

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
 - o 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
 - o A win averaged 1.809 yellow cards, a loss averaged 2.004 yellow cards, and a draw averaged 2.056 yellow cards
 - o 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
 - o A win averaged 12.1600 fouls, a loss averaged 12.6000 fouls, and a draw averaged 12.7099 fouls
 - o This suggests that discipline 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

For questions or feedback, please contact jessica.23.nicol@gmail.com.

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