The Impact of Sports Facilities on Well-Being in England

Ollie McSwiney
BSc (Hons) Economics
School of Economics
University of Kent, July 2025

Abstract

This dissertation investigated the relationship between sports facility access and well-being in England. Life satisfaction and anxiety levels were used as measures of well-being. While sports facilities may not improve well-being directly, they enable individuals to access the physical, mental, and social benefits of sports. Using data from the Active Lives Adult Survey and the ONS Sports Facilities dataset, OLS regressions were conducted, controlling for multiple demographic and socioeconomic factors. The results showed that a higher number of sports facilities per 10,000 people was associated with greater life satisfaction and lower anxiety. Further subgroup analysis differential effects among different age groups and genders. Notably stronger effects were found among males and adults aged 50-65, where it was found that the greater number of sports facilities per 10,000 people was associated with higher levels of life satisfaction and lower levels of anxiety. The findings estimated a total social welfare value of £212.4 billion, supporting the case for investment in sports infrastructure.

AI Statement

I acknowledge the use of generative AI in code development in this paper. However, the work reported remains my own.

Acknowledgements

I would like to thank my dissertation supervisor Irma Clots-Figueras for the valuable advice and guidance she provided me throughout this process.

Introduction

Well-being has become a prominent concern worldwide, and a key objective for policymakers is to maximise this. One common approach to improve well-being is to encourage physical activity. Physical activity and sport have been shown to increase well-being (Malm et al., 2019). To achieve this, sports facilities play a crucial role. Sports facilities are defined as open or enclosed spaces that are available for the use and enjoyment of the general public and are essential for promoting an active lifestyle among the population (Sport Madness, 2024). Despite the presence of sports facilities themselves not providing an increase in well-being, they can act as enablers. Sports facilities allow individuals to participate in physical activity and therefore realise the physical, mental, and social benefits that sports provide.

Existing research consistently demonstrates that engagement in sport enhances self-esteem, reduces anxiety, and strengthens social bonds (Liu et al., 2024; LSE, 2017). However, these studies focus on the benefits of sport participation, not the benefits of sports facilities. Without sufficient or accessible facilities, participation in sports could be limited, resulting in the benefits of sports not being fully maximised.

This dissertation aims to address this gap in research by empirically examining the relationship between sports facilities and well-being within England. The measures of well-being used are life satisfaction and anxiety levels, aligning with the government standards for policy appraisal (HM Treasury, 2021). Using nationally representative data, this research isolates the effect of sports facilities from other drivers of well-being by controlling for multiple demographic and socioeconomic factors.

Overall, understanding the impact sports facilities have on the well-being of individuals within England is valuable information for the UK Government and can have important implications for public policy. This dissertation can provide evidence to support investment in sports infrastructure as a tool to improve well-being in England.

Literature Review

Every day there are positive and negative emotions which contribute towards overall levels of an individual's happiness, or well-being. The World Health Organisation (WHO) (2021) defines well-being as an all-encompassing measure of quality of life and the ability of people and societies to contribute to the world with a sense of meaning and purpose. Well-being is not just the absence of disease or illness, it is a state of equilibrium or balance that can be affected by life events or challenges (Dodge et al, 2012).

Well-being can be assessed in different ways – both short term and long term. In the short term, individuals experience daily (and hourly) fluctuations in well-being, which can be assessed using ecological momentary assessment (EMA) and involves participants reporting their immediate experiences and emotions in real time, often multiple times throughout the day (Chen et al., 2024). However, in the long term, other measures are used. For example, life satisfaction, which is a cognitive and global assessment of one's overall quality of life, often seen as subjective (Malvaso and Kang, 2022). Another established measure used is anxiety score, which determines how anxious one is feeling about their general life. Therefore, EMA can be considered a flow of current feelings, whereas life satisfaction and anxiety score are a longer-term grade of an individual's total well-being.

Within this analysis, life satisfaction and anxiety score are used as a measure of individual well-being. These are a better representation of an individual's overall well-being, in addition to being common indicators considered by the government in the development of options and appraisal (HM Treasury, 2021), providing supporting evidence for policy-making decisions.

Drivers of Well-Being

Many factors can contribute to an individual's well-being. Every aspect of an individual's life influences their state of well-being. Researchers investigating happiness have found the following factors influence a person's well-being (James et al., 2021; Ni et al., 2019; Nohales et al., 2024):

- Friendships and relationships: A higher number of friends and socialising are thought to contribute positively to an individual's well-being.

- Physical and mental health: Disabled individuals report lower well-being levels than non-disabled individuals (ONS, 2019).

- Regular exercise: Exercise is a common way to improve well-being.

- Family size: A larger family may have a higher financial burden, leading to increased stress and anxiety.
- Gender: Males and Females go through different experiences which can impact well-being.

- Ethnicity: Different ethnicities face challenges that other ethnicities may not have to deal with, negatively impacting well-being.

- Time of the year: Seasonal depression can exist where individuals may have improved well-being in summer compared to winter.

- Income: Lower incomes are associated with poorer mental health and well-being (NIH, 2024).

- Age: As individuals get older, they may experience certain life changes that impact their physical and mental health (NIMH, 2023).

- Where you live: Different regions have varying living conditions and economic status which can impact well-being.

These factors will help determine what the control variables will be when running the regressions for this research. Covariates are included in the regression to control for other factors which may be correlated with satisfaction (i.e., omitted variable bias). Failure to control for these covariates may bias the coefficient of interest by invertedly confounding the impact of sports facility density and omitted variable bias.

Sports and Sports Facilities' Impact

The literature suggests that participation in physical activity directly impacts mental health, enhancing individuals' outlook and emotional state (Liu et al., 2024). Those who participated in sports prior to college reported higher levels of self-esteem and happiness compared to non-participants (Collins et al, 2018). An LSE study found those who play team sports also reported higher life satisfaction. The social aspects and psychological benefits of team membership, such as feelings of belonging and social identity, contribute to this effect (LSE, 2017).

Whilst the positive effects of sports are widely reported, studies regarding the impact of specifically sports facilities is lacking. This research aims to fill that gap.

Sports facilities can be open or enclosed spaces that are available for the use and enjoyment of the general public. Having public sports facilities is essential for promoting an active lifestyle among the population (Sport Madness, 2024).

Sports facilities have the ability to provide both physical and social benefits. Local sports clubs and activity groups also act as community hubs. They're places where people of different ages, cultures, and backgrounds, who may otherwise never meet, come together through a shared passion. This creates rising levels of social trust and a greater sense of belonging and community spirit (Sport England, 2024). This in conjunction with the physical and mental benefits make sports, as well as the facilities which enable sport, a major contributor to an individual's overall well-being.

Evidence from China also suggests that sports, along with sports facilities, are incredibly important for well-being. The State Council of China stated that physical health is a requirement for the promotion of the all-round development of people, a basic condition for economic and social development, and the common pursuit of the masses (Zhang et al., 2021). With sport playing such a large part in their lives, for both health and cultural reasons, this highlights the importance of sports facilities in enabling sport participation. Physical fitness was prioritised as a national strategy. The strategy proposed to utilise country parks, urban parks, public green space, and vacant urban places to build expansive sports facilities (Zhang et al., 2021). Sport is increasingly popular in China, where government has invested heavily in recent decades to become a world power in Olympic and other sports, and to improve public health (Project Play, 2024).

Related Literature

Similar to this research being conducted in England, Zhang et al. (2021) carried out a study in China looking at "The Influence of Community Sports Parks on residents' subjective well-being".

The results indicated that Community Sports Parks have positive effects on residents' subjective well-being (Zhang et al., 2021). The areas with Community Sports Parks had a higher well-being, showing that in the process of planning, construction, and transformation of the community, the ratio of sports facilities and related exercise facilities should be clearly defined (Zhang et al., 2021).

Zhang et al. (2021) control for other factors known to drive well-being, isolating the effect of Community Sports Parks on well-being. This proposed research will draw on their methodological approach, also controlling for drivers of well-being to best isolate the impact of sport facility density on life satisfaction and anxiety.

However, there were also some differences. Zhang et al. (2021) used general Subjective Well-Being (SWB). Subjective Well-Being is the degree to which residents make positive comments on their overall quality of life (F. Wang, 2016). Whereas this research will be using both life satisfaction and anxiety score to measure well-being, as these effects can be practically used to inform UK Government policymaking. Despite Zhang et al. (2021) finding conclusive results, this may not be applicable for the UK Government to use. The vast differences in culture, population and general living limit the transferability of these results. This presents the need for a similar study to be carried out within England.

Black et al. (2018) undertook a similar study in the UK – "The effect of school sports facilities on physical activity, health, and socioeconomic status in adulthood". The paper reinforced the benefits of physical exercise.

However, the results from this paper contrast the belief that investment in physical activity before adulthood may be particularly beneficial (Hallal, 2006). Black et al. (2018) find no evidence to suggest that attending schools with adequate sports facilities affects obesity or other key indicators of physical health, well-being, or economic outcomes (Black, 2018).

These differing outcomes could be explained by the differences in the research method. Black (2018) is only assessing the adequacy of sports facilities within schools, and the effect that has on later life, whereas Zhang et al. (2021) assessed the quantity of the facilities and their immediate impact. The results from Black (2018) also point to the idea that benefits are only anticipated where there is an undersupply of facilities. Increasing the supply of sport facilities where supply exceeds demand is unlikely to represent value for money.

These two papers show different methods of conducting the research, as well as other measures that could possibly be used to assess well-being.

Nevertheless, it leads to the overall question of how important are sports facilities in improving well-being among the residents of England? Whilst engagement with sport has been shown to have significantly and positively affected individual subjective well-being (Liu and Zhong, 2023), ensuring individuals have access to sport facilities is crucial in ensuring that these well-being benefits can be realised.

The existing literature has emphasised the significance of sports and sports facilities. However, there is a notable gap in research on sports facilities, particularly within England, which highlights the importance of addressing this question. The literature has also validated the selection of life satisfaction and anxiety score as the measure of well-being, as well as the choice of control variables to ensure the minimisation of external influences on well-being.

This reinforces the importance of this dissertation question—understanding the impact of sports facilities on well-being is critical information for policymakers.

Well-Being Valuation in Government Decision Making

Knowing the impact of the number of sports facilities on life satisfaction and anxiety scores is important for UK Government policymakers. Using life satisfaction figures, the Government are able to calculate a WELLBY value. WELLBY is a one-point increase in life satisfaction for one individual for one year (Frijters, et al., 2024). This enables the government to put a monetary value on the life satisfaction scores, giving a benefit to use in a cost-benefit analysis. The Green Book's official guidelines for policy analysis, using 2019 prices, values a one-point increase in WELLBY at £13,000 (HM Treasury, 2021). After adjusting this for inflation to 2024 prices, the value is £16,138 (Bank of England, 2025).

By quantifying the well-being benefits of sports facilities, policymakers can make more informed decisions about resource allocation and investment. This is the UK Governments structured approach to policy appraisal (HMT Green Book, 2024). This dissertation helps to provide insights on the monetary value of the well-being benefits, allowing these to be compared against any costs.

Data

This chapter will discuss the data which underpins the regression analysis which is used to explore the research question. The key data sources are the Active Lives Adult Survey and the Office for National Statistics Sports Facilities data. The selection of these datasets was based on their reliability, large-scale, and suitability for addressing the research question, and will be detailed below.

Data Sources

This research uses a combination of two primary datasets: the 2022/23 wave of the Active Lives Adult Survey and the 2021 Office for National Statistics (ONS) Sports Facilities Data. The Active Lives Adult Survey is a large-scale, nationally representative survey carried out by Sport England that records detailed self-reported information regarding physical activity, sports participation, and subjective well-being measures, the latter being particularly relevant for this dissertation. The subjective well-being acts as this study's dependent variables, and included:

- **Life Satisfaction:** *Overall, how satisfied are you with your life nowadays, where 0 is "not at all satisfied" and 10 is "completely satisfied"?*

- **Anxiety Level:** *On a scale where 0 is "not at all anxious" and 10 is "completely anxious", overall, how anxious did you feel yesterday?*

Respondents were required to rate their life satisfaction and anxiety levels on an eleven-point scale (from 0 to 10), where a higher score suggests higher levels of life satisfaction or greater levels of anxiety.

The Active Lives Survey is one of the largest datasets available for analysing physical activity and well-being in England. It is conducted by Sport England in collaboration with the UK government, ensuring a high level of representativeness. The 2022/23 iteration of the Active Lives Survey included responses from 177,000 individuals across England. Such large sample sizes ensured sufficient statistical power, and allowed for detailed sub-group analysis, for example exploring the extent to which there were differential effects between different genders and age groups. Furthermore, the survey follows standardised data collection methods, reducing response biases and ensuring comparability across different years (noting that time-series analysis is beyond the scope of this study). Life satisfaction and anxiety levels being measured align perfectly with this research focus, making the Active Lives Survey an ideal choice for assessing impacts on well-being.

The Active Lives Survey also contains a range of demographic and socioeconomic variables which can be utilised. Control variables were drawn from the Active Lives Survey, such as age, gender, disability status, number of children, ethnicity, education level, occupational classification, and region. These were incorporated into the regression analysis to account for potential confounding factors. The inclusion of these control variables in addition to the well-being measures (life satisfaction and anxiety level) make the Active Lives Adult Survey a suitable dataset for this well-being analysis.

The ONS Sports Facilities Data provides information on the number of sports facilities across England, broken down at the Middle Layer Super Output Area (MSOA) level[1]. To assess the impact of sports facilities on well-being, the key independent variable in this study is taken as number of sports facilities per 10,000 people (i.e. a measure of sports facility density). Using sports facility density as opposed to the absolute number of sports facilities per MSOA allows for a consistent comparison across different regions.

The ONS Sports Facilities Data is also a reliable and objective dataset. It accurately provides full details of the number of sports facilities in England to the public. As an official national database, ONS offers regularly updated records of facility distribution, therefore making it one of the most reliable sources available for measuring the public's access to sports facilities. The use of sports facility density also ensures that any differences in population across regions are accounted for, allowing for accurate and meaningful comparisons across the country.

The combination of these datasets enables the link between the dependent and independent variables to be established. With both datasets, validity and robustness are ensured. Using reliable data for this research was crucial for analysing the relationship between sports facility density and well-being, making these datasets well-suited for the purpose of this study.

Data Processing and Challenges

A key challenge with the two datasets arose when merging them. There was a difference in geographic aggregation levels. The ONS Sports Facilities Data was recorded at the MSOA level, and the Active Lives Survey only provided geographic identifiers at the Local Authority (LA) level. This discrepancy meant that the number of sports facilities per 10,000 people in each respondent's local authority was not known. This area level had to be consistent for this analysis, therefore it was necessary to aggregate up the MSOA data to LA level.

The following steps were undertaken to ensure geographic consistency across the dependent and independent variables:

- Step 1: Identifying MSOA level populations using UK 2021 Census data

[1] Typically contain around 5,000 to 15,000 individuals and between 2,000 to 6,000 households.

- Step 2: Multiplying the number of sports facilities per 10,000 people by MSOA populations to obtain total number of facilities.

- Step 3: Aggregate both facilities and population up to LA level.

- Step 4: Re-calculate the number of sports facilities per 10,000 people at the LA level by dividing number of sports facilities by number of 10,000's of each LA population.

Additionally, the size of the Active Lives Survey created computational challenges. The full survey responses data contained 10,468 variables across 177,000 individuals. The survey collected responses across a vast range of topics, and some of the questions contained significant levels of granularity (e.g. one variable for each sport). Similar issues were encountered for other questions (albeit to a less extent) e.g. for ethnicity and other demographic questions. This was problematic for two principal reasons:

- Firstly, there was an excessive number of variables that were redundant. Many variables contained overlapping or highly specific information that was not required for this analysis.

- Secondly, this led to computational constraints. With over 177,000 respondents in combination with over 10,000 variables, the full dataset for the survey was too large to be processed efficiently using the chosen coding software 'R' on a personal laptop.

To address these issues, the dataset had to be loaded into Stata using university computers[2]. The dataset was first examined for relevant variables, focusing on those related to well-being, demographics, and physical activity. Variables that were unnecessary for this study were removed, leaving only key variables required for the regression analysis.

This considerably reduced the dataset's size, while also maintaining all the necessary information. After exporting the final reduced dataset back into a format compatible for R, it could then be processed efficiently on a personal laptop for the regression analysis.

[2] Access to Stata is restricted to institutional use only so could not be used on a personal laptop.

Finally, another significant challenge with the datasets was again found within the Active Lives Survey data. There was a high proportion of missing responses in the well-being variables. Approximately 115,000 individuals (out of a total sample of 177,000) contained missing data for the subjective well-being questions. These missing responses were due to two reasons:

- Firstly, the survey design. Only half of the participants were asked the well-being questions.

- Secondly, some participants opted not to answer the questions related to their well-being.

As the well-being responses are critical to this analysis, participants with missing values for life satisfaction and anxiety were dropped from the dataset. This resulted in a final sample size of 62,545 respondents. While the data loss was substantial, the remaining sample remained large enough to ensure the reliability of this analysis (Memon, et al., 2020).

This structured approach to processing the data ensured that the datasets were consistent, reliable, and relevant for the upcoming regression analysis. With the challenges addressed, the research was equipped with the optimised dataset, allowing for accurate regression analysis to be carried out into the relationship between sports facility density and well-being in England.

Methodology

This chapter will outline the methods and techniques used to undergo the study, as well as describe the set-up of further analysis and diagnostic checks used. All OLS regressions and diagnostic checks were conducted using the statistical coding software 'R'.

Ordinary Least Squares (OLS) Regression

To evaluate the relationship between sports facilities and well-being in England, this research utilised an Ordinary Least Squares (OLS) regression model. OLS regression is a linear estimation method that aims to minimise the sum of squared residuals, resulting in a linear line of best-fit that identifies the marginal increase in the dependent variable for a unit increase in the independent variable. One major advantage of OLS is the ability to quantify the strength and direction of relationships between two variables, while also controlling for confounding factors (Verbeek, 2017).

The key outputs from the OLS regression model which were relevant to this research include firstly, the regression coefficients. These show the size and direction of the relationship between the independent variable and the dependent variables, i.e. the relationship between the number of sports facilities per 10,000 people and self-reported levels of life satisfaction and anxiety. Each coefficient represents the expected change in the dependent variable for a one-unit increase in the independent variable, assuming all other variables are held constant (Ali & Younas, 2021). It is expected that there will be a positive coefficient for life satisfaction, as sports facilities are expected to have a positive effect on an individual's life satisfaction. A negative coefficient was expected for anxiety, as the predicted positive impact on an individual would decrease the anxiety level.

Standard errors are also estimated, which measure the variability of the coefficient estimates. The larger standard errors, the more uncertain the estimates are. In this research, robust standard errors were used, to correct for any heteroskedasticity that was present. Heteroskedasticity is the non-constant variance of errors across observations. By using robust standard errors, the hypothesis test remains valid even if heteroskedasticity is present, therefore ensuring the reliability of the results. Any presence of heteroskedasticity was also confirmed through the BP test as described later.

These standard errors can be used to calculate p-values, which can be used to infer the statistical significance of variables. A p-value is probability of obtaining the value of the coefficient under the null hypothesis. This analysis uses the conventional level of p-values for statistical inference:

- A p-value below 0.01 shows strong evidence against the null hypothesis, meaning the relationship between sports facility density and subjective well-being is statistically significant. These are denoted with three asterisks (***)

- A p-value between 0.01 and 0.05 suggests moderate statistical significance. These are denoted with two asterisks (**).

- A p-value between 0.05 and 0.1 shows weak statistical significance. These are denoted with one asterisk (*).

- A p-value above 0.1 suggests the effect is statistically insignificant. Statistically insignificant results do not have an asterisk.

Two regression models were used for the analysis:

- Life Satisfaction = β_0 + β_1Sports Facilities + β_2Age + β_3Gender + β_4Disabled + β_5 Children + β_6Ethnicity + β_7Region + β_8Education + β_9NSSEC + β_{10}Month + ϵ

- Anxiety = β_0 + β_1Sports Facilities + β_2Age + β_3Gender + β_4Disabled + β_5Children + β_6 Ethnicity + β_7Region + β_8Education + β_9NSSEC + β_{10}Month + ϵ

The dependent variables in this study were life satisfaction and anxiety. Both of these are measured on a 0 to 10 scale, with a higher value meaning a greater life satisfaction or greater level of anxiety.

β_1Sports Facilities represents the key independent variable i.e. the number of sports facilities per 10,000 people. This is a continuous variable representing the density of sports facilities in each Local Authority. β_1 denotes the marginal impact on life satisfaction for a unit increase in the number of sports facilities per 10,000 people.

Control variables were also included. This isolates the effect of sports facilities on well-being, reducing omitted variable bias. By including these demographic, socioeconomic and temporal factors, their effect on well-being is accounted for. This helps to ensure that the estimated relationship between sports facilities and well-being is not bias by confounding factors. Multiple of these control variables were converted into dummy variables as a way to utilise them and be included in the regression model. The control variables chosen for were:

- Age (continuous variable): Well-being may naturally differ across different ages. Younger individuals could have higher anxiety due to social pressures, or older individuals may have a higher satisfaction due to financial freedom.

- Gender (binary variable: male = 0/female = 1): Men and women will commonly have different levels of well-being. Therefore, controlling for gender accounts for these differences and accurately records the impact of sports facilities.

- Disability (binary variable: does not have a disability = 0/has a disability = 1): Participants in the survey who have disabilities may face extra barriers in life, resulting in lower life satisfaction or increased anxiety.

- Children (continuous): Individuals with children might experience certain positive and negative emotions that those without children do not. Controlling for this factor confirms that these differences are not mistakenly attributed to sports facilities.

- Ethnicity (a binary variable for each of the six ethnic groups): Cultural and social differences between ethnic groups can affect well-being. Furthermore, ethnic minorities could face greater challenges and struggles, impacting their life satisfaction and anxiety.

- Region (a binary variable for each of the nine regions within England): Different regions in England have varied levels of infrastructure such as schooling and healthcare access, as well as differing economic conditions. Controlling for the region the participant lives in guarantees that the regression outcomes are not as a result of geographical differences.

- Education[3] (a binary variable for six qualification levels, denoting an individual's highest qualification): Education is a common link to factors such as income and employment opportunities. More educated respondents may have a higher income, potentially significantly impacting well-being.

[3] Education and occupation used as best indicator of socioeconomic class.

- NSSEC[3] (a binary variable for seven classifications of jobs): Similar to education, occupation status is commonly associated with income. Those in a higher-level job could have a greater well-being.

- Month (a binary variable for each month respondents completed the survey): An individual may record different levels of life satisfaction depending on the month they took the survey. Weather and financial pressures can affect both life satisfaction and anxiety.

A full breakdown of these control variables, including the dummy variables categories, can be found in **Appendix 1**.

Given that categorical variables were transformed into binary variables, the regression specifications needed to ensure that perfect multicollinearity did not arise. Perfect multicollinearity occurs when an independent variable is a perfect linear combination of other independent variables. In order to avoid this, one category from each group of dummy variables was omitted. By doing this, the model avoids the *'dummy variable trap'*. The chosen omitted categories were:

- Female omitted from gender.
- Asian excluding Chinese omitted from ethnicity.
- North East omitted from region.
- Level 4 and above omitted from education level.
- NSSEC 1-2 omitted from occupational classification.
- December omitted from month of survey

Diagnostic Checks

Firstly, the R-squared value can be used as a robustness check. The R-squared value indicates the proportion of variance in the dependent variable that is due to the independent variable (and control variables if used). A higher R-squared value would portray that the model has high explanatory power.

Several further diagnostic tests were run on the models to ensure the robustness and reliability of the regression results. The tests aimed to explore threats to the underlying assumptions of OLS, specifically potential issues of heteroskedasticity and multicollinearity.

First, the Breusch-Pagan (BP) test was conducted. The BP test is a statistical method used to detect heteroskedasticity in regression models. Heteroskedasticity refers to the situation where the variance of the error terms in a regression model is not constant across all levels of the independent variables (Hahn & Shi, 2021; Lee, 2025). This can lead to inefficient estimates and biased standard errors, which would also lead to incorrect p-values.

The null hypothesis of the BP test is that there is homoskedasticity (constant variance of the error term), and the alternative hypothesis is the presence of heteroskedasticity. If the null hypothesis is rejected (i.e. the test returns a p-value less than 0.05), then it indicates that there is heteroskedasticity within the error structures.

If heteroskedasticity was to be detected, then this research's use of robust standard errors would be validated. Robust standard errors correct for heteroskedasticity and allow for more reliable estimates of the standard errors. Overall, this test is valuable in ensuring appropriate statistical inference from the OLS regression in that the standard errors and interpretation of statistical significance are not incorrectly affected by unequal variance across observations.

Secondly, the Variance Inflation Factor (VIF) test was used. The VIF test is used to detect multicollinearity in regression models. It quantifies how much the variance of a regression coefficient is inflated due to correlation among the independent variables (PennState, 2018). This can lead to unstable estimates of regression coefficients, inflated variance of these estimates, and difficulties in interpreting the results – which is particularly problematic if multicollinearity affects the key independent variable of interest. Multicollinearity can make it challenging to determine the individual effects of variables (Kim, 2019).

Following common practice, a VIF value of less than 5 means no multicollinearity, a value between 5 and 10 has some concern, and a value of greater than 10 indicates high multicollinearity.

This VIF test can be used to confirm whether or not the process of omitting dummy variables to avoid multicollinearity was successful.

The combination of the BP test and the VIF test ensured that any presence of heteroskedasticity and multicollinearity within the regression model was known and able to be corrected for. By applying these two tests, the robustness and reliability of the model's estimates are strengthened, allowing for more accurate results for the impact of sports facilities on well-being in England.

Subgroup Analysis

In addition to the already stated regression analysis, further regressions were undertaken on different subgroups to gain further insights into the impact of sports facilities on well-being. This allowed for a deeper understanding of the varying effects across key demographic groups within England.

Firstly, separate OLS regressions were conducted for males and females. A regression was run using only the males in the survey, and then a regression was run using only the females in the survey. This approach gave an outlook of whether the relationship would differ between the men and women. By running separate regressions, different coefficient values and R-squared values were calculated, allowing the possibility to make a comparison between the two genders.

Finally, separate OLS regressions were then carried out for different age groups, to explore how the impact of sports facilities changes across different life stages. The age groups were:

1. $17< x \leq 22$: The youngest group, primarily thought of as 'Students'.

2. $22< x \leq 35$: Represents 'Early Career'. The age where generally you may be beginning your career.

3. $35< x \leq 50$: Classed as 'Mid-Career'. Established within their job, likely balancing work and family responsibilities.

4. 50< x ≤ 65: Individuals approaching the end of their career. Thought of as 'Late Career'.

5. 65+[4]: A general age for 'Retired'.

Each age group regression was conducted using only respondents within the respective age range.

Results

This section displays the key results from the OLS regressions and the diagnostic checks. Full results are visible in Appendix 2, 3, 4 and 5. This section presents only the results, the next section launches a discussion and policy implications.

Summary Statistics

Prior to conducting the regression analysis, summary statistics of the key variables were collected. This helped to develop an understanding of the distributional properties of the number of sports facilities per 10,000 people, life satisfaction, and anxiety.

Table 1: Summary Statistics

Variables	Observations	Mean	Median	Standard Deviation	Minimum	Maximum
Sports Facilities per 10,000	309	18.02	16.99	6.78	5.70	111.80
Life Satisfaction	62,545	7.01	7.00	2.06	0.00	10.00
Anxiety	62,545	3.49	3.00	2.88	0.00	10.00

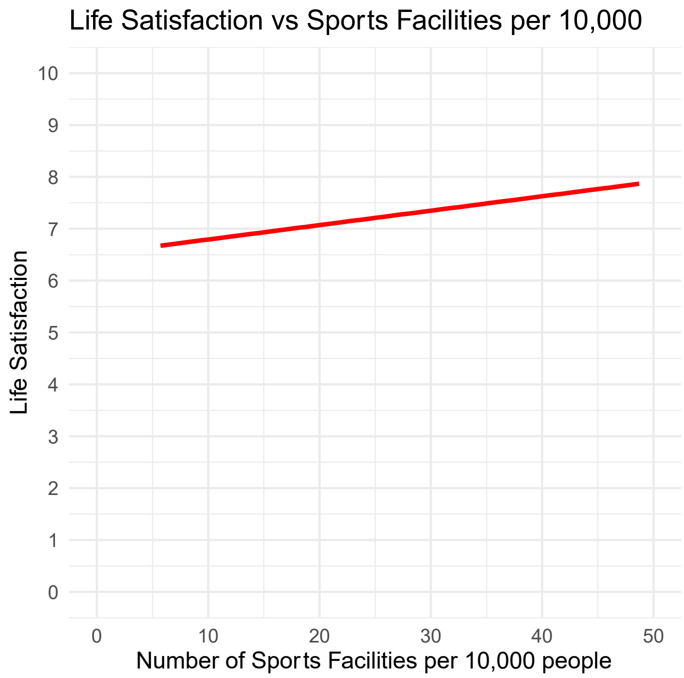
[4] The age range was 17-95, therefore '65+' is 65-95.

The mean number of sports facilities per 10,000 people is 18.02, with a median of 16.99. This indicates a slight skew towards higher values. The large range of 106.1 highlights the regional disparities in the number of sports facilities per 10,000 people in each Local Authority.

For life satisfaction, the mean is 7.01, and a similar median of 7.00. This suggests that there is relatively symmetrical distribution of life satisfaction. Anxiety, however, has a mean of 3.49, but also has a higher standard deviation than life satisfaction of 2.88, showing that there was a greater variation in the anxiety levels recorded.

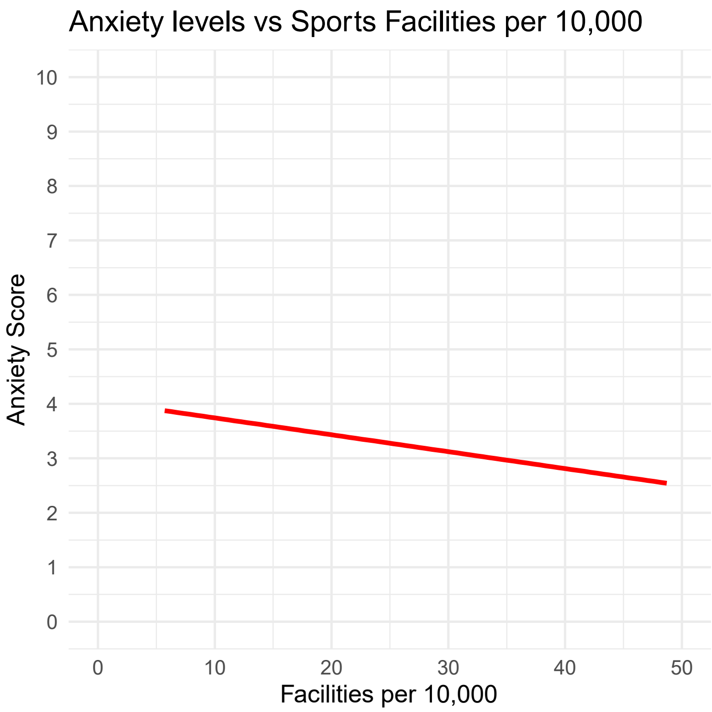
To further explore the initial relationship between sports facility density and well-being, graphs were constructed – one with life satisfaction as the dependent variable, and one with anxiety as the dependent variable.

<u>Graph 1: Correlation of Number of Sports Facilities per 10,000 people and Life Satisfaction</u>



As shown in the above graph[5], the scatter plot suggests a positive correlation between sports facility density and life satisfaction. This implies that areas with a higher number of sports facilities per 10,000 people are correlated with higher levels of self-reported life satisfaction.

Graph 2: Correlation of Number of Sports Facilities perm 10,000 people and Anxiety Score



As seen in this graph, there was a negative correlation between sports facility density and anxiety levels. This indicates that as the number of sports facilities per 10,000 people increases, the anxiety level in that area tends to be lower.

However, these results only show correlation – not causation. They are useful as an initial exploration of the relationship but do not explain the direct impact that sports facilities have.

[5] For the scatters, a sample of 100 was taken. The regression line was based off the whole dataset.

Regression Results

To effectively examine the impact of the number of sports facilities per 10,000 people on life satisfaction and anxiety, OLS regressions were performed. OLS regressions allow for other factors which may drive well-being to be controlled. Regressions were performed firstly without controls, and then with controls. Key results from both are presented in the following table:

Table 2: OLS Regression Key Results

	Life Satisfaction	**Life Satisfaction**	**Anxiety**	**Anxiety**
Coefficient (Facilities per 10,000)	0.0213*** (0.00112)	0.0136*** (0.00235)	-0.0286*** (0.00169)	-0.0139*** (0.00186)
R^2	0.0049	0.09	0.0046	0.083
Controls	No	Yes	No	Yes
Observations	62,545	62,545	62,545	62,545

Note: Refer to ***Appendix 1*** *for the controls used. Refer to* ***Appendix 2*** *for full regression results.*

In the model without controls, each additional sport facility per 10,000 people is associated with an increase in life satisfaction of 0.0213 points, statistically significant at the 99% confidence level. Furthermore, each additional sport facility per 10,000 people is associated with a decrease in anxiety of 0.0286 points, statistically significant at the 99% confidence level.

However, after the controls were added into the regression model, the results changed. When accounting for the control variables, each additional sports facility per 10,000 people is associated with an increase in life satisfaction by 0.0136 points, statistically significant at the 99% confidence level. Each additional facility per 10,000 people is also associated with a decrease in anxiety of 0.0139 points, statistically significant at the 99% confidence level.

For life satisfaction, the R-squared value went from 0.0049 up to 0.09 once controls were added, and for anxiety the R-squared value went from 0.0046 to 0.083. This demonstrates that the control variables used appropriately model the variation in well-being effects.

Diagnostic Checks Outcomes

These tests in combination with the use of robust standard errors give confidence that the underlying assumptions of OLS are met.

Breusch-Pagan (BP) Test

Firstly, the BP test was conducted to examine whether heteroskedasticity was present in the models.

Table 3: Breusch-Pagan Test Results

	Life Satisfaction	Life Satisfaction	Anxiety	Anxiety
Controls	No	Yes	No	Yes
BP Test Statistic	94.658***	1886.9***	24.107***	533.7***
Degrees of Freedom (df)	1	40	1	40
Observations	62,545	62,545	62,545	62,545

In all of the models, the null hypothesis of homoskedasticity was strongly rejected – suggesting the presence of heteroskedasticity within the errors. This provides clear evidence that the use of robust standard errors is justified and necessary, in order to adjust for non-constant variance in residuals and improve the interpretation of the results.

Variance Inflation Factor (VIF) Test

Secondly, the VIF test was conducted to check for multicollinearity among explanatory variables. All VIF values were below 5, meaning that no serious multicollinearity issues exist. Refer to **Appendix 3** for the full values.

Subgroup Analysis Outcomes

Additional OLS regressions were conducted on the two genders and five different age groups. This is looking for differential effects across both gender and age. The same controls as previously described were used.

Gender

To further investigate the impact of sports facilities density on well-being, further regressions were estimated using firstly only the male respondents, and secondly only the female respondents.

Table 4: Gender OLS Regression Key Results

	Male	**Female**
Life Satisfaction: Coefficient (Sports Facilities per 10,000)	0.145*** (0.00332)	0.0125*** (0.00330)
Life Satisfaction: R^2	0.09	0.097
Anxiety: Coefficient (Sports Facilities per 10,000)	-0.0156*** (0.00217)	-0.0120*** (0.00270)
Anxiety: R^2	0.07	0.079
Observations	27,434	35,072

*Note: Same controls as seen in **Appendix** 1 were used. Refer to **Appendix 4** for full values.*

These results show that Males have a significantly stronger positive relationship between sports facility density and life satisfaction (β = 0.145) than females (β = 0.0125). Therefore, an increase in the number of sports facilities per 10,000 people is likely to have a more positive impact on life satisfaction for males than females.

However, the difference in the coefficient for anxiety is much smaller. Males have a slightly stronger negative relationship (β = -0.0156) compared to females (β = -0.0120). This shows that males experience a slightly larger reduction in anxiety due to an increase in the number of sports facilities per 10,000 people than females.

Both relationships were highly significant at the 99% confidence level, showing that across both males and females there are positive benefits to sports facilities.

Age

OLS regressions were run on the different age groups. The results are presented below.

Table 5: Age Groups OLS Regression Key Results

	17< x ≤ 22	22< x ≤ 35	35< x ≤ 50	50< x ≤ 65	65+
Life Satisfaction: Coefficient (Sports Facilities per 10,000)	0.0166** (0.00555)	0.00766** (0.00242)	0.00771*** (0.00175)	0.0133*** (0.00308)	0.00775** (0.00270)
Life Satisfaction: R^2	0.06	0.08	0.09	0.10	0.06
Anxiety: Coefficient (Sports Facilities per 10,000)	-0.0167* (0.0769)	-0.0161*** (0.00367)	-0.0156*** (0.00303)	-0.0158*** (0.00308)	-0.00404 (0.00441)
Anxiety: R^2	0.07	0.06	0.045	0.045	0.0038
Observations	4,521	12,118	16,532	17,188	14,502

*Note: Same controls as seen in **Appendix 1** were used. Refer to **Appendix 5** for full values.*

There is a positive effect seen across all age groups indicating that higher levels of sports facilities per 10,000 people are associated with greater levels of life satisfaction. The strongest relationship between sports facility density and life satisfaction was in the 50-65 age group (β = 0.133), while the weakest was in the 22-35 age group (β = 0.00766)

Similarly, there is also a beneficial effect seen across all age groups for anxiety levels. The strongest relationship for anxiety was in the 17-22 age group (β = -0.0167), while the weakest was in the 65-95 age group (β = -0.00404) where the effect was also statistically insignificant.

These results demonstrate that the impact of sports facilities vary across different demographics, which will be further explored in the Discussion section of this research.

Discussion

This section discusses the interpretation of the above results, and the impact this may have on policy makers.

Interpretation of Regression Results

The regression results show a clear positive and statistically significant relationship between sports facility density and life satisfaction. In the model without controls, the coefficient was 0.0213. This reveals that for every additional sports facility per 10,000 people, there will be an increase in life satisfaction by 0.0213 points. This demonstrates that higher levels of sports facilities per 10,000 people are associated with higher levels of life satisfaction.

Even once control variables were introduced to the model, the outcome was similar. The coefficient decreased to 0.0136 but remained highly significant. This shows that even after accounting for differences in age, gender, ethnicity, region, education, occupation, and month of survey, a greater number of sports facilities still resulted in a higher life satisfaction score being reported. The addition of the controls also increased the R-squared value from 0.0049 up to 0.09, showing that the model's explanatory power had increased. This means that 9% of the variation in life satisfaction can be explained by the model.

These findings contribute to UK Government policy decisions, advocating for investment in sports facilities. This would not only benefit the physical health of individuals, but also have a positive effect on how they view their overall happiness and life satisfaction.

There was also a meaningful outcome in regard to anxiety. The regressions found a negative and statistically significant relationship between sports facility density and anxiety level. The coefficient of -0.0286 in the uncontrolled model suggested that an increase of one sports facility per 10,000 people would result in a 0.0286-point decrease in anxiety. Similarly to life satisfaction, once controls were added this slightly decreased to -0.0139. The relationship remains significant and indicates that greater densities of sport facilities are associated with lower levels of anxiety. This aligns with the belief that access to sports facilities can help play a role in reducing stress and other mental health concerns, by encouraging social interaction and physical activity.

The R-squared value increased once controls were added, from 0.0046 to 0.083. This shows that once demographic and socioeconomic characteristics are accounted for, the model becomes much more explanatory – as 8.3% of the variation in anxiety is explained by the model.

The results for both life satisfaction and anxiety together provide strong evidence that the number of sports facilities provides a clear benefit to mental well-being. As the number of sports facilities rises, individuals tend to feel happier about their overall lives and experience lower levels of anxiety.

While the results demonstrated a strong positive association between sports facility density and well-being, it is important to recognise the potential for endogeneity. Reverse causality could exist if areas with higher initial levels of well-being are more likely to invest in sports infrastructure. As this dissertation does not address endogeneity directly, the results should be interpreted as correlational rather than causal.

Social Welfare Value

The regression results can also be used to estimate the value of the social welfare benefits of sports facilities. In this research, a monetary valuation was carried out using the WELLBY framework. A WELLBY is a one-point increase in life satisfaction for one individual for one year (Frijters et al., 2024). This approach converts changes in well-being into monetary terms, resulting in a social value measure that can be compared against the cost of public investment.

- Step 1: The calculations began with the coefficient of the controlled model for life satisfaction (0.0136), which represents the gain in life satisfaction from one additional facility per 10,000 people. This value was multiplied by the number of sports facilities per 10,000 people in each Local Authority (LA), which gave the WELLBY per person per number of sports facilities per 10,000 people for each LA.

- Step 2: However, as this was still in “per 10,000”, this had to be scaled up. The WELLBY per person was multiplied by the population of each LA (in 10,000s) to estimate the total WELLBY value from sports facilities in each LA.

- Step 3: Next, a monetary value was applied using the Green Book's official guidelines for policy analysis. Using 2019 prices, the UK Government value a one-point increase in WELLBY at £13,000 (HM Treasury, 2021). After adjusting this for inflation to 2024 prices, the value is £16,138 (Bank of England, 2025). By multiplying the total WELLBY per LA by £16,138, each LA has a monetary value for how much their WELLBY from sports facilities is valued at.

- Step 4: Summing the values across all LAs produced a total national social welfare value of £212.4 billion, with an average of £4,173 per person.

This result highlights the significant impact that sports infrastructure has on society. This goes beyond the economic outcomes included in a traditional cost-benefit analysis, rather this captures the emotional and psychological benefits that sports facilities provide to individuals in England. This large monetary value is due to well-being benefits solely. Knowing sports facilities are so valuable can be vital information to use as a key instrument to improve national welfare.

The social welfare value of £212.4 billion provides a meaningful tool for policymakers. It allows sports facility provision to be directly compared to other forms of public spending and supports the claim that investing in sports infrastructure in communities will result in positive outcomes – not only in physical health but in mental well-being and quality of life.

Interpretation of Subgroup Results

Gender Outcomes

The results for the sub-group analysis between genders revealed a large disparity between males and females for the effect of sports facilities on life satisfaction. For males, the coefficient was 0.145 – over 10 times larger than the female coefficient of 0.0125. This shows that men experience much greater improvements in life satisfaction when the number of sports facilities increase.

There are multiple possible explanations for this difference. Firstly, men may use the sports facilities more often. It is generally more common for males to participate in sports from a young age (Emmonds et al., 2023), ultimately leading to them perhaps utilising the available sports facilities more as they get older. Furthermore, it may also be due to women feeling uncomfortable using public sports facilities (Cowley & Schneider, 2025), so may tend to avoid using them, meaning they are not able to fully realise the benefits of participating in sport. Finally, it is possible that current facility types and layouts are unintentionally tailored towards male preferences, limiting female engagement.

This gender gap is very important. It suggests that current sports infrastructure may not be serving both genders equally. The gender gap suggests that male's value access to sports facilities more than females. Therefore, if the government is seeking to maximise its return on investment, it should focus funding and interventions on male provision. However, this is not ethical. Despite an investment towards males resulting in the largest return on investment, the government also aim for equality. If policymakers aim to maximise national well-being for everyone, then they must consider how to increase engagement with sports facilities for women.

For anxiety, the difference was not as drastic. The male coefficient was -0.0156, compared to -0.0120 for females. While both coefficients are significant and negative, males benefit slightly more with a greater reduction in anxiety levels as a result of an increase in sports facilities.

This could again suggest that women may face barriers when it comes to accessing sports facilities. For example, safety concerns. These could prevent women from fully utilising sports facilities and realising the full mental health benefits. If policymakers found a way to increase female sports facility usage, then there would also be a decreased burden on the NHS, as sports facilities can enable participants to realise the full physical and mental well-being benefits of sports.

Both life satisfaction and anxiety showing stronger results for males highlights a clear inequality in outcomes. The results suggest a trade-off between value for money in policies and ensuring equity in access between males and females. These findings can be useful going forward for policymakers, as discussed later in this research.

Age Outcomes

The 50-65 age group had the highest coefficient (0.0133), suggesting that individuals in their 'late career' gained the most benefit from a greater number of sports facilities per 10,000 people. This may be because as individuals approach this age in their life, they may have more financial freedom and more free time which can allow them to increase their participation and usage of the sports facilities.

The lowest life satisfaction coefficient was in the 22-35 age group (0.00766). This implies that individuals in their 'early career' benefit the least from an increase in sports facilities. This could be as individuals are in this age range, they may be just starting out their careers and families, so do not have as much time or financial freedom to fully realise the benefits of sports facilities.

These differences are important because they demonstrate that the life satisfaction gains from sports facility investment would not be evenly distributed across the population. This poses the trade-off to the government. They could aim to maximise their investment through the largest coefficient and target the 50-65 age group, or they could aim for equality and seek to increase engagement among younger adults.

The largest reduction in anxiety was seen in the 17-22 age group (-0.167), suggesting that 'students' experience the biggest fall in anxiety levels as a result of a higher number of sports facilities. The facilities and physical activity may be used as a valuable outlet to relieve stress from the pressures of university or school. Furthermore, this age group would have the highest use of social media (Vogels et al., 2022), so using sports as a way to detach yourself from the pressures of social media may also be another reason why 'students' experience the greatest benefits in anxiety levels.

The weakest effect was in the 65+ age group (-0.00404). The result was also statistically insignificant. This could reflect lower usage rates of the sports facilities amongst 'retired' individuals, possibly due to mobility or other health issues that prevent them from being fully able to participate in sports (Stenner et al., 2020). Or it could also signify that the 65+ age group have no benefit to their anxiety level as a result of an increase in the number of sports facilities per 10,000 people.

These outcomes highlight the dilemma the government face when considering policies targeted to sports facilities. The OLS regressions estimated the coefficients, where the larger coefficients signifies where money should be invested to result in the greatest return. However, this would raise an equity issue. Maximising returns by investing into the groups with the highest coefficients would exclude the other groups who already do not benefit as much from an increase in the number of sports facilities per 10,000 people.

Policy Implications

The findings of this study can provide for policymakers within the UK Government. There is evidence of significant social welfare benefits associated with access to sports facilities providing a rationale for investment in sports infrastructure. The total social welfare value of £212.4 billion, and average of £4,173 per person, show that the well-being gains from sports facilities are not only meaningful, but also have the potential to outweigh the cost of the public spending. These figures can be used to support funding allocations targeted at ensuring access to sports facilities across the country.

Not only should policies focus on the expansion of sports facilities, but also on making them more inclusive. The results show that males currently benefit more than females. Investment and strategies should be directed towards increasing female usage of sports facilities, which ultimately would allow them to realise the benefits of sports. This could be addressed by ensuring that women feel welcome, safe, and willing to participate in more sports.

Similarly, tailored initiatives are needed for age groups that currently experience lower benefits from sports facilities. For the 22–35 age group, strategy could focus on affordability, flexible access, or location nearer to workplaces and homes. For older adults, policies could promote low-impact activities and accessibility. This will ensure the older age groups can still use the sports facilities and take part in physical activity even if they have any health conditions.

These strategies should be integrated into plans to improve health, social care, and urban planning. Although these strategies may not be seen as optimal in a cost benefit analysis, they would increase equality and in the long run allow for future investments to be beneficial for everyone. Sports facilities should not be viewed as leisure assets or luxuries – they should be seen as an important tool to improve an individual's well-being. By improving the nations physical and mental health, the burden on the NHS and other health services may also decrease. This decreased burden on the NHS would also lead to further benefits that are not mentioned in this report, but should be considered in a full cost benefit analysis.

Overall, this research provides strong evidence that sports infrastructure is a powerful public good. Greater levels of sports facility density are associated with greater levels of life satisfaction and lower levels of anxiety, controlling for other factors.

Limitations and Future Research

While this dissertation provides evidence of a positive association between sports facilities and well-being, several limitations must be acknowledged.

Firstly, the analysis is correlational rather than causal. Although the results suggest that higher access to sports facilities is linked to improved life satisfaction and reduced anxiety, this does not state whether increasing the number of sports facilities per 10,000 people would cause well-being to rise. More advanced econometric methods (e.g. the use of panel data methods such as fixed affects regressions) and higher quality data (e.g. person-level panel data rather than area level repeated cross sections) would likely be required to begin to understand the causal relationship.

The second limitation was interpreting the coefficients. A low coefficient may be due to barriers described in this study such as accessibility or safety, or it could reflect smaller well-being benefits from sports facility access. Distinguishing between these possibilities is not possible within the scope of this study but could be an important avenue for future research.

Thirdly, the goals of the UK Government policies are uncertain. This research assumed a focus on maximising equality by targeting the groups with the lowest coefficients. However, policymakers may prioritise achieving the greatest return on investment, which would focus investment on the groups with the highest coefficients. The UK Government therefore needs to consider the trade-off between return on investment and equity in its spending decisions.

Conclusion

This dissertation has explored the impact of sports facilities on well-being in England, using life satisfaction and anxiety level as key measures. The findings displayed evidence that greater access to sports facilities is associated with higher levels of life satisfaction and lower levels of anxiety, controlling for demographic and socioeconomic factors. This reaffirms that sports facilities create opportunities for physical activity and social engagement.

Further subgroup analyses revealed important differences across age and gender. Males experience a significantly stronger positive relationship between sports facility density and life satisfaction compared to females, suggesting barriers may exist which limit the ability of women to fully realise the benefits of sports participation. Similarly, adults in the late stage of their careers (aged 50-65) experience the strongest relationship between sports facility density and life satisfaction, while younger adults (aged 22-35) benefit less. Anxiety reductions were more significant among younger individuals (aged 17-22), showing the potential of sports participation to alleviate stress.

The overall social welfare value of sports facilities was estimated to be £212.4 billion. This highlights their large contribution to national well-being. These results emphasise that investment in sports infrastructure does not only provide physical health benefits, but is a broader societal good, capable of improving mental well-being.

Policymakers should not only focus on expanding sports facilities, but also on improving accessibility and inclusivity. If their aim is for equality, then finding ways to increase the benefits for women and other age groups is crucial. This would ensure that sports facilities are enabling the benefits of sport participation for everyone, maximising both individual and collective well-being across the country.

References

Ali, P. & Younas, A., 2021. *Understanding and interpreting regression analysis.* [Online]
Available at: https://ebn.bmj.com/content/24/4/116
[Accessed 26 3 2025].

Bank of England, 2025. *Inflation Calculator.* [Online]
Available at: https://www.bankofengland.co.uk/monetary-policy/inflation/inflation-calculator
[Accessed 25 3 2025].

Black, N., 2018. *The effect of school sports facilities on physical activity, health and socioeconomic status in adulthood.* [Online]
Available at:
https://www.sciencedirect.com/science/article/pii/S027795361830621X?casa_token=xxB1VEv3pvMAAAAA:d7cbJz-c_yUARcb3LdksX-czgJ8gGpAoc-GEsQXSXAcLNZWl-yhOQrBe5I4A_yQrR5XMWpQ#bib12
[Accessed 7 12 2024].

Chen et al, 2024. *Emotion regulation flexibility and momentary affect in two cultures.* [Online]
Available at: https://www.nature.com/articles/s44220-024-00215-3
[Accessed 14 12 2024].

Collins et al, 2018. *Effects of Early Sport Participation on Self-esteem and Happiness.* [Online]
Available at: https://thesportjournal.org/article/effects-of-early-sport-participation-on-self-esteem-and-happiness/
[Accessed 14 12 2024].

Cowley, E. & Schneider, J., 2025. *"I sometimes feel like I can't win!": An exploratory mixed-methods study of women's body image and experiences of exercising in gym settings.*

[Online]
Available at: https://pubmed.ncbi.nlm.nih.gov/39879151/
[Accessed 22 4 2025].

Dodge et al, 2012. [Online]
Available at:
https://www.internationaljournalofwellbeing.org/index.php/ijow/article/download/89/238/954
[Accessed 24 12 2024].

Emmonds, S. et al., 2023. *Youth Sport Participation Trends Across Europe: Implications for Policy and Practice.* [Online]
Available at:
https://eprints.leedsbeckett.ac.uk/id/eprint/9063/10/YouthSportParticipationTrendsAcrossEuropeImplicationsForPolicyAndPracticePV-EMMONDS.pdf
[Accessed 22 4 2025].

F. Wang, D. W., 2016. *Place, geographical context and subjective well-being: State of art and future directions.* [Online]
Available at:
https://scholar.google.com/scholar_lookup?title=Place%2C%20geographical%20context%20and%20subjective%20well-being%3A%20State%20of%20art%20and%20future%20directions&publication_year=2016&author=F.%20Wang&author=D.%20Wang
[Accessed 7 12 2024].

Frijters, P., Krekel, C., Sanchis, R. & Santini, Z., 2024. *The WELLBY: a new measure of social value and progress.* [Online]
Available at: http://eprints.lse.ac.uk/123746/1/s41599-024-03229-5.pdf
[Accessed 25 3 2025].

Hahn, J. & Shi, R., 2021. *Breusch and Pagan's (1980) Test Revisited.* [Online]
Available at: https://economics.ucr.edu/repec/ucr/wpaper/202110.pdf
[Accessed 27 3 2025].

Hallal, 2006. *Early determinants of physical activity in adolescence: prospective birth cohort study.* [Online]
Available at: https://www.bmj.com/content/332/7548/1002?ehom
[Accessed 7 12 2024].

HM Treasury, 2021. *Wellbeing Guidance for Appraisal: Supplementary Green Book Guidance.* [Online]
Available at:
https://assets.publishing.service.gov.uk/media/60fa9169d3bf7f0448719daf/Wellbeing_guidance_for_appraisal_-_supplementary_Green_Book_guidance.pdf
[Accessed 14 12 2024].

HM Treasury, 2021. *Wellbeing Guidance for Appraisal: Supplementary Green Book Guidance.* [Online]
Available at:
https://assets.publishing.service.gov.uk/media/60fa9169d3bf7f0448719daf/Wellbeing_guidance_for_appraisal_-_supplementary_Green_Book_guidance.pdf
[Accessed 25 3 2025].

HMT Green Book, 2024. *The Green Book 2022.* [Online]
Available at: https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020
[Accessed 17 4 2025].

James et al, 2021. *Factors influencing wellbeing in young people during COVID-19: A survey with 6291 young people in Wales.* [Online]
Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC8673639/
[Accessed 14 12 2024].

Kim, J. H., 2019. *Multicollinearity and misleading statistical results.* [Online]
Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC6900425/
[Accessed 27 3 2025].

Lee, S., 2025. *A Comprehensive Guide to Interpreting the Breusch-Pagan Test.* [Online]
Available at: https://www.numberanalytics.com/blog/a-comprehensive-guide-to-interpreting-breusch-pagan-test
[Accessed 27 3 2025].

Liu and Zhong, 2023. *The impact of sports participation on individuals' subjective well-being: the mediating role of class identity and health.* [Online]
Available at: https://www.nature.com/articles/s41599-023-02064-4
[Accessed 14 12 2024].

Liu, R., Menhas, R. & Saqib, Z., 2024. *Does physical activity influence health behavior, mental health, and psychological resilience under the moderating role of quality of life?.* [Online]
Available at:
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1349880/full
[Accessed 17 4 2025].

LSE, 2017. *Team sports boost life-satisfaction.* [Online]
Available at: https://www.lse.ac.uk/News/Latest-news-from-LSE/2017/01-January-2017/Life-satisfaction
[Accessed 14 12 2024].

Malm, C., Jakobsson, J. & Isaksson, A., 2019. *Physical Activity and Sports—Real Health Benefits: A Review with Insight into the Public Health of Sweden.* [Online]
Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC6572041/
[Accessed 4 5 2025].

Malvaso and Kang, 2022. *The relationship between areas of life satisfaction, personality, and overall life satisfaction: An integrated account.* [Online]
Available at:
https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2022.894610/full
[Accessed 14 12 2024].

Memon, M. et al., 2020. *2pf5q-2q0s5.* [Online]
Available at: https://jasemjournal.com/wp-content/uploads/2020/08/Memon-et-al_JASEM_-Editorial_V4_Iss2_June2020.pdf
[Accessed 26 3 2025].

Ni et al, 2019. *Determinants of physical, mental and social well-being: a longitudinal environment-wide association study.* [Online]
Available at: https://academic.oup.com/ije/article/49/2/380/5686034?login=false
[Accessed 14 12 2024].

NIH, 2024. *How do income changes impact on mental health and wellbeing for working-age adults? A systematic review and meta-analysis.* [Online]
Available at:
https://pmc.ncbi.nlm.nih.gov/articles/PMC7614874/#:~:text=Lower%20incomes%20are%20associated%20with,a%20causal%20effect%20is%20debated.
[Accessed 10 12 2024].

NIMH, 2023. *Older Adults and Mental Health.* [Online]
Available at: https://www.nimh.nih.gov/health/topics/older-adults-and-mental-health#:~:text=As%20people%20age%2C%20they%20may,%2C%20social%20isolation%2C%20or%20loneliness.
[Accessed 10 12 2024].

Nohales et al, 2024. *Occupational, academic, and personal determinants of wellbeing and psychological distress in residents.* [Online]
Available at:

https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1347513/full
[Accessed 14 12 2024].

ONS, 2019. *Disability, well-being and loneliness, UK: 2019.* [Online]
Available at:
https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/disability/bulletins/disabilitywellbeingandlonelinessuk/2019
[Accessed 10 12 2024].

PennState, 2018. *Detecting Multicollinearity Using Variance Inflation Factors.* [Online]
Available at: https://online.stat.psu.edu/stat462/node/180/
[Accessed 27 3 2025].

Project Play, 2024. *Wolrd's Leaing Sport Systems.* [Online]
Available at: https://projectplay.org/world-sport-systems/china
[Accessed 7 12 2024].

Sport England, 2024. *Why moving matters.* [Online]
Available at: https://www.sportengland.org/about-us/uniting-movement/why-moving-matters#:~:text=Local%20sports%20clubs%20and%20activity,of%20belonging%20and%20community%20spirit.
[Accessed 2 12 2024].

Sport Madness, 2024. *How to use sports facilities to promote an active lifestyle.* [Online]
Available at: https://sportmadness.club/en/public-sports-facilities-2/#:~:text=Public%20administrators%20play%20a%20vital,investing%20in%20public%20sports%20facilities.
[Accessed 2 12 2024].

Stenner, B., Buckley, J. & Mosewich, A., 2020. *Reasons why older adults play sport: A systematic review.* [Online]

Available at: https://www.sciencedirect.com/science/article/pii/S2095254619301462
[Accessed 22 4 2025].

Verbeek, M., 2017. *Using linear regression to establish empirical relationships.* [Online]
Available at: https://wol.iza.org/uploads/articles/336/pdfs/using-linear-regression-to-establish-empirical-relationships.pdf
[Accessed 26 3 2025].

Vogels, E., Gelles-Watnick, R. & Massarat, N., 2022. *Teens, Social Media and Technology 2022.* [Online]
Available at: https://www.pewresearch.org/internet/2022/08/10/teens-social-media-and-technology-2022/
[Accessed 22 4 2025].

Zhang, Z. et al., 2021. *The influence of Community Sports Parks on residents' subjective well-being: A case study of Zhuhai City, China.* [Online]
Available at: https://www.sciencedirect.com/science/article/pii/S0197397521001284
[Accessed 17 4 2024].

Appendix

Appendix 1: Control Variables

Variable	Breakdown
Age	Age of the respondent. Ranges from 17 to 95.
Gender	Gender of the respondent. Male or female.
Disability	Disability status of the respondent. Does not have a disability or has a disability.
Children	Number of children the respondent has. Ranges from 0 to 6.
Ethnicity	Ethnicity of the respondent. White, Black, Chinese, Asian excluding Chinese, Mixed, or Other Ethnicity.

Region	Region the respondent lives in. East Midlands, West Midlands, East, London, North East, North West, South East, South West or Yorkshire and the Humber.
Education	Highest level of qualification the respondent has. Level 4 and above, Level 3, Level 2, Level 1 and below, Other qualification or No qualification.
NSSEC	Occupational status of the respondent. NSSEC 1 and 2: Higher and lower managerial, administrative, and professional occupations. NSSEC 3: Intermediate occupations. NSSEC 4: Small employers and own account workers. NSSEC 5: Lower supervisory and technical occupations. NSSEC 6 and 7: Semi-routine and routine occupations. NSSEC 8: Unemployed. NSSEC 9: Not classified i.e. students, retired, unable to work.
Month	Month of the year the respondent undertook the survey. January, February, March, April, May, June, July, August, September, October, November, or December.

Appendix 2: Full OLS Regression Results for Life Satisfaction and Anxiety Level

		(0.0400)		(0.0352)
Level 1 and below		-0.249		0.147
		(0.134)		(0.103)
Other qualification		0.0500		-0.0843
		(0.0794)		(0.0686)
No qualification		-0.115		0.198**
		(0.0748)		(0.0616)
NSSEC 3		-0.219***		0.0925*
		(0.0424)		(0.0412)
NSSEC 4		-0.101		0.0117
		(0.0526)		(0.0505)
NSSEC 5		-0.167***		0.0551
		(0.0486)		(0.0494)
NSSEC 6 and 7		-0.495***		0.195***
		(0.0480)		(0.0442)
NSSEC 8		-1.261***		0.762***
		(0.102)		(0.0821)
NSSEC 9		-0.0785		0.0195
		(0.0546)		(0.0571)
January		0.0169		-0.0252
		(0.0565)		(0.0548)
February		-0.0735		0.0835
		(0.0574)		(0.0541)
March		0.0302		-0.00448
		(0.0577)		(0.0575)
April		-0.0743		0.114*
		(0.0558)		(0.0537)
May		-0.0598		-0.0188
		(0.0580)		(0.0556)
June		0.00748		0.0210
		(0.0593)		(0.0566
July		-0.0582		0.0422
		(0.0610)		(0.0553)
August		0.0701		-0.0838
		(0.0577)		(0.0554)
September		-0.0454		0.0479
		(0.0556)		(0.0521)
October		0.0398		0.0248
		(0.0577		(0.0582)
November		-0.0224		0.109
		(0.0593)		(0.0575)
R^2	0.0049	0.09	0.0046	0.083

Level 3		-0.120***		0.00415
		(0.0345)		(0.0336)
Level 2		-0.0327		-0.00707
		(0.0400)		(0.0352)
Level 1 and below		-0.249		0.147
		(0.134)		(0.103)

Appendix 3: VIF Test Full Results

	Life Satisfaction	Anxiety
Sports Facilities per 10,000	1.47	1.17
Age	1.46	1.34
Male	1.08	1.08
Disabled	1.06	1.05
Children	1.09	1.14
White	1.91	1.98
Black	1.29	1.32
Chinese	1.10	1.14
Mixed	1.25	1.28
Other ethnicity	1.13	1.14
East Midlands	2.63	3.07
West Midlands	2.89	3.03
East	3.03	3.42
London	4.00	3.03
North West	3.40	3.87
South East	3.84	4.27
South West	2.78	2.75
Yorkshire and the Humber	2.82	2.62
Level 3	1.28	1.18
Level 2	1.34	1.226
Level 1 and below	1.06	1.04
Other qualification	1.09	1.07
No qualification	1.18	1.17
NSSEC 3	1.21	1.15
NSSEC 4	1.12	1.08
NSSEC 5	1.13	1.15
NSSEC 6 and 7	1.32	1.21
NSSEC 8	1.19	1.09
NSSEC 9	1.58	1.21
January	1.71	1.71
February	1.72	1.74
March	1.74	1.61
April	1.75	1.76
May	1.74	1.68
June	1.75	1.64
July	1.76	1.69
August	1.74	1.68
September	1.80	1.85
October	1.66	1.59
November	1.82	1.61

Appendix 4: Full OLS Regression Results for Male and Female

	Life Satisfaction		Anxiety	
Gender	**Male**	**Female**	**Male**	**Female**
Controls	Yes	Yes	Yes	Yes
Observations	27,434	35,072	27,434	35,072
Sports Facilities per 10,000	0.145*** (0.00268)	0.0125*** (0.00330)	-0.0156*** (0.00217)	-0.0120*** (0.00270)
Age	0.0188*** (0.000943)	0.0174*** (0.00124)	-0.0378*** (0.00130)	-0.0421*** (0.00118)
Disabled	-0.907*** (0.0282)	-1.01*** (0.0363)	0.969*** (0.0402)	1.03*** (0.0339)
Children	0.0110 (0.0140)	0.0312 (0.0226)	0.0322 (0.217)	-0.00254 (0.0189)
White	0.0203 (0.0421)	0.0192 (0.0751)	-0.315*** (0.0750)	0.0618 (0.0670)
Black	0.206 (0.0782)	-0.523*** (0.139)	-0.211 (0.143)	-0.430*** (0.0121)
Chinese	-0.189 (0.0127)	-0.161 (0.142)	-0.0378 (0.185)	0.0606 (0.152)
Mixed	0.120 (0.0841)	-0.406** (0.125)	-0.416** (0.150)	0.124 (0.123)
Other ethnicity	0.129 (0.109)	-0.196 (0.180)	0.439* (0.190)	0.0629 (0.179)
East Midlands	-0.132 (0.0726)	-0.0910 (0.0942)	-0.113 (0.101)	0.0210 (0.0903)
West Midlands	0.0393 (0.0726)	-0.0739 (0.0939)	-0.198 (0.101)	0.0379 (0.0902)
East	-0.00669 (0.0706)	-0.114 (0.0895)	-0.155 (0.0995)	-0.00639 (0.0878)
London	-0.0277 (0.0690)	-0.189* (0.0926)	-0.0759 (0.102)	0.122 (0.0912)
North West	-0.0156 (0.0680)	-0.126 (0.0869)	-0.0977 (0.0972)	0.0408 (0.0853)
South East	-0.0824 (0.0674)	-0.172* (0.0869)	0.114 (0.0961)	0.0587 (0.0850)
South West	-0.0463 (0.721)	-0.0413 (0.0966)	-0.178 (0.104)	0.0697 (0.0930)
Yorkshire and the Humber	-0.00931 (0.0708)	-0.0775 (0.103)	-0.118 (0.106)	0.0345 (0.0932)
Level 3	-0.0332 (0.0352)	-0.189*** (0.0450)	-0.100 (0.0516)	0.0876* (0.0446
Level 2	0.0804 (0.0375)	-0.144** (0.0512)	-0.116* (0.0552)	(0.0898 (0.0483)
Level 1 and below	-0.193* (0.0917)	-0.305 (0.156)	0.232 (0.163)	0.106 (0.144)

Other qualification	0.165* (0.0631)	-0.0738 (0.113)	-0.0642 (0.0999)	-0.101 (0.104)
No qualification	0122 (0.0631)	-0.357*** (0.105)	0.195* (0.0977)	0.215* (0.938)
NSSEC 3	-0.271*** (0.0600)	-0.202*** (0.0471)	0.264** (0.0943)	0.0548 (0.0476)
NSSEC 4	-0.113* (0.0462)	-0.111 (0.0814)	-0.0807 (0.0663)	0.139 (0.0799)
NSSEC 5	-0.141* (0.0495)	-0.306** (0.106)	0.0182 (0.0612)	0.169 (0.0930)
NSSEC 6 and 7	-0.521*** (0.0411)	-0.476*** (0.0614)	0.129 (0.0682)	0.245*** (0.0624)
NSSEC 8	-1.69*** (0.0743)	-0.972*** (0.117)	1.01*** (0.146)	0.672*** (0.109)
NSSEC 9	0.0659 (0.0492)	-0.191** (0.0706)	-0.230* (0.0953)	0.168* (0.0742)
January	0.0587 (0.0800)	-0.0207 (0.0791)	-0.0246 (0.0809)	-0.0190 (0.0732)
February	-0.0950 (0.0843)	-0.0484 (0.0762)	0.0731 (0.0812)	0.0900 (0.0729)
March	-0.0120 (0.0866)	0.0672 (0.0765)	-0.0621 (0.0847)	0.0398 (0.0772)
April	-0.109 (0.0825)	-0.0513 (0.0748)	0.0861 (0.0803)	0.133 (0.0724)
May	-0.0657 (0.0833)	-0.0538 (0.0809)	-0.115 (0.0829)	0.0538 (0.0753)
June	-0.0566 (0.0870)	0.0645 (0.0797)	0.0737 (0.0857)	-0.0182 (0.0761)
July	-0.0671 (0.0905)	-0.0466 (0.0803)	0.0923 (0.0842)	0.00493 (0.0747)
August	0.0849 (0.0831)	0.0468 (0.0784)	-0.135 (0.08212)	-0.0487 (0.0747)
September	-0.0869 (0.0847)	-0.00191 (0.0727)	-0.00339 (0.0771)	0.0873 (0.0709)
October	0.0301 (0.0842)	0.0754 (0.0787)	-0.0159 (0.0856)	0.0572 (0.0778)
November	-0.0500 (0.0900)	-0.00511 (0.0766)	0.0106 (0.0847)	0.181* (0.0781)
R^2	0.09	0.097	0.07	0.079

Appendix 5: Full OLS Regression Results for Life Satisfaction for Age Groups

	17< x ≤ 22	22< x ≤ 35	35< x ≤ 50	50< x ≤ 65	65+
Controls	Yes	Yes	Yes	Yes	Yes
Observations	4,521	12,118	16,532	17,188	14,502
Sports Facilities per 10,000	0.0166** (0.00555)	0.00766** (0.00242)	0.00771*** (0.00175)	0.0133*** (0.00308)	0.00775** (0.00270)
Male	0.202** (0.0652)	-0.0213 (0.0384)	-0.0475 (0.0316)	0.0600 (0.0320)	0.0854* (0.0407)
Disabled	-0.942*** (0.0804)	-0.941*** (0.0453)	-1.07*** (0.0387)	-1.05*** (0.0340)	-0.875*** (0.0390)
Children	0.0105 (0.0498)	0.0740** (0.0253)	0.136*** (0.153)	-0.0181 (0.306)	-0.0400 (0.0823)
White	0.173 (0.100)	0.122 (0.0680)	-0.0670 (0.0561)	0.0249 (0.0968)	0.375* (0.162)
Black	-0.0863 (0.193)	-0.124 (0.134)	-0.0780 (0.111)	-0.175 (0.159)	0.671* (0.276)
Chinese	-0.0524 (0.210)	-0.236 (0.143)	-0.243* (0.122)	0.00171 (0.185)	0.592 (0.321)
Mixed	0.105 (0.170)	0.021 (0.118)	-0.381** (0.116)	-0.704*** (0.198)	0.614* (0.391)
Other ethnicity	-0.350 (0.303)	-0.0541 (0.173)	0.163 (0.152)	-0.233 (0.248)	0.0227 (0.391)
East Midlands	-0.150 (0.153)	-0.0892 (0.0979)	-0.0378 (0.0938)	-0.0676 (0.0886)	0.0778 (0.113)
West Midlands	-0.0291 (0.154)	-0.0184 (0.0994)	-0.0116 (0.0932)	-0.104 (0.0892)	0.0872 (0.114)
East	-0.171 (0.155)	-0.0393 (0.0960)	-0.143 (0.0910)	-0.0563 (0.0863)	0.0594 (0.111)
London	-0.0752 (0.153)	-0.0959 (0.0955)	-0.0812 (0.0910)	-0.288** (0.0939)	-0.127 (0.122)
North West	-0.229 (0.145)	-0.116 (0.0919)	-0.0663 (0.0889)	-0.0837 (0.0851)	0.0512 (0.109)
South East	-0.167 (0.147)	-0.0497 (0.0.0927)	-0.0791 (0.0875)	-0.113 (0.0840)	-0.0245 (0.108)
South West	-0.182 (0.166)	0.0278 (0.0991)	-0.110 (0.0955)	-0.0702 (0.0903)	0.0621 (0.114)
Yorkshire and the Humber	-0.126 (0.165)	0.0217 (0.1010)	0.0204 (0.0962)	-0.175 (0.0923)	0.0729 (0.119)
Level 3	-0.141 (0.0863)	-0.281*** (0.0495)	-0.191*** (0.0456)	-0.128** (0.0445)	-0.0685 (0.0608)
Level 2	-0.240* (0.109)	-0.215** (0.0735)	-0.236*** (0.194)	-0.0831 (0.0439)	0.00946 (0.0575)
Level 1 and below	-0.666* (0.329)	-0.754** (0.231)	-0.354 (0.194)	-0.226 (0.129)	-0.00656 (0.153)
Other qualification	0.0626 (0.322)	0.0120 (0.163)	0.0258 (0.123)	-0.0936 (0.0923)	0.155 (0.0793)

No qualification	-0.227 (0.171)	-0.527** (0.162)	-0.411** (0.131)	-0.465*** (0.105)	-0.120 (0.0851)
NSSEC 3	-0.0199 (0.161)	-0.274*** (0.0670)	-0.182** (0.0563)	-0.142** (0.0501)	-0.143* (0.0688)
NSSEC 4	-0.261 (0.287)	-0.129 (0.112)	0.0575 (0.0722)	-0.180** (0.0595)	-0.158* (0.0702)
NSSEC 5	0.239 (0.157)	-0.170* (0.0814)	-0.162* (0.0705)	-0.359*** (0.0675)	-0.140 (0.0752)
NSSEC 6 and 7	-0.242* (0.114)	-0.504*** (0.0771)	-0.395*** (0.0684)	-0.387*** (0.0599)	-0.244** (0.0817)
NSSEC 8	-0.300 (0.194)	-1.127*** (0.144)	-1.04*** (0.132)	-1.59*** (0.150)	-1.14*** (0.336)
NSSEC 9	0.117 (0.0896)	-0.307*** (0.0733)	-0.229 (0.127)	-0.511** (0.157)	-0.421* (0.176)
January	-0.00144 (0.146)	-0.0178 (0.0833)	0.0676 (0.0698)	0.122 (0.0698)	0.0932 (0.0878)
February	-0.0648 (0.147)	-0.133 (0.0840)	--0.0324 (0.0723)	0.0269 (0.0699)	0.00165 (0.0870)
March	-0.111 (0.144)	0.0538 (0.0886)	0.0638 (0.0753)	0.0682 (0.0739)	0.0949 (0.0907)
April	-0.223 (0.142)	0.0209 (0.0821)	0.0126 (0.0701)	0.0815 (0.0698)	-0.0739 (0.0900)
May	-0.110 (0.150)	0.0186 (0.0877)	0.0196 (0.0732)	0.0199 (0.0731)	0.0623 (0.0901)
June	0.170 (0.147)	-0.0434 (0.0883)	0.0882 (0.07409)	-0.0599 (0.0747)	0.905 (0.0884)
July	-0.0388 (0.150)	-0.0307 (0.0859)	-0.0353 (0.0726)	0.0537 (0.0734)	0.00517 (0.0893)
August	0.206 (0.141)	0.0976 (0.0870)	0.0912 (0.0716)	0.113 (0.0714)	0.0502 (0.0916)
September	-0.0361 (0.141)	0.0235 (0.0804)	-0.0574 (0.0704)	0.146* (0.0668)	0.0371 (0.820)
October	0.109 (0.150)	0.0512 (0.0874)	0.124 (0.0742)	0.0748 (0.0767)	0.0464 (0.0952)
November	-0.0431 (0.164)	0.0146 (0.0872)	0.0333 (0.0757)	-0.0200) (0.0761)	0.0466 (0.0882)
R^2	0.06	0.08	0.09	0.10	0.06

Full OLS Regression Results for Anxiety Level for Age Groups

	17< x ≤ 22	22< x ≤ 35	35< x ≤ 50	50< x ≤ 65	65+
Controls	Yes	Yes	Yes	Yes	
Observations	4,521	12,118	16,532	17,188	14,502
Sports Facilities per 10,000	-0.0167* (0.0769)	-0.0161*** (0.00367)	-0.0156*** (0.00303)	-0.0158*** (0.00308)	-0.00404 (0.00441)
Male	-0.941 *** (0.0884)	-0.555*** (0.0542)	-0.253*** (0.0453)	-0.378*** (0.0454)	-0.623*** (0.0592)
Disabled	1.144*** (0.101)	1.175*** (0.0588)	1.132*** (0.0514)	0.958*** (0.0464)	0.697*** (0.0560)
Children	-0.0180 (0.0585)	-0.0825* (0.0320)	-0.0275 (0.0214)	0.223*** (0.0416)	0.129 (0.123)
White	0.100 (0.136)	-0.0906 (0.0906)	-0.0986 (0.0783)	-0.296* (0.123)	-0.908*** (0.230)
Black	-0.0282 (0.239)	-0.532** (0.181)	-0.392** (0.151)	-0.480* (0.199)	-0.657 (0.419)
Chinese	0.432 (0.320)	0.0368 (0.203)	-0.0421 (0.184)	-0.0159 (0.284)	-1.75*** (0.452)
Mixed	0.145 (0.224)	-0.263 (0.162)	-0.0257 (0.160)	0.0807 (0.243)	-0.599 (0.484)
Other ethnicity	0.337 (0.325)	0.365 (0.265)	-0.0595 (0.210)	0.379 (0.289)	-0.289 (0.438)
East Midlands	-0.156 (0.223)	-0.0149 (0.140)	0.0130 (0.134)	-0.119 (0.124)	0.0351 (0.156)
West Midlands	-0.00403 (0.222)	-0.00984 (0.139)	-0.0269 (0.132)	-0.144 (0.131)	-0.0600 (0.157)
East	-0.0181 (0.225)	-0.0108 (0.136)	0.0295 (0.130)	-0.233 (0.121)	-0.0239 (0.151)
London	-0.0679 (0.222)	-0.0250 (0.136)	0.0148 (0.131)	-0.0148 (0.130)	0.236 (0.171)
North West	-0.0643 (0.210)	0.0766 (0.130)	0.0300 (0.127)	-0.169 (0.120)	0.0878 (0.150)
South East	0.0763 (0.214)	0.00611 (0.131)	0.106 (0.126)	-0.245* (0.117)	0.134 (0.148)
South West	0.0977 (0.238)	-0.0375 (0.144)	0.0683 (0.137)	-0.241 (0.128)	0.151 (0.159)
Yorkshire and the Humber	0.215 (0.239)	0.0225 (0.143)	0.0188 (0.137)	-0.137 (0.130)	0.0194 (0.164)
Level 3	-0.0962 (0.110)	0.0167 (0.0676)	0.00768 (0.0638)	0.0502 (0.0640)	0.155 (0.0907)
Level 2	-0.0835 (0.109)	0.310** (0.0976)	0.0565 (0.0764)	0.0279 (0.0619)	0.0284 (0.083)
Level 1 and below	-0.00574 (0.365)	0.225 (0.261)	0.496* (0.247)	0.0958 (0.182)	0.0766 (0.210)
Other qualification	0.121 (0.400)	-0.0413 (0.236)	-0.259 (0.168)	0.07009 (0.128)	-0.0648 (0.118)

No qualification	-0.258 (0.218)	0.312 (0.197)	0.142 (0.159)	0.269* (0.129)	0.404 (0.119)
NSSEC 3	-0.0664 (0.211)	0.221 (0.0916)	0.137 (0.0806)	0.104 (0.0733)	-0.140 (0.100)
NSSEC 4	-0.312 (0.319)	-0.0371 (0.160)	-0.105 (0.103)	0.0195 (0.0823)	0.0660 (0.0993)
NSSEC 5	0.0389 (0.224)	-0.0867 (0.109)	0.0282 (0.0985)	0.00252 (0.0921)	0.204 (0.111)
NSSEC 6 and 7	0.0733 (0.148)	0.221* (0.101)	0.267** (0.0921)	0.194* (0.0820)	-0.0147 (0.108)
NSSEC 8	0.239 (0.238)	0.563*** (0.161)	0.577*** (0.150)	1.33*** (0.168)	1.79*** (0.491)
NSSEC 9	0.000132 (0.114)	0.475*** (0.0946)	0.604*** (0.169)	0.471* (0.196)	0.368 (0.228)
January	-0.0275 (0.196)	0.167 (0.115)	-0.0126 (0.101)	-0.129 (0.101)	-0.122 (0.129)
February	0.244 (0.196)	0.267* (0.118)	0.236* (0.102)	-0.186 (0.0996)	0.0339 (0.128)
March	0.187 (0.203)	0.0883 (0.126)	0.120 (0.108)	-0.163 (0.105)	-0.0922 (0.132)
April	0.380* (0.186)	0.229* (0.114)	0.224* (0.100)	-0.109 (0.100)	0.0656 (0.131)
May	-0.00721 (0.199)	-0.0985 (0.121)	0.0920 (0.102)	-0.131 (0.102)	-0.0217 (0.136)
June	0.0889 (0.206)	0.199 (0.123)	0.0494 (0.106)	-0.177 (0.105)	0.152 (0.136)
July	-0.253 (0.198)	0.140 (0.119)	0.147 (0.104)	-0.138 (0.103)	0.209 (0.134)
August	0.0892 (0.196)	0.00376 (0.122)	-0.0259 (0.102)	-0.143 (0.102)	-0.171 (0.131)
September	0.301 (0.188)	0.00376 (0.113)	0.0523 (0.0980)	-0.0978 (0.0972)	0.0971 (0.121)
October	-0.0499 (0.205)	0.174 (0.125)	-0.00552 (0.105)	-0.127 (0.107)	0.143 (0.144)
November	0.396 (0.218)	0.317* (0.0120)	0.0926 (0.107)	-0.00287 (0.107)	0.240 (0.132)
R^2	0.07	0.06	0.045	0.045	0.0038