**The optimal age profile of a squad at English football league level, for sustained growth**

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**Abstract**

This paper provides analysis and commentary for the decision-making processes involved in the construction of an English Football League (EFL) squad, with the objective of financial sustainability over the long-term. A triangular theorem of correlations is investigated relating to the age profile of those squads and their relative effects on success, fee-inducing transfer potential and budget-planning.

Quantitative analysis is conducted using secondary data, predominantly over a 5-year period between 2017-18 and 2021-22 seasons in the EFL. The study aims to identify significant patterns between the ages (and age make-up) of those squads and the corresponding success, and secondarily, the characteristics of revenue-inducing transfers from these clubs.

The results provide evidence that there is no significant correlation between the average age of a team and its performance, while greater (though still not significant) correlation between this performance and the distribution of minutes played by under-23-year-olds is identified. The transfer analysis indicates increased frequency for player revenue at ages prior to peak-performance age.

The recommendation is that clubs prioritize budgetary growth, ahead of short-term outcomes, for sustained success within the league pyramid, with an emphasis on reducing the age profile of the squad and providing greater opportunity for gametime at younger ages.

**Keywords**: football, EFL, finance, sustainability, growth, age, success, performance

**1. Introduction**

The English Football ‘pyramid’ is structured with the world’s richest football league (Jones, 2021), The Premier League, at its pinnacle. Below the 20-team Premier League is the English Football League (EFL), formed of three professional leagues consisting of 24-teams beneath which there is a large regionalised ‘non-league’ pyramid-shaped system. However, a lack of financial sustainability has long been endemic within English football, causing at worst insolvency of clubs (Szymanski, 2012) and at best ‘financial stresses’ (Philippou & Maguire, 2022). Though this is an issue within all of European football, the perceived riches of achieving promotion to The Premier League exasperate this problem within the English game. Szymanski describes this contest for sporting success as an ‘arms race’ which leads to a reliance on owner-funding. Where these losses become insurmountable for the owner, company administration is frequently applied which can lead to insolvency, such as the case for Bury FC in 2020.

The EFL introduced the Salary Cost Management Protocol (SCMP) in 2004 in an attempt to alleviate the problem – restricting the level of player-related expenditure to a percentage of income – but this has been proven to have been unsuccessful in improving the profitability of football clubs (Evans et al., 2018). When the COVID-19 pandemic heightened these financial fragilities, a result of supporters being restricted from attending matches, the EFL introduced a ‘hard’ salary cap within League One and Two. This though, was overturned by an independent arbitration panel (Malcolm, 2021). Consequently, a requirement for examination of the governance within English football persisted, acknowledged at governmental level with the 2021 Independent Fan-led Review into Football Governance, led by Tracey Crouch MP (Thomas & McLaughlin, 2021). The subsequent actions from this review are yet to be ratified, continuing the jeopardy for many football clubs and the communities for which they were initially founded.

One club for whom reliance on ‘owner funding’ is not possible is AFC Wimbledon. While this unsustainable reliance on individuals to absorb financial losses to maintain solvency within football isn’t preferable, for AFC Wimbledon this model simply isn’t plausible. AFC Wimbledon is an unusually structured English Football League club, having been founded & predominantly owned by supporters since its formation in 2002. Borne out of the relocation of Wimbledon FC to Milton Keynes (Afcwimbledon, 2020), AFC Wimbledon have hastily risen through the amateur leagues to EFL League One. Historically, AFC Wimbledon have attempted to align the costs with the forecasted income as to remain sustainable. Having no one wealthy benefactor dictates that the club must spend within its means. A stadium move – to a larger, modern Plough Lane Stadium, complete with hospitality functions - offers rewarding future income streams but with over £15million of finance needed with which to fund it, the club now has a debt that requires servicing. This finance has been achieved through a small amount of private equity sale, a successful bond scheme (Ploughlanebond, 2022), and a crowd-funding equity sale.

The ownership structure of AFC Wimbledon dictates that the long-term prospects of the club are strongly correlated with the level of income. Accordingly, where turnover remains consistent, this dictates that costs remain constant as well, the foremost being the player wages. While this results in consistently stable and sustainable financial outcomes, this leads to little opportunity for growth on the football performance of the club. As examined on numerous occasions (Plumley et al., 2018; Madsen et al., 2018), there is a strong positive correlation between player wages and final league position. This indicates that for AFC Wimbledon to have reasonable expectations of growth on the field, this growth would need to be found with additional revenues.

Tasked with the role of Recruitment & Analysis Manager at AFC Wimbledon, this conundrum of how to generate growth in AFC Wimbledon’s footballing income streams (and therefore increase the playing budget), while maintaining sporting performance initiated the objectives of this study. Is there an optimal profile of a football team at English Football League level, for sustainable growth? How does the club generate income from the sale of players? What is the age profile of players to increase probability of these sales? How does this affect the short-term performance and the long-term projections? What is the impact on player wages within the squad? Is there an optimal balance between immediate performance and future growth and is this balance efficiently witnessed within professional football? Are most football staff so incentivised by short term outcomes, with the resulting individual benefits, that the long-term processes are neglected?

This study commences examination of a triangular hypotheses, which are listed below:

**Hypothesis 1:** **There is no significant correlation between age and footballing performance or success in EFL football**. Is there evidence that ‘experience’ is required for footballing success? Is there an average age that correlates to improved probability of achievement at EFL level? This hypothesis proposes that there is no correlation between age and success at EFL level.

**Hypothesis 2:** **Greater sales revenue can be expected from players pre-peak-performance age.** Which clubs are likely to spend money purchasing players? What is the profile of player that these clubs require? This hypothesis proposes that the purchasing clubs are likely to be peak-performance clubs with a requirement of acquiring talent at the ages prior to peak performance.

**Hypothesis 3:** **There is a positive correlation between age and salary, suggesting that salaries tend to increase with age within professional football**. This hypothesis proposes that younger players cost less in salary, allowing for potentially superior players at the corresponding younger age bracket than older profiles.

A successful combination of positive results from these hypotheses would dictate an aligned strategy towards a younger profile of squad within EFL. On the assumption that for growth within the football pyramid to be sustained, the footballing budget is required to be at a corresponding level, the primary objective should be budgetary growth ahead of sporting success. While it is imperative that the sporting performance not be so unsuccessful that other income streams reduce (supporter revenues, performance-related revenues such as television contracts etc), to maintain historical performance but to increase future budgets would present greater opportunity for forthcoming performance. And on examination of those three hypotheses, they would be appropriate in tandem. For example, Hypothesis 2, ‘Greater sales revenue can be expected from players pre-peak-performance age’ implies benefits from Hypothesis 3, with the younger players implying lower wages. These two hypotheses are supported by Hypothesis 1, with the ‘traditionally implied’ negative impact on short term performance non-existent.

While prevailing wisdom has conventionally been that “you can’t win anything with kids,” some of the most storied successes in recent time have been founded upon creating a long-term structure from which youth players can develop. The most famous manager in English football history, Sir Alex Ferguson, established a club-first strategy of long-term growth and success rather than priority towards immediate achievement at Manchester United (Elberse, 2013). Brentford FC’s ‘Moneyball’ approach has been globally lauded resulting in a traditionally EFL club obtaining Premier League status for the first time in its history (Guha, 2020). Its use of data and forward-thinking decision-making processes have enabled a consistent stream of revenues from player sales that has then been reinvested into the playing squad the subsequent season. This approach has borne witness to almost constant budgetary growth and aligned with it, sporting achievement. Numerous other clubs, both in England and abroad, have sought to replicate a similar strategy as an awareness of the necessity for greater financial prudence grows stronger – Glasgow Rangers in Scotland being one such example (Thomson, 2020). A mutual feature of the successfully growing clubs, as highlighted above, is the resolute emphasis on longer term processes even where results have been subpar in the immediate - Sir Alex Ferguson was almost replaced in 1990 after a winless run of eight games (Ryan, 2021), while Brentford owner Matthew Benham has the necessary control to unwaveringly proceed with a heavily analysed strategy.

The objective of this paper is to commence analysis of the triangular hypotheses. There is a thorough examination of all literature on six topics relating to the three hypotheses, reviewing appropriate analysis across English football, global football and other relevant sports. Following this Literature Review is a comprehensive Methodology, detailing the use and reasoning behind our data analysis. This data analysis, within the Results section, is focussed on the first two hypotheses: Hypothesis 1 – a detailed examination of the correlation between age and success within the English Football League, and Hypothesis 2 – examination of transfer activity within the English Football League. As detailed within the Literature Review, there have been several studies on these subjects, but this paper presents greater detail, original methodology and examines leagues that have not been studied previously. These findings are discussed and concluded with recommendations for further analysis to generate a more complete framework from which AFC Wimbledon, as well as all clubs seeking sustainability, can work from.

**2. Literature Review**

Following thorough inspection of articles deemed relevant to the project (Appendix A), a total of 63 publications, including vocational material, have been referenced for this paper. These texts were then distributed into six main themes of the review, though some articles were utilised for multiple themes. These themes were: 1) Correlation Between Squad Age & Success in Men’s Football, 2) Analysis of Age & Peak Performance in football, 3) Analysis of Age & Success and Age & Peak Performance in Other Sports, 4) Analysis of Player Characteristics & Transfers in Football, 5) Correlation Between Player Age & Wages in Football and 6) Correlation Between Budget & Success in Football. High-quality journal-published articles form the foundation of the review, though vocational material found via google, websites & podcasts were also researched.

2.1. Correlation Between Squad Age & Success in Men’s Football

Quantitative analysis on the correlation between the relative age composition of football squads and their success, was non-existent until 2017. The earliest accessed commentary on the subject (Elberse, 2013) involved an interview with former Manchester United manager Sir Alex Ferguson, who set about creating a club identity based on modern foundations, specifically building a club constructed on young talent. This policy was contrary to popular opinion at the time, with one respected television commentator famously analysing that “you can’t win anything with kids”. Though no analysis of the correlation was undertaken, Ferguson extends that his priority was to construct a football club rather than simply a 1st team. The concept of relative experience of a squad was less important to Ferguson than creating a long-standing supply chain of young talent to that 1st team.

An initial quantitative examination into the relationship between age and success, Banos (2017) attempted to investigate one team specifically over a seven-year period. The subject club was Bayer 04 Leverkusen (Bayer) of the German Bundesliga between 2008/09 – 2015/16, assessing outcome-based factors along with the changing age profiles within the starting line-ups. The study concluded that Bayer actually achieved higher league positions with a younger squad, though the older sides were more likely to overturn early match deficits, suggested as a result of stronger mentality. The sample size of this study, both in using only one club and over a relatively small period, requires questioning as to the validity of these conclusions. As a club that historically fields younger teams, the range of age profiles of the teams (22.8 – 24.1) remains extremely young by European association standards (Poli et al., 2017) even at the uppermost of this range.

A pair of papers (Poli et al., February 2018; Poli et al., June 2018) extended the analysis with respect the age structure of squads within the top divisions of 31 European leagues, between 2009–2017. The Croatian league was found to be the youngest average age (24.23) with the Cypriot league the oldest on average (27.48) and the average to be 25.9 years. Though the most competitive, or successful league within European competition were found to be neither at the top or the bottom of the range, there was found to be statistically significant negative correlation between age at the UEFA league ranking coefficient (Fig.1). Within this study, Netherlands and Croatia were outliers of leagues with a far younger age while still ranked highly on UEFA’s coefficient.

Both studies did find that within countries, there was a vast age range of Champions, with the youngest average to be found in Netherlands and the eldest in Cyprus, though there was a minor tendency towards older squads. The reports suggest cultural influence with the Netherlands in particular having a history of youth development (Willacy, 2019). The overall conclusion was found to be that there is no one rule for success but an average age of 26.5 is suggested as optimal. Further conclusions are that there should be a limit of players over the age of 27 to produce sustainability, and that the stability (lack of player turnover year-to-year) of the squad is significantly correlated to ongoing success.

The proposed optimal age of 26.5 in the previous study aligns with the trend towards a higher average age of teams throughout the evolution of the UEFA Champions League (Kalen et al., 2019). This study investigated the aging trend of these squads from the competition’s inception in 1992 until 2018, with an increase in average age of competing teams of 1.6 years, from 24.9 to 26.5 years of age. Explanations for this include advancements in support functions to aid player performance, such as greater focus on physical monitoring, diet and conditioning (Anderson & Sally, 2013; Dendir 2016). This analysis presented the average age of goalkeepers and defenders to be greater than midfield or attacking players but interestingly, there was no significant evidence of an age profile of the successful teams within this competition.

Jensen (2020) furthered the analysis on the subject with his thesis investigating the Norwegian, Danish & Swedish top divisions in 2019. The examination of how young players impacted sporting achievement in Norway presented a totally scattered chart, with a fractional insignificant trendline towards success for the younger teams. Within Sweden and Denmark, there remained no significant correlation with the insignificant trend being slightly opposite to Norway with a slight skew towards the older teams. Again, the clear limitation of the study is the short time period and small sample size of investigation. As an aside, this investigation finds that more significant to success than squad age is squad turnover, or lack of. The stability of sides has strong positive correlation with success, although it could be argued that success may be a precursor to stability as less players are likely to be replaced voluntarily.

In 2020, Football Australia produced an appraisal of player ages globally in an attempt to gain a superior understanding of why Australia was producing so few, young international footballers (Hunter, 2020). The paper studied the number of minutes played by under-23-year-old players, for all teams in 35 top divisions globally. There concluded no correlation between the percentage of minutes played by these U23 players and points-per-game achieved. Meaningfully for their investigation, there was found to be a significant number of minutes in a season (2,250) that an under-23 player should appear for him to be likely to represent his country at international level in the future. This investigation was the primary one in which the distribution of players, from development - to peak - to experienced, was utilised rather than simply an average age. The outcome of this report was that a long-term strategy was implemented, with the aim to bring about a decline in average age in the Australian A-League from its current label as an ‘experienced player’ league.

Furthermore in 2020, AC Milan conducted a confidential report into the effect of squad average age on Expected Goal Difference (xGD), using 9 of Europe’s elite leagues over a two-season period. Expected goals is an underlying metric that measures the quality of chances created & conceded by teams (Whitmore, 2021). As per Fig.2, there concluded to be no correlation using larger samples of teams.

The final quantitative analysis of this topic continues this investigation between the underlying performance (xG) and squad age (Hobbs, 2021), again within Europe’s top leagues. The conclusions continue that there is no significant trendline where squads are older or younger in achieving success. One potentially interesting addition to the conclusion is that there appears to be slightly superior performance by those teams at the lower end of the table, with an increased age profile. Highlighted is that this investigation involves underlying performance data rather than actual outcomes – there could be an argument that one of the benefits of experience is the ability to remain calm under pressure situations, and therefore further work using results could be undertaken to eliminate the variance in xG and outcomes.

To conclude this section is mention of an article (Phillips, 2021) about the processes at Danish Superliga club, FC Nordsjaelland (FCN). Consistently the youngest, or one of, teams within European top divisions, FCN have set a strategy for growth based on the principle of playing and developing young players. Despite having an average attendance far below most of the clubs in the Danish Superliga, FCN have continued to perform above the levels expected of their financial position. Indeed, FCN qualified for the Europa League in recent years.

2.2. Analysis of Age & Peak Performance in Football

The subject of the peak age profile of footballers (age at which they are considered their best) on an individual basis became a topic of vocational debate during Arsene Wenger’s reign as manager at Arsenal (Hynter, 2014). Famously, Wenger established a policy at the club to award no more than one-year contracts for players over the age of 30, a result of the risk-reward valuation placed upon these profiles. Ironically, current Arsenal manager, Mikel Arteta was one to voice his disapproval with this strategy, on account of his opinion that player performance can frequently peak during these years.

This discussion of the age at which an individual player peaks was deliberated later that year (Carter, 2014). Using average ages of players from all World Cup winning sides to this point, Carter noted that 27.5 years was the peak performance age. Indeed, the same number was found to be the average age of all players from the 32 squads during the 2014 World Cup.

The primary academic investigation on the subject, Dendir (2016) used player ratings from the analysis website WhoScored.com over a 5-year period, including four of Europe’s top leagues. The report established the understanding that a player career is graphically represented as an inverted U-shape with the peak occurring between 25-27 years, slightly younger than the ‘late-20’s’ that had generally been considered. Interestingly, the study found variations between playing positions, with forward players likely to peak at 25 in contrast to defenders, who had a mean peak at 27. Crucially, Dendir reminds that this is a mean peak and that all players can peak at different ages, as a result of physical conditioning and gametime amongst other reasons.

A couple of 2019 studies (Sal de Rellan-Guerra et al., 2019; Kalen et al., 2019) followed. The first of these focussed on some of the core disciplines within football, both physical and technical – distance covered, quantity of high-speed runs, pass completion percentage – to ascertain the peak age for performance in the German Bundesliga. Results highlighted the decline in physical performance over the age of 30 years, though established a superior pass completion percentage after this age. The conclusion again emphasised the earlier decline in certain positions, in particular forward and wide positions with the recommendation that particular caution be paid for clubs offering contracts to these positions past the age of 30.

The second of these investigations researched the ages of all players to have played in the Champions League since its inception in 1992. Using the assumption that the Champions League is a peak-performance competition, generally considered the elite club competition globally, this study offers a realistic reference for peak performance of footballers. Once again, an inverted U-shape is witnessed with an average age of 25.75 – illustrated on the graph below (Fig. 3). Interestingly, the average age of competing teams in the Champions League has significantly risen, 1.6 years increase over the history of the competition (1992-93 to 2017-18), from 24.9 to 26.5. As with other sports, to be further investigated, the assumption is that advancements in conditioning of athletes is primary causation of this analysis.

Latterly, a paper investigating the ages of players nominated for major individual, international awards was investigated (Oterhals et al., 2021). Using this methodology supported the previous findings that the peak ages of players were increasing over the preceding ten years. The results indicated that peak performance was between 27 – 28 years of age, again varying across positions of player. Oterhals surmises that the decline in physiological performance can be compensated by technical & tactical improvements throughout player careers.

2.3. Analysis of Age & Success and Age & Peak Performance in Other Sports

There is an absence of literature regarding the comparative age profile of sports teams and this correlating success. Core explanation for this is that there are very few team sports similar to football, the fluid nature or both the game and the transfer system creating such a range of age opportunity for a coach or selector. Sports such as cricket or baseball, and even American Football to some extent, are stop-start in their nature and don’t necessarily rely on constant physical excursion or in-play ‘teamwork’, without regular intervals. In addition, the draft system used in sports in USA (Greene, 2013) allows for competitive balance and a guaranteed infusion of youth on an annual basis, thus leading to a smaller range of age profiles in squads.

There would, however, appear to be an aging trend with athletic performance over the past few decades. There are a wide range of peak performance ages across sports, attainable with respect the differing attributes required to compete – for example, explosion or endurance necessitating opposing physical qualities. The following papers investigate sports such as athletics, triathlon, tennis, baseball, ice-hockey etc.

Fair (2008) conducted a comprehensive study of the peak performance age of baseball players, the trend over time and comparisons within baseball and with other sports. Applying a sample from baseball over the 20th century, Fair established that the peak performance age to be 28 years old, with a swifter decline in performance of pitchers over batters, likely due to the physical demands on pitchers. The peak performance age had again risen over time, and evidence suggested that baseball players were affected by the aging process earlier than other sports such as athletics, swimming and chess.

A 2011 study (Villaroel et al.) into the peak performance of triathletes observed the peak performance age to be between 26 and 32, a relatively wide range. Interestingly with this paper though, the results in major championships (Olympics, World Championships) were superior from older athletes in comparison to regular season events. This suggests that ‘experience’ could be an important characteristic where greater heights of importance or stress at events are observed. Once again, the trend was towards a higher age of peak performance in recent years. Rust et al. (2012) extended this research, investigating ironman triathletes from 1983 to 2012. Striking results were obtained, the average age of top 10 athletes rising from 26 years old to 35 years old over the years – with the ages in all three triathlon disciplines (swimming, cycling & running increasing.

Arguably the sport with most similarity to football, the average age of Championship teams in basketball in the first 13 years of the 21st century was 28.7 (Risso, 2013). Though limited in sample size, the conclusion was that successful teams were generally built around players in their 20’s rather than 30’s and ongoing success was observed with these profiles. Further research conducted (Kovalchik, 2014; Allen & Hopkins, 2015) maintain similar conclusions that athletes are tending to peak and maintain performance at older ages. Tennis has seen a significant increase in ages of players in the top 100, with the average age now 27.9 years and no teenagers in the top 100 in the world rankings – again citing the superior endurance of older players now compared to years previous. The range of peak-performances ages is quite stark between sports – with swimming considered to peak at 20 years old compared to long-distance cycling at 39 years old, establishing that the peak ages are very aligned to a combination of level of endurance, speed & experience required for each discipline. The consistency amongst sport though is that there is a positive correlation with increasing peak age over time.

2.4. Analysis of Player Characteristics & Transfers in Football

A secondary hypothesis in this paper is the age profile of teams and their associated success, the following is a review of literature surrounding the valuation and regularity of transfers. Particular consideration of these transfers are the characteristics of them, predominantly the age profile of players generating income for clubs. In order to establish a financially rewarding transfer policy, an investigation into the player characteristics required to a player’s market value is essential. Much literature on the significant indicators to the player’s market value reflect on the importance of age of the player. A seminal piece on this subject, Carmichael & Thomas (1993) highlight age as an important indicator to market valuation, with a quadratic curve evident in an inverted U-shape. Much of the subsequent literature concluded the increase in value of players into the mid-twenties with decline thereafter.

Utilizing more recent data (Muller et al., 2017; Ante, 2019; Kalen et al., 2019; Felipe et al., 2020), highlighted the presence of an inverted U-shape where age is concerned. Player position (greater value for more attacking positions), minutes played, and even popularity of a player impacted their market value. The former used a dataset of 4217 players from five top European leagues, over six seasons and utilised a regression-based data analytical approach, using multiple characteristics to successfully estimate with reasonable confidence the valuation of players. Ante’s investigation two years later involved a smaller, updated dataset concluding similar results to those previously found. Kalen et al. confirmed previous findings, though analysed that the peak value occurs between the ages of 26 – 30, with a significant drop-off after the age of 31. One recent piece of literature on the subject with a noteworthy conclusion, Metelski (2021) conducted similar analysis based on the Polish 1st division – the Ekstraklasa. Whereas most previous studies had focussed on major leagues or ‘peak performance’ leagues (the Kalen et al. study involved UEFA Champions League teams), Metelski found that the majority of transfers from this league were between the ages of 21 – 24 and the peak transfer fees paid were for players before the age of 21.

To summarise this section, there is a generally consistent outcome in terms of player value conforming to an inverted U-shape, as per performance levels. However, the Metelski findings carry the potential that these values vary depending on the type of league, since ‘development leagues’ frequently supply players for peak performance leagues – offering explanation for the lower ages of peak value for players from these leagues. Player values increase with player position closer to the opposition penalty area, increase with greater exposure at higher levels of the game and match minutes, as well as non-footballing factors such as public/social presence.

2.5. Correlation Between Player Age & Wages in Football

As a result of the confidentiality of data on player wages throughout most leagues globally, there is minimal published literature on the subject of how the age of a player correlates to his salary. However, as a result of the regulated labour market in American sport, Major League Soccer (MLS) regularly publish player renumeration – offering an opportunity to analyse trends in player wages with age (Prockl & Frick, 2018). As per player performance analysis and player valuations analysis, the wages follow an inverted U-shape, meaning wages grow as the player ages until a point at which they dip until retirement. However, the prominent difference is that the peak of that inverted U was found to be far later in terms of salary, as late as 33.6 years old. One should consider the MLS to be slightly later in this arc, as a consequence of the late age of entry into the league (generally 23+ years old due to the draft system employed). Nether-the-less, this study indicates that salaries lag player performance and generally increase with age until a far later point.

2.6. Correlation Between Budget & Success in Football

The final discussion point for which to review literature is the correlation between club budget (or expenditure) and success. The hypothesis that there is a significantly strong correlation between budget (or player expenditure) and on-field success is predominant in the justification for greater emphasis on long-term financial growth. A seminal piece on this subject, Szymanski (1997) investigated the association over a large sample of years in the late 20th century with strong evidence favouring the hypothesis.

Subsequently, numerous examinations (Hall et al., 2002; Carmichael et al., 2011; Gerhards & Mutz, 2017; Plumley et al., 2018; Madsen et al., 2018) have similarly concurred with the analysis – Hall et al., Carmichael et al. & Plumley et al. using data from England while Gerhards & Mutz and Madsen et al. scrutinising the same relationship from Europe and Scandinavia respectively. Indeed, the graphic data below, provided from EFL League One over 3 recent years (Fig. 4), offers similar indications as all previous literature leading to a robust conclusion that the financial power of a club is the most meaningful predictor of success.

**3. Research Methodology**

The aim of this study is to ascertain the optimal age profile of a squad in the English Football League, for sustained growth. All evidence obtained previously illustrates the strong correlation between budget (or expenditure on players) and sporting success or performance. Therefore, our objective is to organically increase this budget year-to-year, while annually maintaining expected sporting performance in the short-term.

On this basis, we have a triangular hypothesis with which to investigate:

**Hypothesis 1:** There is no correlation between age and footballing performance or success in EFL football.

**Hypothesis 2:** Greater sales revenue can be expected from players pre-peak-performance age.

**Hypothesis 3:** There is a positive correlation between age and salary, suggesting that salaries tend to increase with age within professional football.

**Hypothesis 1:** **There is no correlation between age and footballing performance or success in EFL football.**

3.1. Test Design

This hypothesis has been tested using a variety of metrics for both age of teams and performance measures. Analysing the correlation between age and success using as many different metrics as possible allows for as thorough an overview of the hypothesis as possible. These have initially been split into eight tests:

1. Average age of teams compared to league position
2. Average age of teams compared to total points
3. Average age of teams compared to over/under expectation
4. Average age of teams compared to net expected goals (xG)
5. Percentage of minutes played by U23 compared to league position
6. Percentage of minutes played by U23 compared to total points
7. Percentage of minutes played by U23 compared to over/under expectation
8. Percentage of minutes played by U23 compared to net expected goals (xG)

Following these eight tests, aggregated tests of all teams are investigated:

1. Average age of all teams finishing in a nominated league position
2. Percentage of minutes played by U23 of all teams finishing in a nominated league position

And finally, an inspection of the 5 most successful and least successful teams:

1. Age Profile of Most Successful & Unsuccessful Teams

Each of these first ten tests have been conducted using a two-axis XY scatter plot, which plots all of the sample points to exhibit the relationship between the two variables. On each of the eight scatter plots, a logarithmic trendline has been inserted, which is a curved line of best fit of the data points. A logarithmic line has been utilised (in place of the similar, linear line) as a result of the datatype: as reviewed, there is a historical analysis in sport of peak performance in the mid-late 20’s with the phase beforehand considered ‘development’ and the ‘experienced’ age towards 30 years old. Derived from these plots is a R² value, which is represented on the graph. When interpreting regression analysis, the R² value is the statistical measure that represents the proportion of the variance for a dependent variable (in this case, success) that is explained by an independent variable (in this case, age). The significance of the R² value is contextually dependant on the test and the number of variables that may be responsible for the dependant variable (Fernando, 2021; Frost 2022). Generally, within social sciences, a R² value is considered to have high level of correlation above 0.7 (70%) but a level at approximately 0.5 (50%) may still be significant.

The data consists of 239 teams, from English Football League One and League Two, for 5 seasons between 2017-18 to 2021-22 (3 seasons where xG data is utilised). Each division comprises 24 clubs each season – however, Bury FC failed to complete the 2019-20 season and their results were expunged. In addition, the 2019-20 was curtailed in March (after approximately 35 rounds of games) due to the COVID-19 pandemic. A points-per-game (PPG) ratio was used to generate the final league standings.

3.2. Data Collection

Dividing the age data into these two succinct categories allows us to test for the impact of ‘mean’ age and age ‘range’. For example, a mean age for two teams may be the exact same (25); one team may have eleven players of 25-years old; while the other team may be constructed of five players at 20-years-old, five players at 30-years-old and one 25-year-old. Though the average age is the same, the construction of the teams is very different. By testing with the percentage of minutes played by players under the age of 23, this allows further inspection into those circumstances. Isolating the performance data into a multitude of metrics also allows for deeper scrutiny of what constitutes performance – there has traditionally been a cliché in football that “the table doesn’t lie.” However numerous studies (Rathke, 2017; Umami et al., 2021) have identified the significance of ‘expected goals’ as a more accurate measure of performance. By testing against four separate measures, a more significant result can be achieved.

The data for this thesis was gathered using secondary data collection. To define this form of data collection, “secondary data is every dataset not obtained by the author” (Martins et al., 2018). The data used for both age and performance is quantitative data, using statistics from the previous 5 seasons in the English Football League One and League Two. The data covers the time period 2017-18 season until 2021-22 season. It was decided that League One and League Two were the most appropriate leagues in EFL for our hypothesis – both the Premier League and the Championship would be considered peak performance leagues, while there is not the available data required at levels below League Two. This study had no requirement for qualitative data and the accessibility of evidence-based statistics on secondary sources allowed for no primary data needs.

Age data is divided into two categories: the average age of teams is provided by FBref (fbref.com). Though other websites provide the average age of squads, this site uses a more precise average, as weighted by minutes played and age taken at the time of each match. This was chosen as it successfully eliminates such situations as a non-playing squad member distorting the average age on the pitch; for example, a 45-year-old reserve goalkeeper who never plays. The ‘percentage of minutes played by U23’ data is provided by Experimental 3-6-1 (www.experimental361.com). This data distributes the minutes played each season by each age year, allowing a graphic representation of the age range within teams.

Performance data is divided into four categories: ‘league position’, ‘total points’, ‘over/under expectation’ and ‘expected goals’. League position refers to the final position in the particular league for that individual season, while total points denotes the final points tally for the corresponding season. These have been provided using Instat (Instat.com). For the COVID-19 shortened season (2019-20), the ‘expected points’ at time of curtailment (March 2019) has been used. ‘Expected Points’ is a measure provided by Spreadex (spreadex.com), a spread-betting company specialising in football gambling and forecasting. Prior to the start of the season, and updated continuously, Spreadex traders predict the average total of points expected by each team for the whole season. These form a ‘market’ for which to bet on by clients. The data used here is a comparative measure of the pre-season prediction (taken on the day of the first match of each season) and the final points total achieved. Finally, ‘net expected goals’ data has been provided by Instat. Expected Goals (xG) “measures the quality of a chance by calculating the likelihood that it will be scored from a particular position on the pitch during a particular phase of play” (Whitmore, 2021). The xG data has been represented as ‘net’ xG per game: the average xG compared to opponent per game for that corresponding season.

3.3. Study Limitations

With regard the data used for both ‘Expected Points’ and ‘Expected Goals’, there are assumptions and limitations that require addressing. With ‘Expected Points’, as derived by Spreadex football traders, the primary point of note is that we must assume that the trader has predicted and traded the price to a certain degree of expertise. Conventional wisdom of successful bookmaking companies would suggest that odds-makers are accurate with predictions, a hypothesis backed up by academic evidence of effective forecasting (Forrest et al., 2005). In addition, there are some limitations to the price with respect to this study; would there be a natural inflation of a price for teams with more experienced players? Higher rated teams may to have a larger budget, which allows for greater expenditure on older players – is there an element of double counting?

It must also be acknowledged that the Expected Goals models carry limitations. Indeed, the model is the result of the inputs of which different companies use varying degrees of accuracy. The basic model of xG considers the probability of a goal being scored from an exact position on the field. More developed models consider the goalkeeper positioning, shot power, height of the ball at striking, position of opposition etc. The model emphasises that the larger the sample, the more accurate the prediction will be. In a game with scarcity of goals, xG models should be informative and supportive for decision-making process but are far from fallible. Instat has been chosen by the author on the understanding that it is a developed yet not the outstanding market measure of xG – access to these exclusive models are provided at excessive expense.

This study includes 5 seasons of data for eight of the ten tests conducted. As with any quantitative analysis, a larger sample size results in enhanced confidence in the result. The data concerning ‘percentage of minutes played by U23’ is only available for the previous 5 seasons, limiting the potential for a larger sample. For consistency, it was decided to use these 5 seasons (2017/18 – 2021/22) for all tests, excluding those involving expected points (xG). The xG data for League One and League Two is only available for the previous 3 seasons, so correlations involving xG data includes 2 seasons less than the 5 used for other correlations - these will involve the season between 2019-20 – 2021-22.

**Hypothesis 2:** **Greater sales revenue can be expected from players pre-peak-performance age.**

3.4. Test Design & Data Collection

This hypothesis has been tested by plotting the quantity of transfers to Premier League & Championship clubs, where a transfer fee was involved, for 5 seasons between 2017-18 and 2021-22 seasons. These include the summer transfer windows preceding each season, and the winter transfer during that season. The data is provided from Transfermarkt.com

3.5. Study Limitations

Transfermarkt.com is considered a leading player data and valuation website, but not all information is 100% accurate, since many transfer fees are undisclosed to the public. Player transfer values are based upon publicised data, though for the simplification purpose of this investigation, a decision has been made to investigate where any transfer fee (regardless of size) was involved. The ages of players are the whole ages, rather than ‘to the day of transfer’ ages – as such, all ages are ‘rounded down’.

**Hypothesis 3:** **There is a positive correlation between age and salary, suggesting that salaries tend to increase with age within professional football.**

This hypothesis is **not** to be tested during this paper as a result of a lack of accurate public information available on player salaries.

**4. Results**

The layout of this section is as follows:

* Investigation of Hypothesis 1, followed by discussion
* Investigation of Hypothesis 2, followed by discussion

Note: Hypothesis 3 is **not** tested within this paper.

**Hypothesis 1: There is no significant correlation between age and footballing performance or success in EFL football.**

The average age of teams within this sample is **26.03** years of age. The eldest recorded team averages 29.6 years (Wycombe, 2021-22) while the youngest averages 23.4 years (Lincoln City, 2020-21). Of the 10 eldest sides, the most successful finishing position was 2nd (Bury, 2018-19) while of the 10 youngest sides, the most successful was also 2nd (Barnsley, 2018-19).

The average percentage (%) of minutes played by players under the age of 23 is **24.31%**. The team with the highest percentage of minutes played by players under 23 years old is 56.45% (MK Dons, 2021-22) while the team with the lowest percentage is 3.22% (Portsmouth, 2020-21). Of the 10 sides with the highest percentage, the most successful finishing position was 2nd (Crewe, 2019-20) while of the 10 sides with the least percentage, the most successful was 1st (Wigan, 2021-22).

4.1.1. Average age of teams compared to league position

The first set of results investigates the correlation between the average age of each team per season and plots this against their corresponding league position for that season. Visually (Fig. 5), the plots appear to be scattered evenly and a logarithmic trendline has been generated with a **R² value = -0.0067**. This indicates that the proportion of variance in improved league position explained by the average age is less than 1%.

The 10 league champions comprised an average age of 25.84 with the eldest champions averaging 27.7 years old (Wigan, 2021-22) and the youngest being 24.1 (Hull City, 2020-21). The 9 clubs finishing in 24th position had an average age of 25.21 with the eldest being 26.7 (Bradford, 2018-19) and the youngest being 24.1 (Macclesfield, 2019-20).

4.1.2. Average age of teams compared to total points

The next set of results investigates the correlation between the average age of each team per season and plots this against their corresponding season points achieved for that season. Again visually (Fig. 6), the plots appear to be scattered evenly and a logarithmic trendline has been generated with a **R² value = 0.0063**. This again indicates that the proportion of variance in improved total points achieved, that is explained by the average age, is less than 1%.

The 10 league teams with the highest points total comprised an average age of 25.43 with the eldest averaging 27.7 years old (Wigan, 2021-22) and the youngest being 23.8 (Barnsley, 2018-19). The 10 clubs finishing with the lowest points totals had an average age of 25.31 with the eldest being 26.8 (Oldham, 2021-22) and the youngest being 23.7 (AFC Wimbledon, 2021-22).

4.1.3. Average age of teams compared to over/under expectation

The following set of results investigates the correlation between the average age of each team per season and plots this against their corresponding season points achieved compared to expectation for that season. Once again, the plots (Fig. 7) appear totally random, and this is backed up with a logarithmic trendline generated with a **R² value = 0.0008**. This illustrates an almost perfect lack of correlation between the variables.

The 10 league teams with the highest points total compared to preseason expectation comprised an average age of 26.32 with the eldest averaging 27.7 years old (Wigan, 2021-22) and the youngest being 25 (Wigan, 2017-18). The 10 clubs finishing with the lowest points totals had an average age of 25.58 with the eldest being 27.8 (Notts County, 2018-19) and the youngest being 24.2 (Scunthorpe, 2021-22).

4.1.4. Average age of teams compared to expected goals (xG)

The next set of results (Fig. 8) investigates the correlation between the average age of each team per season and plots this against their corresponding expected goals (xG) achieved for that season. A logarithmic trendline has been generated with a **R² value = 0.0153**. Though higher than the correlation between previous variables, the value again indicates that the proportion of variance in improved net xG that is explained by an increasing average age, is approximately 1.5%.

The 10 league teams with the highest xG comprised an average age of 25.98 with the eldest averaging 27.7 years old (Wigan, 2021-22) and the youngest being 25 (FGR, 2021-22). The 10 clubs finishing with the lowest xG had an average age of 24.92 with the eldest being 26.8 (Gillingham, 2021-22) and the youngest being 23.7 (AFC Wimbledon, 2021-22).

4.1.5. Percentage of minutes played by U23 compared to league position

The next set of results investigates the correlation between the percentage of minutes played by under-23-year-olds each team per season and plots (Fig. 9) this against their corresponding league position for that season. A logarithmic trendline has been generated with a **R² value = 0.0761**. This illustrates that the proportion of variance in worsened league position explained by an increase in minutes played by under-23-year-olds is 7.61%.

The 10 league champions comprised an average of 19.22% of minutes played by under-23-year-olds with the highest percentage averaging 31.49% (Coventry, 2019-20) and the lowest percentage being 7.67% (Wigan, 2021-22). The 9 clubs finishing in 24th position had an average minutes played by under-23-year-olds of 34.58% with the highest percentage being 45.69% (Chesterfield, 2017-18) and the lowest percentage being 19.87% (Bury, 2017-18).

4.1.6. Percentage of minutes played by U23 compared to total points

The next set of results investigates the correlation between the percentage of minutes played by under-23-year-olds each team per season and plots (Fig. 10) this against their corresponding total points for that season. A logarithmic trendline has been generated with a **R² value = 0.084**. This illustrates that the proportion of variance in reduced season points explained by an increase in minutes played by under-23-year-olds is 8.4%.

The 10 teams with the highest points total comprised an average of 21.51% of minutes played by under-23-year-olds with the highest percentage averaging 56.45% (MK Dons, 2021-22) and the lowest percentage being 7.67% (Wigan, 2021-22). The 10 clubs finishing with the lowest points total had an average number of minutes played by under-23-year-olds of 36.7% with the highest percentage being 50.31% (AFC Wimbledon, 2021-22) and the lowest percentage being 16.47% (Oldham, 2021-22).

4.1.7. Percentage of minutes played by U23 compared to over/under expectation

The next set of results investigates the correlation between the percentage of minutes played by under-23-year-olds each team per season and plots (Fig. 11) this against their corresponding season points achieved compared to expectation for that season. A logarithmic trendline has been generated with a **R² value = -0.0256**, with teams performing fractionally worse than expected as the % of minutes by U23’s increases. Again, the value assigns 2.56% of this variance to the dependant variable.

The 10 teams with the highest points total compared to expectation comprised an average of 16.76% of minutes played by under-23-year-olds with the highest percentage being 25.67% (Shrewsbury, 2017-18) and the lowest percentage being 7.67% (Wigan, 2021-22). The 10 clubs finishing with the lowest points total compared to expectation had an average minute played by under-23-year-olds of 32.84% with the highest percentage being 49.54% (Doncaster, 2021-22) and the lowest percentage being 16.05% (Notts County, 2018-19).

4.1.8. Percentage of minutes played by U23 compared to expected goals (xG)

Finally, the following set of results investigates the correlation between the percentage of minutes played by under-23-year-olds each team per season and plots (Fig. 12) this against their corresponding net expected goals achieved for that season. A logarithmic trendline has been generated with a **R² value = -0.1042**. A club’s reduction in net xG for the season can be 10.42% explained by the increasing percentage of minutes played by U23’s.

The 10 teams with the highest expected goals comprised an average of 19.81% of minutes played by under-23-year-olds with the highest percentage being 36.22% (Rotherham, 2019-20) and the lowest percentage being 7.67% (Wigan, 2021-22). The 10 clubs finishing with the lowest expected goals had an average minutes played by under-23-year-olds of 37.05% with the highest percentage being 49.54% (Doncaster, 2021-22) and the lowest percentage being 25.19% (Gillingham, 2021-21).

4.1.9. Combined Results

Table 1 illustrates the eight tests conducted and their corresponding R² values. All eight tests show negligible correlation between age of squads and the ultimate success of these teams. Proportion of variance of the success that can be attributed to the corresponding age of the teams ranges between 0.0008 (0.08%) and 0.1042 (10.42%). These figures are not considered significant in regression analysis. Changing the age variable to ‘percentage of minutes played by U23) does increase that correlation compared to ‘average age’ so one can deduct that this has more relevance than the ‘average age’.

4.1.10. Combined Age Profiles by League Position

An alternative approach to this investigation is to aggregate all the teams that finished in each league position and plot these against the ‘average age’ and the ‘percentage of minutes played by U23’. For example, all the teams that won the league averaged 25.84. The first scatter plot (Fig.13), examining the average age of the 10 teams that finished in each league position over these 5 years, produce a trendline with a **R² value = -0.0907**. This suggests that an improvement in a club’s league position can be 9% explained by their increasing average age. Interestingly, the top two places average an age below the overall league average – these are the only position in the top half of the table where this is the case. There is an outlier to this analysis with last place averaging over 0.5 years lower than any other position. Without this, the **R² value reduces to -0.0236**.

The second scatter plot (Fig.14) examines the average percentage of minutes played by U23 players, by the 10 teams that finished in each league position over the 5 years. For example, all the league winners averaged 19.22% of minutes played by U23. This produces our highest **R² value, of 0.4437**, suggesting that the proportion of variance in improved league position explained by the percentage of minutes played by U23 is 44.37%. Again, the bottom two positions are the two positions with the highest percentage of U23 players, both being over 30%, over 6% greater than the average.

4.1.11. Age Profile of Most Successful & Unsuccessful Teams

A different method to this investigation is to observe the most and least successful clubs in the English football leagues and assess whether the age profiles of their squads have any correlation. The subject of the study is sustained growth at English Football League level, so the measure of success used is to be the improvement in the league pyramid. Success at the elite level of the English game (Premier League) would be marginal by this measure, as a result of the lack of uplift available. For the success to be considered sustainable, the longer the period of time observed allows for greater confidence that there has been growth. The emphasis of this paper is ‘sustained’ growth – there will be multiple seasons of success or failure that may be influenced by short-term factors: a cash injection or shortage, a star player, a fortunate period, injuries etc. Therefore, the data has been extended to a 10-year period (2012-13 – 2021-22), and a change in league pyramid position from the conclusion of the 2012-13 season compared to the conclusion of the 2021-22 season has been calculated. Each club is analysed with a unique 10-year trendline. A review of the 5 clubs with the greatest growth and the 5 clubs with the greatest decline is then undertaken with commentary, including player revenue and expenditure, extracted from Transfermarkt.com to assess whether net financial profit or losses provide explanation for the trends. It is worth noting that of these 50 seasons observed, on only one occasion was there a points deduction (Wigan Athletic, 2019-20) which influenced the pyramid position (Stone, 2020).

Table 2 & Fig. 15 illustrate the 10 English football clubs to be examined in the following section. The most successful club during this period (measured by rise in football pyramid) is Luton Town, with a rise of 73 places, from 99th position (7th in the National League) at the end of 2012-13 season to 26th position (6th in the Championship) at the end of the 2021-22 season. Alternatively, Yeovil Town have witnessed the steepest decline, with a drop of 56 places from 48th position (4th in League One) to 104th position (12th in National League) over the same period.

*Luton Town*

Luton Town (Table. 3) are the team with the greatest rise in league pyramid position in English professional football over this 10-year period, with an improvement of 73 places. A large club, in terms of revenue and attendances in the National League following a period of financial difficulty & points deductions, Luton have established themselves a period of almost constant improvement. The average age of 26.18 is marginally above the average of 26.03 years, while their use of U23 players has been below average at 12.02% (compared to a league average of 24.31%) over the 5 years. In terms of player sales, Luton have generated £10,765,000 in net player revenues in this period, including 6 purchases (including a transfer fee) and 7 sales. £10,000,000 of these sales came during the 2019-20 season with the sales of James Justin & Jack Stacey.

*Lincoln City*

Lincoln City (Table. 4) have risen 47 places in the league pyramid in English professional football over this 10-year period. The average age of 25.44 is slightly below the average of 26.03 years, while their use of U23 players has also been above average at 27.85% (compared to a league average of 24.31%) over the 5 years. In terms of player trading, both sales & purchases have been extremely rare with 2 sales at a value of £725,000 and 2 purchases for £140,000.

*Brentford*

Brentford (Table. 5) are one of the most heralded stories in English football of late, their rise of 34 places into the English Premier League a result of innovative practice and successful implementation of a player trading model (Singh, 2021). The average age of 24.55 has consistently been below the average of 26.03 years, while their use of U23 players has also been consistently above average at 29.56% (compared to a league average of 24.31%) over the 5 years. Brentford’s storied player trading has generated net proceeds of almost £67,000,000 over the 10 years – a number that was over £100,000,000 prior to their debut season in the Premier League last season. Transfermarkt.com has a total of 28 player sales over the 10-year period, with a revenue of £172,000,000. This success is a principal explanation for their successful rise from League One to the Premier League.

*Forest Green Rovers*

Forest Green Rovers (Table. 6) have risen 33 places in the league pyramid in English professional football over this 10-year period. The average age of 25.32 is below the average of 26.03 years, while their use of U23 players has been above average at 32.61% (compared to a league average of 24.31%) over the 5 years. Interestingly, FGR have reformed their approach since they achieved promotion to the Football League in 2017-18, from which time their average age has dropped to 24.68 years old. In terms of player sales, FGR have sold 3 players over the 10-year period at a value of £862,000 without paying a fee for any recruit.

*Coventry City*

Coventry City (Table. 7) have risen 25 places in league pyramid in English professional football over this 10-year period. The average age of 24.66 is below the average of 26.03 years, while their use of U23 players has been above average at 28.01% (compared to a league average of 24.31%) over the 5 years. In terms of player sales, Coventry have sold 10 players at a value of £7,450,000 while spending on only 4 players for £3,570,000 to generate a net profit of almost £3,900,000.

*Yeovil Town*

Yeovil Town (Table. 8) are the club which has witnessed the greatest decline in league position over the 10-year period, with a drop of 56 places. By traditional league heritage, Yeovil were at their most successful period in 2012-13 and have now regressed to arguably a more natural standing. The average age of 25.22 is slightly below the average of 26.03 years, while their use of U23 players has been well above average at 44.3% (compared to a league average of 24.31%) over the 5 years (though only 2 years of data available). Yeovil have sold only one player during this period (£135,000) without paying a fee for a recruit.

*Notts County*

Notts County (Table. 9) have fallen 41 places in the league pyramid in English professional football over this 10-year period. The average age of 27.23 is higher than the average of 26.03 years, while their use of U23 players has been below average at 14.97% (compared to a league average of 24.31%) over the 5 years (though only 2 years of data available). Notts County have failed to sell any players during this period with their one purchase being £250,000.

*Sunderland*

Sunderland (Table. 10) have fallen 32 places in the league pyramid in English professional football over this 10-year period. The average age of 26.7 is higher than the average of 26.03 years, while their use of U23 players has been slightly below average at 20.01% (compared to a league average of 24.31%) over the 5 years. Player trading also illustrates a concerning picture with a net transfer loss of £61,450,000. Sunderland spent heavily in the early part of this data without success which left them in a financially precarious position.

*Oldham Athletic*

Oldham (Table. 11) have fallen 28 places in the league pyramid in English professional football over this 10-year period. The average age of 25.3 is lower than the average of 26.03 years, while their use of U23 players has been above average at 30.34% (compared to a league average of 24.31%) over the 5 years. In terms of player sales, Oldham have paid for and sold 3 players with a net profit of £630,000 from these transactions.

*Wigan Athletic*

Wigan Athletic (Table. 12) have fallen 27 places in the league pyramid in English professional football over this 10-year period. The average age of 26.68 is higher than the average of 26.03 years, while their use of U23 players has been slightly below average at 19.49% (compared to a league average of 24.31%) over the 5 years. In terms of player sales, Wigan have been very successful with a net transfer income of over £31,000,000. Historically, Wigan have been a smaller club (by attendances and pyramid position) so to even maintain Championship football has required success in this area.

4.1.12. Combined Results

Observing the five most and least successful clubs in English professional football over a 10-year period, by measure of pyramid improvement or decline, the relevant data is grouped in Table.13 and Table.14 respectively.

Of the five most successful clubs, the average age of these 50 individual teams is 25.23, below the average of 26.01 years. Four of the five teams average at least 0.5 years below the average, while Luton Town average slightly above the average. The mean percentage of minutes played by under-23-year-olds is 26.01%, slightly above the average of 24.31%. Again, only Luton Town have averaged below the league average. All clubs have made profit from player purchases/sales though with varying measures of significance.

Of the five least successful teams, the average age of the 50 individual teams is 26.23, fractionally above average with three of the five teams above and two below. The mean percentage of minutes played by under-23-year-olds is 25.82%, again above the average of 24.31%.Three of the clubs have made a profit from player purchases/sales, though only two of these are figures of real significance.

4.1.13. Hypothesis 1 Discussion

The multitude of tests conducted, with a variety of approaches attempt to further the research (Banos, 2017; Poli et al., 2018; Kalen et al., 2019; Jensen, 2020; Hunter, 2020; Hobbs, 2021) involving the correlation between ages of football teams and their corresponding success. While none of these had found any significant correlation in either direction, Poli et al. identified that at the top levels of the sport, there was a correlation with the average ages of leagues and the UEFA coefficient, suggesting a minimal trend towards leagues at peak performance age. This peak age of 26.5 years old aligns with the average age of Champions League players, as investigated by Kalen et al. and within the range of peak performance leagues indicated in Australia’s Performance Gap Paper (Hunter, 2020). Though there appears to be agreement on the ‘peak’ performance age of a footballer, studies into individual leagues (Jensen, 2020; Hobbs, 2021) indicate no correlation with the average age of successful teams within their respective leagues.

The results identified above offer some original substance, both in dataset and methodology. Within the dataset, this is the primary study involving teams not involved in the top division of their country’s leagues. The relevance of this is that the leagues may not be considered ‘peak performance’ and as such, short-term success may not be considered the sole objective for club progression. With regard methodology, the depth of analysis investigates not just the average ages but also the average number of minutes played by under-23-year-olds, as well as running multiple barometers as a measure of success. **The results do not offer any significant correlations and support our hypothesis that there is no significant correlation between age and footballing performance or success in EFL football.** However, there are some interesting outcomes that require further analysis.

None of the four tests involving average age of teams indicate even the slightest level of significance. The four tests involving the percentage of minutes played by under-23-year-olds also do not reach a level of mathematical significance but suggest noticeably greater correlation in all tests than the average age. And within all eight of these tests, the correlations are in favour, even at the minutest degree, of an older squad. Logically, this would stand to reason assuming a peak age of approximately 26.5 years old. Where a player is more experienced, there is greater certainty about the performance level of that player. There is clear evidence of the player’s ability, thus reducing the potential ranges of outcomes of that player’s future ability. Players with less experience carry more volatility in their range – until the player has played games at professional level, there is still the unknown to his performance level resulting in the possibility of both under-performance or over-performance.

Indeed, all eight tests, as well as the league positional averages, indicate that the worst performing sides average a younger age and greater percentage of minutes by under-23-year-olds. However, it is also noticeable that the most successful teams have a correlation towards a younger profile, supporting the theory of increased volatility on a short-term basis with a younger team or increased minutes by inexperienced players. This increased volatility is again supported when analysing the most or least successful clubs throughout this period. Four of the five most successful clubs over a longer-term average a younger average age and greater productivity of younger players. On all of these instances, the club have made profit financially on net transfer activity, some of these extremely notable. With regard the unsuccessful teams, there is more randomness to their failings, with both old & young profiles and mixed financial results.

A further point of note is the context behind some of the teams involved, notably the unsuccessful ones. There are instances where financial difficulty or transfer embargos have resulted in teams having to include ‘youth’ players involuntarily (one such example being Bolton, 2019-20). The purpose is to ascertain whether there is a correlation between age profile and predicted success – clubs forced to play players not deemed ‘ready’ would generate poor success predictions, providing explanation for the lowest R² value being over/under expectation. This is supported by the 24th placed clubs being significantly younger than all other positions. Furthermore, teams without the possibility of success at the conclusion of a season (generally relegated or without anything to ‘play for’) often include ‘youth’ players to provide experience in games without consequence. Again, these are not the squad profiles required for long-term planning analysis and would indicate that the R² correlations above could reduce even further when these individual cases are removed.

**Hypothesis 2:** **Greater sales revenue can be expected from players pre-peak-performance age.**

Following is data on all transfers to Premier League or Championship clubs in the five seasons, from 2017-18 season to 2021-22 inclusive. Only transfers involving a fee to the selling club are included, since the purpose of this investigation is to generate revenue for a ‘trading’ club. There are a total of **785** transfers of these types, 459 purchased by Premier League clubs and 326 purchases for Championship clubs. Of these purchases, 232 were from EFL clubs or below (including sales from Championship clubs) and 71 were from clubs at League One level or below. During this five-year period, only 8 transfers resulted in a player joining a Premier League club from a club at League One level or below. The quantity of transfers took the following profiles between 2017-18 and 2021-22 are charted in Table 15.

4.2.1. Transfer Fees Paid for by Premier League & Championship Clubs, to All Clubs

Fig. 16 is a column chart representing the quantity of transfers to Premier League or Championship clubs, where a transfer fee was involved, between 2017-18 and 2021-22 seasons.

A total of 785 transfers involving a fee paid for by Premier League or Championship clubs during this period. The mode age is 23 years old; the median age is 24 years old and the mean age is 24.14 years old.

A cumulative percentile chart of these transfers can be found in Table. 16. For example, 45% of these transfers involved players aged 23 & under. From this, we can see that >75% of transfers involved players aged 26 years old or younger.

4.2.2. Transfer Fees Paid for by Premier League & Championship Clubs, to EFL Clubs (or below)

Fig. 17 is a column chart representing the quantity of transfers to Premier League or Championship clubs from English clubs at EFL level or below, where a transfer fee was involved, between 2017-18 and 2021-22 seasons.

A total of 232 transfers involving a fee paid for by Premier League or Championship clubs, to English clubs at EFL level or below during this period. The mode age is 25 years old; the median age is 24 years old and the mean age is 24.56 years old.

A cumulative percentile chart of these transfers can be found in Table. 17. From this, we can see that >75% of transfers involved players aged 26 years old or younger.

4.2.3. Transfer Fees Paid for by Premier League & Championship Clubs, to League One Clubs & below

Fig. 18 is a column chart representing the quantity of transfers to Premier League or Championship clubs from English clubs at League One level of below, where a transfer fee was involved, between 2017-18 and 2021-22 seasons.

A total of 71 transfers involving a fee paid for by Premier League or Championship clubs, to English clubs at League One level or below during this period. The mode age is 24 years old; the median age is 24 years old and the mean age is 23.17 years old.

A cumulative percentile chart of these transfers can be found in Table. 18. From this, we can see that >75% of transfers involved players aged 25 years old or younger.

4.2.4. Hypothesis 2 Discussion

A number of papers (Dendir, 2016; Sal de Rallen-Guerra et al., 2019; Kalen et al., 2019) align with the analysis that the peak performance of a football is witnessed, on average, at between 25 – 27 years old. The performance graph can be predicted as an inverted U-shape with steep decline occurring from 30 years old onwards. An extension on this, there have been observation of that peak occurring at a younger age with more attacking players, while defenders and goalkeepers frequently peak in the latter part of that range and above.

The analysis conducted into the transfers of players to the Premier League and Championship indicate **clear agreement with the hypothesis that greater sales revenue can be expected from players pre-peak-performance.** The significance of using the Premier League and Championship are that these are both considered ‘peak performance’ leagues (Hunter, 2020) and more appropriately, are the primary leagues likely to recruit players from League One and League Two. The mean, mode and median ages of players recruited to the Premier League and Championship are all below the perceived peak performance age and in all cases are at least 75% of transfers below this age. This is further exaggerated in transfers from clubs in the lower levels of English football. Graphically, this can be illustrated mapping Kalen et al. (2019) chart of peak performance (Fig.3) in contrast to the dataset analysed above (Fig.16) – a clear lead/lag relationship between the ages of player transfers and peak performance age.

Our evidence further supports that in previous studies on the subject (Carmichael & Thomas, 1993; Muller et al., 2017; Ante, 2019; Kalen et al., 2019; Felipe et al., 2020) that the frequency and value of transfers reflects an inverted U-shape. Furthermore, and aligned with our research, Metelski (2021) conducted a study with the corresponding significance of a ‘production’ league – one that is occupied by greater numbers of pre-peak-performance footballers. This paper reflected a similar pattern of tendency towards a younger peak of the U-shape and our analysis extends this research using English leagues that are frequently suppliers of elite footballers to two of the world’s richest and highest quality leagues.

**5. Conclusions and Recommendations**

This research sought to provide insight into the optimal squad profile for a football club at English Football League level, with specific understanding of sustainably growing the playing budget, while not negatively impacting short-term performance. Notably the first two hypothesises; an extension on previous literature citing the relationship between team age profile and success, and the characteristic profile of transfers likely to generate revenue for the selling club, have been considered. These investigations quantitively analysed and contextualised these relationships, utilising both data and methods previously unemployed. The results indicate that there is no significant correlation between the average age of a team and its corresponding success. Likewise, there is no significant correlation between the usage of players below the age of 23-years-old and success. And finally, there is a distinct pattern of revenue-inducing transfers taking an inverted U-shape, with the arc preceding that of individual peak performance theory.

The recommendations are that clubs seeking not just sustainability, but organic growth, should have conviction in the triangulated theory hypothesised, and construct a squad with precise consideration. This squad should seek to be younger than the league-wide average age and provide opportunity for an above-average percentage of minutes to be played by players under 23-years-old. The extent of this reduction in age from the standard is open to conjecture and requires buy-in from all stakeholders – however, FC Nordsjaelland have successfully demonstrated this process to its extreme (Phillips, 2021). Attention though, is to be paid to the character of the squad, both experienced players and younger ones, to ensure that the correct environment for development (both individual and team) is maintained. While there is evidence to suggest that the long-term outlook will significantly improve, there is indication that increased volatility is to be expected in short-term outcomes. Again, this requires bravery and resourcefulness from stakeholders, especially in the highly pressurised sporting industry where instant gratification is generally desired. It is advised that there be a strong culture and governance throughout the club, with alignment from the hierarchy, to the football staff & team, essential in reducing this unpredictability.

In order to achieve the desired long-term objectives, particular attention is recommended with succession planning within the squad. An intricate knowledge of the likely formation of the squad in future years is preferable, in order to enable pathways for young talent to obtain gametime, while a focus on the on-field positions of those younger players should also be considered (greater youth in attacking areas). Squad stability has been evidenced to have a greater impact on success (Jensen, 2020), augmenting the importance of this long-term planning and the adoption of longer-term contracts for the developing players – with benefits in stability, player development opportunity and player sales value. Research into the most & least successful clubs over the past 10 years highlight the minimal pyramid movement of most clubs. With such a strong positive correlation between budget and success, it is recommended that for a growth perspective, motivation from key decision makers should prioritize budgetary growth (by way of sales revenue) ahead of short-term results. Assuming that these results do not take a significant negative impact that would result in financial losses, the on-field success over individual seasons should be for the attention of the football coaching staff and be of reduced concern for decision-makers.

5.1 Further Research:

Assessing the relationship between the age profile and success requires further extension, with particular attention to the extremes within the data. The relevance of percentage of minutes played by players at certain ages carries more significance than an average, where the detail of that makeup is unknown. It would be interesting to expand on this with different age brackets and across larger sample sizes, both in leagues and timescales involved. Furthermore, the measure of ‘success’ should be further investigated since success should be apportioned in line with club budget – this would allow for more contextualisation and ‘levelling out’. It could be argued that the teams expected to be at the upper portion of football leagues will be expected to have larger budgets. With these larger budgets, there may be a propensity for older and larger squads, a result of affordability, which creates a self-evolving prophecy that older teams are more successful. Additionally, research could be conducted on the evolution of this subject over the past 25 years or so. With evidence of peak performance of athletes within football, and all sports, increasing over this timescale, there could be indication that this rise continues. Therefore, the extent to which a youthful team is desired may not be as extreme, should there be an expectation of further increases in age of peak performance of athletes.

On the subject of fee-inducing player transfers, there is not a substantial volume of literature on this subject, allowing for greater quantity of leagues, players and time-periods to be examined. An examination of the profile of these leagues (in terms of developmental, peak or experienced) and their aligned sales market could be undertaken. Are the desired requirements different in League Two than League One for example, as there is a greater uplift in performance required to the peak performance leagues? Furthermore, the evolving environment for transfers over time requires further investigation. Currently, there is a significant distribution of wealth from Premier League teams, and those Championship teams in receipt of parachute payments (Wilson et al., 2020) compared to lower-budget Championship teams. There is opportunity for closer inspection of the predisposition of these teams and their requirements. And finally, has this landscape evolved since the COVID-19 pandemic and its associated impact on football finances?

The concluding hypothesis within our triangular theorem is the correlation between age, or experience, and salary on an individual basis. Unexplored in this paper, there is minimal research globally on the subject as a result of the privacy of salaries. Qualitative research could be undertaken to further explore the quantitative analysis conducted within the MLS (Prockl & Frick, 2018) which would enable greater confidence to the triangulated proposition.

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**Tables**

Table. 1: Age & Success Combined Results

|  |  |
| --- | --- |
| **Test Description** | **R²** |
| Average age of teams compared to league position | 0.0067 |
| Average age of teams compared to total points | 0.0063 |
| Average age of teams compared to over/under expectation | 0.0008 |
| Average age of teams compared to expected goals (xG) | 0.0153 |
| Percentage of minutes played by U23 compared to league position | 0.0761 |
| Percentage of minutes played by U23 compared to total points | 0.084 |
| Percentage of minutes played by U23 compared to over/under expectation | 0.0256 |
| Percentage of minutes played by U23 compared to expected goals (xG) | 0.1042 |

Table. 2: Most & Least Successful Teams by Pyramid Positional Change (2012–2022)

|  |  |
| --- | --- |
| **Team** | **Pyramid Positional Change** |
| [Luton Town](https://fbref.com/en/squads/e297cd13/2018-2019/Luton-Town-Stats) | 73 |
| [Lincoln City](https://fbref.com/en/squads/d76b7bed/2020-2021/Lincoln-City-Stats) | 47 |
| [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 34 |
| [FGR](https://fbref.com/en/squads/f1eb9593/2017-2018/Forest-Green-Rovers-Stats) | 33 |
| [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2019-2020/Coventry-City-Stats) | 25 |
| Wigan | -27 |
| [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/Oldham-Athletic-Stats) | -28 |
| [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | -32 |
| [Notts County](https://fbref.com/en/squads/3b27de1f/2018-2019/Notts-County-Stats) | -41 |
| Yeovil Town | -56 |

Table. 3: Luton Town, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | National League | [Luton Town](https://fbref.com/en/squads/e297cd13/2014-2015/Luton-Town-Stats) | 25.8 | N/A | 7 | 99 |
| 2013-14 | National League | [Luton Town](https://fbref.com/en/squads/e297cd13/2014-2015/Luton-Town-Stats) | 26.9 | N/A | 1 | 93 |
| 2014-15 | League Two | [Luton Town](https://fbref.com/en/squads/e297cd13/2014-2015/Luton-Town-Stats) | 26.6 | N/A | 8 | 76 |
| 2015-16 | League Two | [Luton Town](https://fbref.com/en/squads/e297cd13/2015-2016/Luton-Town-Stats) | 26.8 | N/A | 11 | 79 |
| 2016-17 | League Two | [Luton Town](https://fbref.com/en/squads/e297cd13/2016-2017/Luton-Town-Stats) | 24.3 | N/A | 4 | 72 |
| 2017-18 | League Two | [Luton Town](https://fbref.com/en/squads/e297cd13/2017-2018/Luton-Town-Stats) | 25.8 | 16.99 | 2 | 70 |
| 2018-19 | League One | [Luton Town](https://fbref.com/en/squads/e297cd13/2018-2019/Luton-Town-Stats) | 25.7 | 15.07 | 1 | 45 |
| 2019-20 | Championship | [Luton Town](https://fbref.com/en/squads/e297cd13/2018-2019/Luton-Town-Stats) | 26.3 | 14.19 | 19 | 39 |
| 2020-21 | Championship | [Luton Town](https://fbref.com/en/squads/e297cd13/2018-2019/Luton-Town-Stats) | 26.7 | 11.33 | 12 | 32 |
| 2021-22 | Championship | [Luton Town](https://fbref.com/en/squads/e297cd13/2018-2019/Luton-Town-Stats) | 26.9 | 2.51 | 6 | 26 |
| **Totals** |  |  | **26.18** | **12.02** |  |  |

Table. 4. Lincoln City, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | National League | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2017-2018/Lincoln-City-Stats) | 25.3 | N/A | 16 | 108 |
| 2013-14 | National League | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2017-2018/Lincoln-City-Stats) | 24.9 | N/A | 14 | 106 |
| 2014-15 | National League | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2017-2018/Lincoln-City-Stats) | 24.6 | N/A | 15 | 107 |
| 2015-16 | National League | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2017-2018/Lincoln-City-Stats) | 26.9 | N/A | 13 | 105 |
| 2016-17 | National League | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2017-2018/Lincoln-City-Stats) | 25.7 | N/A | 1 | 93 |
| 2017-18 | League Two | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2017-2018/Lincoln-City-Stats) | 26.3 | 19.75 | 7 | 75 |
| 2018-19 | League Two | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2018-2019/Lincoln-City-Stats) | 27.5 | 12.46 | 1 | 69 |
| 2019-20 | League One | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2019-2020/Lincoln-City-Stats) | 25.8 | 22.99 | 16 | 60 |
| 2020-21 | League One | [Lincoln City](https://fbref.com/en/squads/d76b7bed/2020-2021/Lincoln-City-Stats) | 23.4 | 45.33 | 5 | 49 |
| 2021-22 | League One | [Lincoln City](https://fbref.com/en/squads/d76b7bed/Lincoln-City-Stats) | 24 | 38.71 | 17 | 61 |
| **Totals** |  |  | **25.44** | **27.85** |  |  |

Table. 5. Brentford, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | League One | [Brentford](https://fbref.com/en/squads/cd051869/2012-2013/Brentford-Stats) | 24.3 | N/A | 3 | 47 |
| 2013-14 | League One | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 25.1 | N/A | 2 | 46 |
| 2014-15 | Championship | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 24.5 | N/A | 5 | 25 |
| 2015-16 | Championship | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 24.3 | N/A | 9 | 29 |
| 2016-17 | Championship | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 24 | N/A | 10 | 30 |
| 2017-18 | Championship | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 24.4 | 26.49 | 9 | 29 |
| 2018-19 | Championship | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 24.3 | 35.9 | 11 | 31 |
| 2019-20 | Championship | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 24.5 | 26.49 | 3 | 23 |
| 2020-21 | Championship | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 24.7 | 29.37 | 3 | 23 |
| 2021-22 | Premier League | [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 25.4 |  | 13 | 13 |
| **Totals** |  |  | **24.55** | **29.56** |  |  |

Table. 6. Forest Green Rovers, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | National League | [FGR](https://fbref.com/en/squads/f1eb9593/2017-2018/Forest-Green-Rovers-Stats) | 23.8 | N/A | 10 | 102 |
| 2013-14 | National League | [FGR](https://fbref.com/en/squads/f1eb9593/2017-2018/Forest-Green-Rovers-Stats) | 26.3 | N/A | 10 | 102 |
| 2014-15 | National League | [FGR](https://fbref.com/en/squads/f1eb9593/2017-2018/Forest-Green-Rovers-Stats) | 27.1 | N/A | 5 | 97 |
| 2015-16 | National League | [FGR](https://fbref.com/en/squads/f1eb9593/2017-2018/Forest-Green-Rovers-Stats) | 26.5 | N/A | 2 | 94 |
| 2016-17 | National League | [FGR](https://fbref.com/en/squads/f1eb9593/2017-2018/Forest-Green-Rovers-Stats) | 26.1 | N/A | 3 | 95 |
| 2017-18 | League Two | [FGR](https://fbref.com/en/squads/f1eb9593/2017-2018/Forest-Green-Rovers-Stats) | 25.3 | 31.45 | 21 | 89 |
| 2018-19 | League Two | [FGR](https://fbref.com/en/squads/f1eb9593/2018-2019/Forest-Green-Rovers-Stats) | 24.7 | 34.19 | 5 | 73 |
| 2019-20 | League Two | [FGR](https://fbref.com/en/squads/f1eb9593/2019-2020/Forest-Green-Rovers-Stats) | 24 | 45.71 | 10 | 78 |
| 2020-21 | League Two | [FGR](https://fbref.com/en/squads/f1eb9593/2020-2021/Forest-Green-Rovers-Stats) | 24.4 | 29.4 | 6 | 74 |
| 2021-22 | League Two | [FGR](https://fbref.com/en/squads/f1eb9593/Forest-Green-Rovers-Stats) | 25 | 22.28 | 1 | 69 |
| **Totals** |  |  | **25.32** | **32.61** |  |  |

Table. 7. Coventry City, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | League One | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2012-2013/Coventry-City-Stats) | 25.4 | N/A | 13 | 57 |
| 2013-14 | League One | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2013-2014/Coventry-City-Stats) | 24.4 | N/A | 9 | 53 |
| 2014-15 | League One | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2014-2015/Coventry-City-Stats) | 23.7 | N/A | 17 | 61 |
| 2015-16 | League One | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2015-2016/Coventry-City-Stats) | 25 | N/A | 8 | 52 |
| 2016-17 | League One | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2016-2017/Coventry-City-Stats) | 23.7 | N/A | 23 | 67 |
| 2017-18 | League Two | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2017-2018/Coventry-City-Stats) | 25.2 | 23.64 | 6 | 74 |
| 2018-19 | League One | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2018-2019/Coventry-City-Stats) | 23.5 | 45.14 | 8 | 52 |
| 2019-20 | League One | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2019-2020/Coventry-City-Stats) | 24.6 | 31.49 | 1 | 45 |
| 2020-21 | Championship | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2019-2020/Coventry-City-Stats) | 25 | 32.12 | 16 | 36 |
| 2021-22 | Championship | [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2019-2020/Coventry-City-Stats) | 26.1 | 7.68 | 12 | 32 |
| **Totals** |  |  | **24.66** | **28.01** |  |  |

Table. 8. Yeovil Town, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | League One | [Yeovil Town](https://fbref.com/en/squads/bd5179b9/2012-2013/Yeovil-Town-Stats) | 24.7 | N/A | 4 | 48 |
| 2013-14 | Championship | [Yeovil Town](https://fbref.com/en/squads/bd5179b9/2014-2015/Yeovil-Town-Stats) | 24.5 | N/A | 24 | 44 |
| 2014-15 | League One | [Yeovil Town](https://fbref.com/en/squads/bd5179b9/2014-2015/Yeovil-Town-Stats) | 24.5 | N/A | 24 | 68 |
| 2015-16 | League Two | [Yeovil Town](https://fbref.com/en/squads/bd5179b9/2015-2016/Yeovil-Town-Stats) | 24.8 | N/A | 19 | 87 |
| 2016-17 | League Two | [Yeovil Town](https://fbref.com/en/squads/bd5179b9/2016-2017/Yeovil-Town-Stats) | 25.3 | N/A | 20 | 88 |
| 2017-18 | League Two | [Yeovil Town](https://fbref.com/en/squads/bd5179b9/2017-2018/Yeovil-Town-Stats) | 24.5 | 50.68 | 19 | 87 |
| 2018-19 | League Two | [Yeovil Town](https://fbref.com/en/squads/bd5179b9/2018-2019/Yeovil-Town-Stats) | 24.6 | 37.93 | 24 | 92 |
| 2019-20 | National League | Yeovil Town | 27.6 | N/A | 4 | 96 |
| 2020-21 | National League | Yeovil Town | 26.7 | N/A | 16 | 108 |
| 2021-22 | National League | Yeovil Town | 25 | N/A | 12 | 104 |
| **Totals** |  |  | **25.22** | **44.3** |  |  |

Table. 9. Notts County, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | League One | [Notts County](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 26.8 | N/A | 12 | 56 |
| 2013-14 | League One | [Notts County](https://fbref.com/en/squads/3b27de1f/2013-2014/Notts-County-Stats) | 25.4 | N/A | 20 | 64 |
| 2014-15 | League One | [Notts County](https://fbref.com/en/squads/3b27de1f/2014-2015/Notts-County-Stats) | 27.6 | N/A | 21 | 65 |
| 2015-16 | League Two | [Notts County](https://fbref.com/en/squads/3b27de1f/2015-2016/Notts-County-Stats) | 27.3 | N/A | 17 | 85 |
| 2016-17 | League Two | [Notts County](https://fbref.com/en/squads/3b27de1f/2016-2017/Notts-County-Stats) | 27.6 | N/A | 16 | 84 |
| 2017-18 | League Two | [Notts County](https://fbref.com/en/squads/3b27de1f/2017-2018/Notts-County-Stats) | 28.1 | 13.9 | 5 | 73 |
| 2018-19 | League Two | [Notts County](https://fbref.com/en/squads/3b27de1f/2018-2019/Notts-County-Stats) | 27.8 | 16.05 | 23 | 91 |
| 2019-20 | National League | [Notts County](https://fbref.com/en/squads/3b27de1f/2018-2019/Notts-County-Stats) | 27.8 | N/A | 3 | 95 |
| 2020-21 | National League | [Notts County](https://fbref.com/en/squads/3b27de1f/2018-2019/Notts-County-Stats) | 28 | N/A | 5 | 97 |
| 2021-22 | National League | [Notts County](https://fbref.com/en/squads/3b27de1f/2018-2019/Notts-County-Stats) | 25.9 | N/A | 5 | 97 |
| **Totals** |  |  | **27.23** | **14.97** |  |  |

Table. 10. Sunderland, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | Premier League | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 26.2 | N/A | 17 | 17 |
| 2013-14 | Premier League | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 26.5 | N/A | 14 | 14 |
| 2014-15 | Premier League | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 27.8 | N/A | 16 | 16 |
| 2015-16 | Premier League | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 27.3 | N/A | 17 | 17 |
| 2016-17 | Premier League | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 26.8 | N/A | 20 | 20 |
| 2017-18 | Championship | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 26.9 | 18 | 24 | 44 |
| 2018-19 | League One | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 26.4 | 15.4 | 5 | 49 |
| 2019-20 | League One | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 26.9 | 14.58 | 8 | 52 |
| 2020-21 | League One | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 27.4 | 12 | 4 | 48 |
| 2021-22 | League One | [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | 24.8 | 40.09 | 5 | 49 |
| **Totals** |  |  | **26.7** | **20.01** |  |  |

Table. 11. Oldham Athletic, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | League One | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2012-2013/Oldham-Athletic-Stats) | 23.6 | N/A | 19 | 63 |
| 2013-14 | League One | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2013-2014/Oldham-Athletic-Stats) | 24.1 | N/A | 16 | 60 |
| 2014-15 | League One | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2014-2015/Oldham-Athletic-Stats) | 25.4 | N/A | 15 | 59 |
| 2015-16 | League One | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2015-2016/Oldham-Athletic-Stats) | 24.9 | N/A | 17 | 61 |
| 2016-17 | League One | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2016-2017/Oldham-Athletic-Stats) | 26.1 | N/A | 17 | 61 |
| 2017-18 | League One | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2017-2018/Oldham-Athletic-Stats) | 25.9 | 34.15 | 21 | 65 |
| 2018-19 | League Two | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2018-2019/Oldham-Athletic-Stats) | 25.1 | 39.21 | 14 | 82 |
| 2019-20 | League Two | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2019-2020/Oldham-Athletic-Stats) | 26.1 | 28.01 | 19 | 87 |
| 2020-21 | League Two | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/2020-2021/Oldham-Athletic-Stats) | 25 | 33.87 | 18 | 86 |
| 2021-22 | League Two | [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/Oldham-Athletic-Stats) | 26.8 | 16.47 | 23 | 91 |
| **Totals** |  |  | **25.3** | **30.34** |  |  |

Table. 12. Wigan Athletic, 10-year Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **League** | **Team** | **Age** | **U23 %** | **Final Position** | **Pyramid Position** |
| 2012-13 | Premier League | Wigan Athletic | 27.7 | N/A | 18 | 18 |
| 2013-14 | Championship | Wigan Athletic | 27.3 | N/A | 5 | 25 |
| 2014-15 | Championship | Wigan Athletic | 27.7 | N/A | 23 | 43 |
| 2015-16 | League One | Wigan Athletic | 26.7 | N/A | 1 | 45 |
| 2016-17 | Championship | Wigan Athletic | 27 | N/A | 23 | 43 |
| 2017-18 | League One | Wigan Athletic | 25 | 11.48 | 1 | 45 |
| 2018-19 | Championship | Wigan Athletic | 25.3 | 26.52 | 18 | 38 |
| 2019-20 | Championship | Wigan Athletic\* | 26.7 | 16.44 | 23 | 43 |
| 2020-21 | League One | Wigan Athletic | 25.7 | 35.34 | 20 | 64 |
| 2021-22 | League One | Wigan Athletic | 27.7 | 7.67 | 1 | 45 |
| **Totals** |  |  | **26.68** | **19.49** |  |  |

Table. 13: Most Successful Clubs (2012–2022) Combined Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Team** | **Pyramid Positional Change** | **Age** | **U23%** | **Net Transfers** |
| [Luton Town](https://fbref.com/en/squads/e297cd13/2018-2019/Luton-Town-Stats) | 73 | 26.18 | 12.02 | £10,765,000 |
| [Lincoln City](https://fbref.com/en/squads/d76b7bed/2020-2021/Lincoln-City-Stats) | 47 | 25.44 | 27.85 | £585,000 |
| [Brentford](https://fbref.com/en/squads/cd051869/2013-2014/Brentford-Stats) | 34 | 24.55 | 29.56 | £66,975,000 |
| [FGR](https://fbref.com/en/squads/f1eb9593/2017-2018/Forest-Green-Rovers-Stats) | 33 | 25.32 | 32.61 | £862,000 |
| [Coventry City](https://fbref.com/en/squads/f7e3dfe9/2019-2020/Coventry-City-Stats) | 25 | 24.66 | 28.01 | £3,880,000 |
|  |  | **25.23** | **26.01** |  |

Table. 14: Least Successful Clubs (2012–2022) Combined Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Team** | **Pyramid Positional Change** | **Age** | **U23%** | **Net Transfers** |
| Yeovil Town | -56 | 25.22 | 44.3 | £135,000 |
| [Notts County](https://fbref.com/en/squads/3b27de1f/2018-2019/Notts-County-Stats) | -41 | 27.23 | 14.97 | -£250,000 |
| [Sunderland](https://fbref.com/en/squads/3b27de1f/2012-2013/Notts-County-Stats) | -32 | 26.7 | 20.01 | -£61,485,000 |
| [Oldham Athletic](https://fbref.com/en/squads/4a04a02b/Oldham-Athletic-Stats) | -28 | 25.3 | 30.34 | £630,000 |
| Wigan | -27 | 26.68 | 19.49 | £31,335,000 |
|  |  | **26.23** | **25.82** |  |

Table. 15: Quantity of Fee-Paying Transfers to Premier League or Championship Clubs (2017–2022)

|  |  |  |
| --- | --- | --- |
| **To** | **From** | **Quantity** |
| Premier League | League One or below | 8 |
| Premier League | EFL or below | 87 |
| Premier League | All competitions | 459 |
| Championship | League One or below | 63 |
| Championship | EFL or below | 145 |
| Championship | All competitions | 326 |
| PL & Championship | League One or below | 71 |
| PL & Championship | EFL or below | 232 |
| PL & Championship | All competitions | 785 |

Table. 16: A cumulative percentile chart of fee-paid transfers to Premier League & Championship Clubs from All Clubs

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Age** | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| **%** | 0 | 1 | 4 | 8 | 14 | 23 | 32 | 45 | 57 | 68 | 77 | 83 | 90 | 93 | 96 | 98 | 99 | 99 | 99 | 100 | 100 |

Table. 17: A cumulative percentile chart of fee-paid transfers to Premier League & Championship Clubs from EFL Clubs (or below)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Age** | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| **%** | 0 | 1 | 3 | 6 | 12 | 16 | 25 | 38 | 50 | 64 | 75 | 82 | 88 | 92 | 96 | 97 | 99 | 99 | 99 | 100 | 100 |

Table. 18: A cumulative percentile chart of fee-paid transfers to Premier League & Championship Clubs from League One Clubs & below

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Age** | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| **%** | 1 | 4 | 8 | 14 | 21 | 25 | 34 | 48 | 68 | 80 | 89 | 93 | 99 | 99 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

**Figures Captions**

Fig. 1: Correlation Between Average Age and Average UEFA Ranking Per League (2009-2017)

Fig. 2: Squad Age & Performance (2018-2020)

Fig. 3: UEFA Champions League Ages (1992–2018)

Fig. 4: League One, League Position vs Average Player Wages (2018–2021)

Fig. 5: Average Age Compared to League Position (2017–2022)

Fig 6: Average Age Compared to Total Points (2017–2022)

Fig 7: Average Age Compared to Above/Below Expectation (2017–2022)

Fig 8: Average Age Compared to Expected Goals (2019–2022)

Fig 9: Percentage of Minutes Played by U23 Compared to League Position (2017–2022)

Fig 10: Percentage of Minutes Played by U23 Compared to Total Points (2017–2022)

Fig 11: Percentage of Minutes Played by U23 Compared to Above/Below Expectation (2017–2022)

Fig 12: Percentage of Minutes Played by U23 Compared to Expected Goals (2019–2022)

Fig 13: Average Age by League Position (2017–2022)

Fig 14: Average Percentage of Minutes Played By U23 by League Position (2017–2022)

Fig. 15: Pyramid Positional Change of Most & Least Successful Teams (2012–2022)

Fig. 16: Quantity of Fee-Paying Transfers by Premier League & Championship Clubs to All Clubs (2017–2022)

Fig. 17: Quantity of Fee-Paying Transfers by Premier League & Championship Clubs to EFL (or Below) Clubs (2017–2022)

Fig. 18: Quantity of Fee-Paying Transfers by Premier League & Championship Clubs to League One or Below Clubs (2017–2022)

**Figures**

Fig. 1:

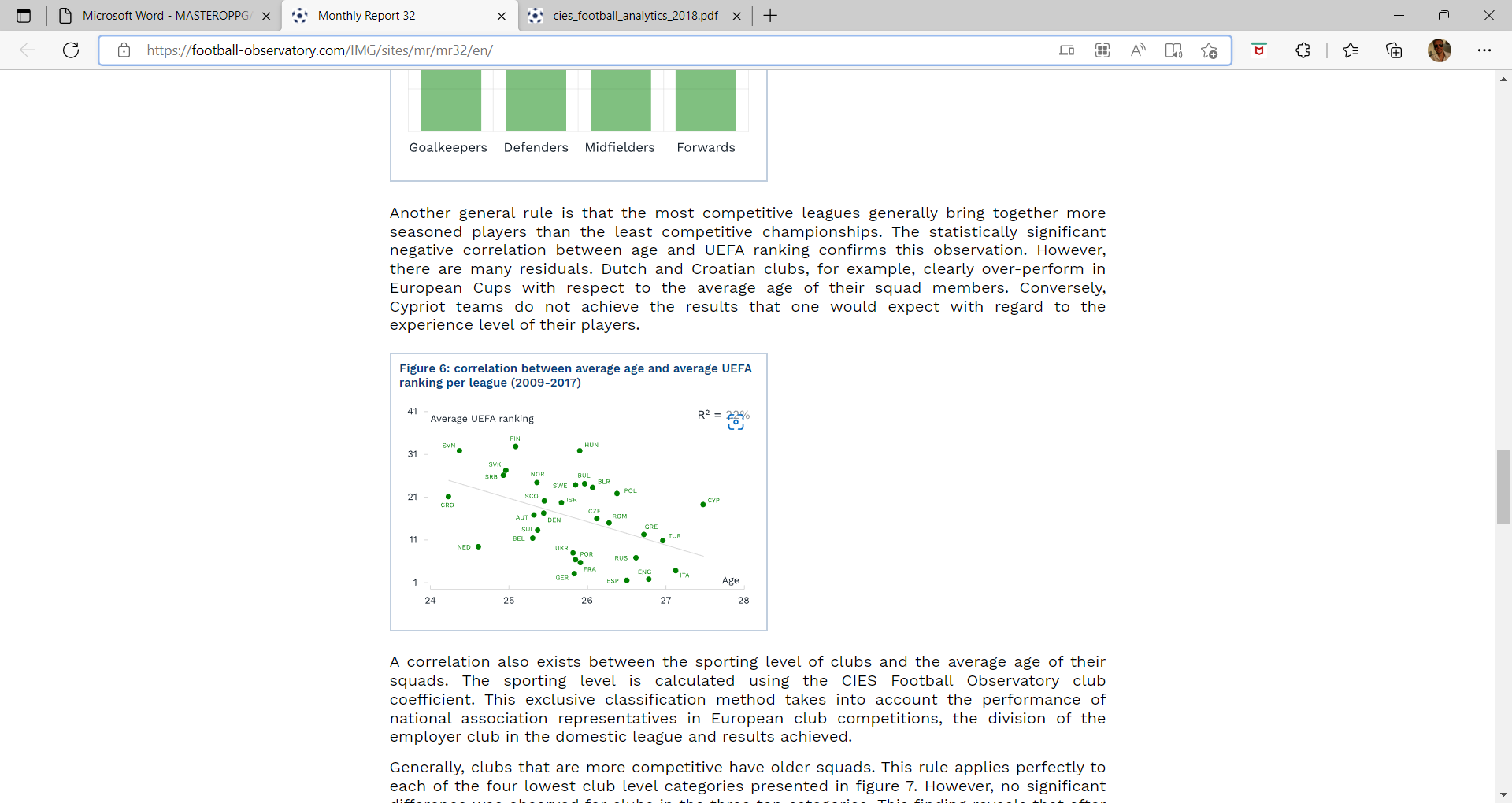


Fig. 2:

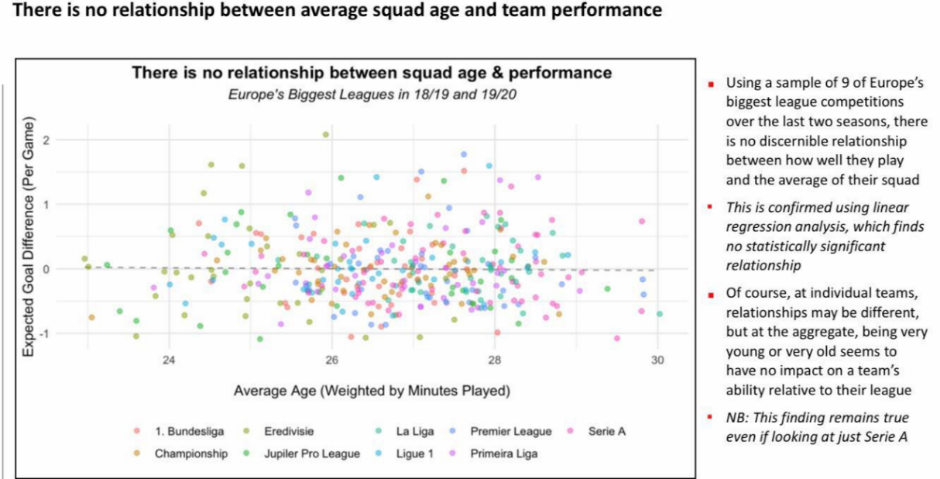


Fig. 3:

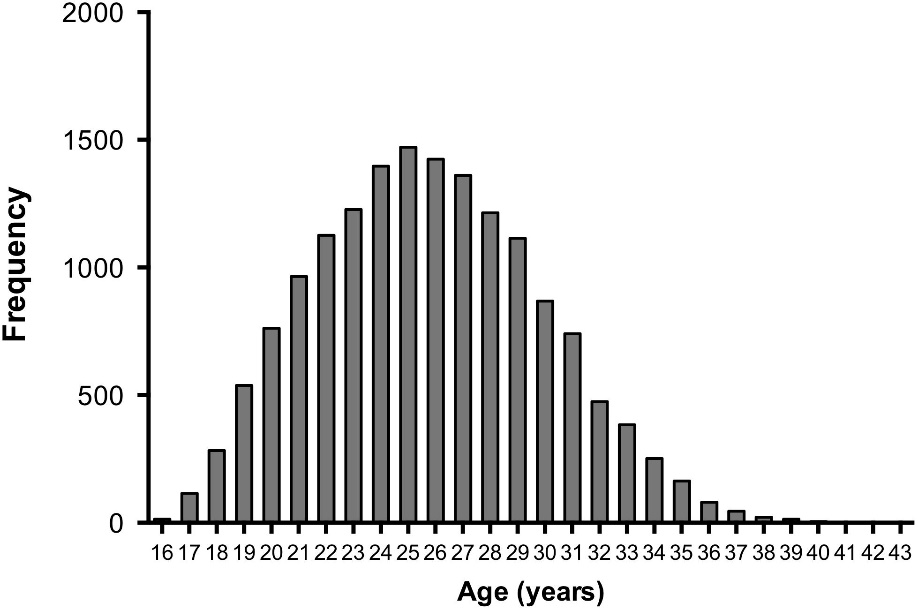


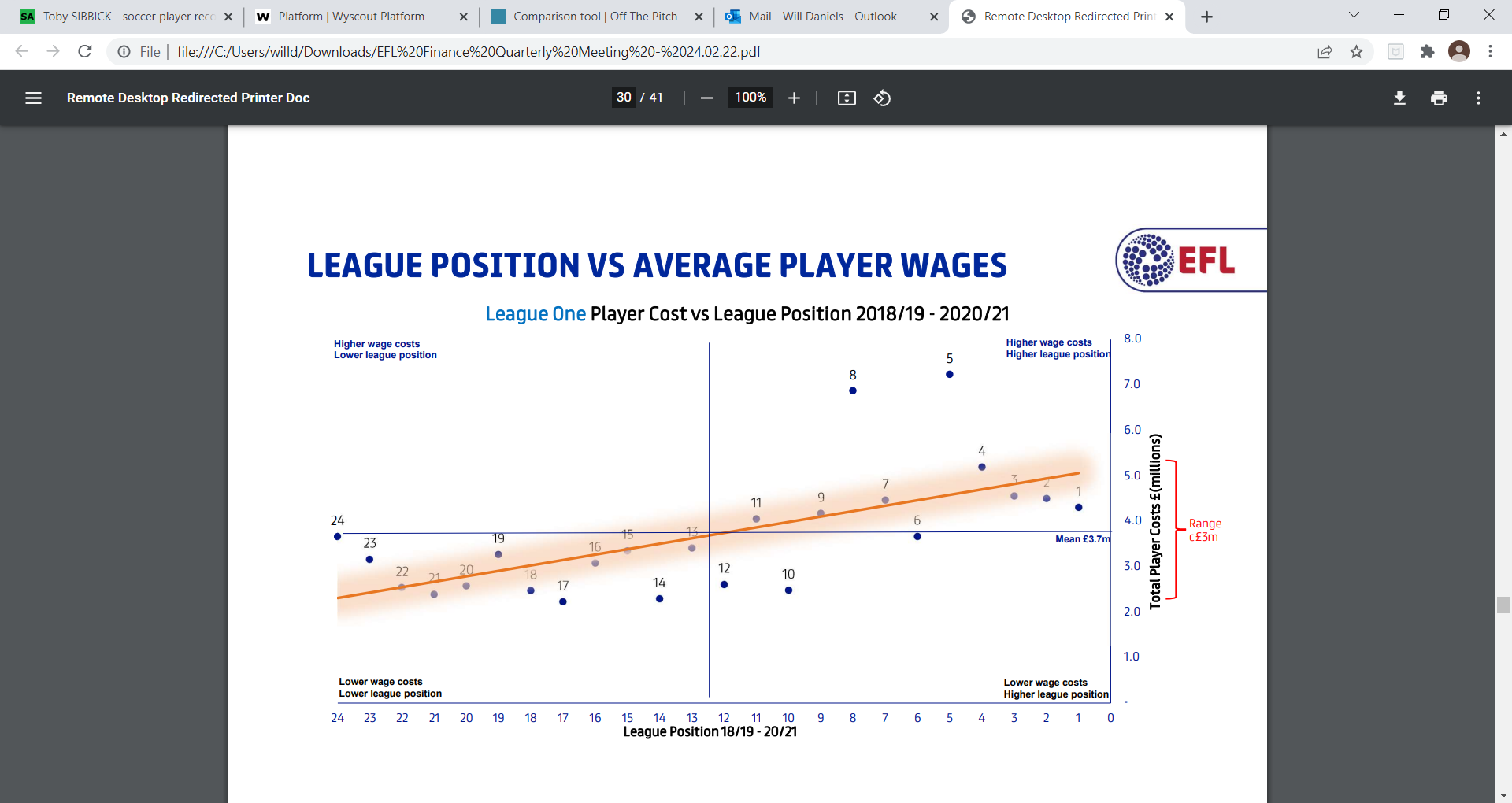
Fig. 4: 

Fig. 5:

Fig. 6:

Fig. 7:

Fig. 8:

Fig. 9:

Fig. 10:

Fig. 11:

Fig. 12:

Fig. 13:

Fig. 14:

Fig. 15:

Fig. 16:

Fig. 17:

Fig. 18: