = 'A' THEN 1 ELSE 0 END AS losses  FROM matches\_raw  UNION ALL  SELECT  awayTeam AS team,  CASE WHEN FTR = 'A' THEN 1 ELSE 0 END AS wins,  CASE WHEN FTR = 'D' THEN 1 ELSE 0 END AS draws,  CASE WHEN FTR = 'H' THEN 1 ELSE 0 END AS losses  FROM matches\_raw  )  AS combined\_results  GROUP BY team  ORDER BY total\_wins DESC; |

A2. Query for Statistics by Result (Win, Draw, Loss)

|  |
| --- |
| SELECT  match\_outcome,  ROUND(AVG(goals), 2) AS avg\_goals,  ROUND(AVG(shots), 2) AS avg\_shots,  ROUND(AVG(shots\_on\_target), 2) AS avg\_shots\_on\_target,  ROUND(AVG(corners), 2) AS avg\_corners  FROM (  SELECT  CASE  WHEN FTR = 'H' THEN 'Win'  WHEN FTR = 'D' THEN 'Draw'  ELSE 'Loss'  END AS match\_outcome,  FTHG AS goals,  HS AS shots,  HST AS shots\_on\_target,  HC AS corners  FROM matches\_raw  UNION ALL  SELECT  CASE  WHEN FTR = 'A' THEN 'Win'  WHEN FTR = 'D' THEN 'Draw'  ELSE 'Loss'  END AS match\_outcome,  FTAG AS goals,  `AS` AS shots,  AST AS shots\_on\_target,  AC AS corners  FROM matches\_raw  ) AS per\_team  GROUP BY match\_outcome  ORDER BY  CASE match\_outcome  WHEN 'Win' THEN 1  WHEN 'Draw' THEN 2  WHEN 'Loss' THEN 3  END; |

A3. Query for Statistics by Team

|  |
| --- |
| SELECT  team,  SUM(goals) AS total\_goals,  SUM(shots) AS total\_shots,  SUM(shots\_on\_target) AS total\_shots\_on\_target,  SUM(corners) AS total\_corners  FROM (  SELECT  homeTeam AS team,  FTHG AS goals,  HS AS shots,  HST AS shots\_on\_target,  HC AS corners  FROM matches\_raw  UNION ALL  SELECT  awayTeam AS team,  FTAG AS goals,  `AS` AS shots,  AST AS shots\_on\_target,  AC AS corners  FROM matches\_raw  ) AS team\_stats  GROUP BY team  ORDER BY total\_goals DESC; |

A4. Query for Shots by Team

|  |
| --- |
| SELECT  team,  SUM(shots) AS total\_shots,  SUM(shots\_on\_target) AS shots\_on\_target,  SUM(shots) - SUM(shots\_on\_target) AS shots\_off\_target  FROM (  SELECT homeTeam AS team, HS AS shots, HST AS shots\_on\_target  FROM matches\_raw  UNION ALL  SELECT awayTeam AS team, `AS` AS shots, AST AS shots\_on\_target  FROM matches\_raw  ) AS combined  GROUP BY team  ORDER BY total\_shots DESC; |

A5. Query for Cards by Match Outcome

|  |
| --- |
| SELECT  match\_outcome,  AVG(total\_yellows) AS avg\_yellow,  AVG (total\_reds) AS avg\_red  FROM (  SELECT  CASE  WHEN result = 'W' THEN 'Win'  WHEN result = 'D' THEN 'Draw'  ELSE 'Loss'  END AS match\_outcome,  yellow\_cards AS total\_yellows,  red\_cards AS total\_reds  FROM (  SELECT  homeTeam AS team,  FTR,  CASE  WHEN FTR = 'H' THEN 'W'  WHEN FTR = 'D' THEN 'D'  ELSE 'L'  END AS result,  HY AS yellow\_cards,  HR AS red\_cards  FROM matches\_raw  UNION ALL  SELECT  awayTeam AS team,  FTR,  CASE  WHEN FTR = 'A' THEN 'W'  WHEN FTR = 'D' THEN 'D'  ELSE 'L'  END AS result,  AY AS yellow\_cards,  AR AS red\_cards  FROM matches\_raw  ) AS team\_matches  ) AS match\_cards  GROUP BY match\_outcome  ORDER BY avg\_red DESC; |

A6. Query for Fouls by Match Outcome

|  |
| --- |
| SELECT  match\_outcome,  AVG(fouls) AS avg\_fouls  FROM (  SELECT  CASE  WHEN FTR = 'H' THEN 'Win'  WHEN FTR = 'D' THEN 'Draw'  ELSE 'Loss'  END AS match\_outcome,  HF AS fouls  FROM matches\_raw  UNION ALL  SELECT  CASE  WHEN FTR = 'A' THEN 'Win'  WHEN FTR = 'D' THEN 'Draw'  ELSE 'Loss'  END AS match\_outcome,  AF AS fouls  FROM matches\_raw  ) AS fouls\_by\_result  GROUP BY match\_outcome; |

Appendix B: Summary Tables

B1: Results by Team

|  |  |  |  |
| --- | --- | --- | --- |
| Team | Total Wins | Total Draws | Total Losses |
| Paris SG | 22 | 10 | 2 |
| Monaco | 20 | 7 | 7 |
| Brest | 17 | 10 | 7 |
| Lyon | 16 | 5 | 13 |
| Lille | 16 | 11 | 7 |
| Nice | 15 | 10 | 9 |
| Lens | 14 | 9 | 11 |
| Marseille | 13 | 11 | 10 |
| Reims | 13 | 8 | 13 |
| Rennes | 12 | 10 | 12 |
| Toulouse | 11 | 10 | 13 |
| Montpellier | 10 | 12 | 12 |
| Strasbourg | 10 | 9 | 15 |
| Nantes | 9 | 6 | 19 |
| Metz | 8 | 5 | 21 |
| Le Havre | 7 | 11 | 16 |
| Lorient | 7 | 8 | 19 |
| Clermont | 5 | 10 | 19 |

B2: Statistics by Result

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Match Outcome | Average Goals | Average Shots | Average Shots On Target | Average Corners |
| Win | 2.34 | 13.31 | 5.63 | 4.37 |
| Draw | 0.99 | 12.75 | 4.13 | 4.66 |
| Loss | 0.62 | 12.23 | 3.82 | 5.04 |

B3: Statistics by Team

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Team | Total Goals | Total Shots | Total Shots On Target | Total Corners |
| Paris SG | 81 | 513 | 199 | 200 |
| Monaco | 68 | 517 | 211 | 183 |
| Brest | 53 | 482 | 173 | 154 |
| Rennes | 53 | 487 | 169 | 158 |
| Marseille | 52 | 479 | 157 | 184 |
| Lille | 52 | 442 | 170 | 178 |
| Lyon | 49 | 443 | 173 | 166 |
| Lens | 45 | 495 | 176 | 175 |
| Montpellier | 43 | 449 | 169 | 139 |
| Lorient | 43 | 369 | 138 | 135 |
| Toulouse | 42 | 403 | 138 | 151 |
| Reims | 42 | 418 | 137 | 174 |
| Nice | 40 | 459 | 160 | 184 |
| Strasbourg | 38 | 366 | 123 | 117 |
| Metz | 35 | 331 | 116 | 133 |
| Le Havre | 34 | 390 | 123 | 128 |
| Nantes | 30 | 380 | 135 | 165 |
| Clermont | 26 | 389 | 129 | 150 |

B4: Shots by Team

|  |  |  |  |
| --- | --- | --- | --- |
| Team | Total Shots | Total Shots On Target | Total Shots Off Target |
| Monaco | 517 | 211 | 306 |
| Paris SG | 513 | 199 | 314 |
| Lens | 495 | 176 | 319 |
| Rennes | 487 | 169 | 318 |
| Brest | 482 | 173 | 309 |
| Marseille | 479 | 157 | 322 |
| Nice | 459 | 160 | 299 |
| Montpellier | 449 | 169 | 280 |
| Lyon | 443 | 173 | 270 |
| Lille | 442 | 170 | 272 |
| Reims | 418 | 137 | 281 |
| Toulouse | 403 | 138 | 265 |
| Le Havre | 390 | 123 | 267 |
| Clermont | 389 | 129 | 260 |
| Nantes | 380 | 135 | 245 |
| Lorient | 369 | 138 | 231 |
| Strasbourg | 366 | 123 | 243 |
| Metz | 331 | 116 | 215 |

B5: Cards by Match Outcome

|  |  |  |
| --- | --- | --- |
| Match Outcome | Average Yellow Cards | Average Red Cards |
| Loss | 2.0044 | 0.1378 |
| Draw | 2.0556 | 0.1111 |
| Win | 1.8089 | 0.0933 |

B6: Fouls by Match Outcome

|  |  |
| --- | --- |
| Match Outcome | Average Fouls |
| Draw | 12.7099 |
| Win | 12.1600 |
| Loss | 12.6000 |

B7: Statistics Per Match

For the Statistics Per Match file, please check the CSV file titled ‘per\_match\_stats.csv’

Appendix C: Data Description within MySQL Database

|  |  |
| --- | --- |
| Column Name | Decription |
| matchID | Unique identifier for each match, taken from the first three letters of the home and away teams |
| date | Date the match was played |
| time | Time the match was played |
| homeTeam | Name of the home team |
| awayTeam | Name of the away team |
| FTHG | Full time home team goals |
| FTAG | Full time away team goals |
| FTR | Full time result |
| HTHG | Half time home team goals |
| HTAG | Half time away team goals |
| HTR | Half time result |
| HS | Home team shots |
| AS | Away team shots |
| HST | Home team shots on target |
| AST | Away team shots on target |
| HF | Home team fouls committed |
| AF | Away team fouls committed |
| HC | Home team corners |
| AC | Away team corners |
| HY | Home team yellow cards |
| AY | Away team yellow cards |
| HR | Home team red cards |
| AR | Away team red cards |