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# Small Area Estimation of Sport Participation and Activity using data from the Active Lives Survey

Prepared for Sport England

# Contents



 

# 1 Background

Small area estimation (SAE) is a technique used to generate estimates in small geographical areas that would otherwise have too few respondents from the survey to derive precise direct estimates. This approach was used to generate area estimates for the 6,791 Middle Super Output Areas (MSOAs) in England for the following measures: participation in sport (at least twice in the past month), inactivity (less than 30 minutes physical activity per week in the past month, excluding gardening), and activity (meeting CMO guidelines of at least 150 minutes physical activity per week in the past month, excluding gardening).

The estimates were generated using data from the 2017/18 Active Lives Survey (ALS). The ALS provides the most comprehensive picture of sports participation in England and is central to Sport England's measurement of its own strategy; with the survey also being used to provide Official Statistics and to help measure the performance of its own partners. The ALS has a large sample size: ALS 2017/18 contained about 180,000 adults, with a minimum sample size of 500 in each English local authority with the exceptions of the Isles of Scilly and the City of London.

# 2 Method

## 2.1 Summary of the approach

The approach used to obtain the small area statistics was to model each of the individual-level outcome measures from the Active Lives Survey (ALS) against a set of external area-level covariates collected from a range of sources using a regression model. The parameter estimates from the regression model were then used to directly calculate the predicted prevalence at the area level.

To account for the differing profiles of age and gender across the MSOA, area-level estimates were obtained for each MSOA separately by age and gender groups. This was done by including the individual-level measures of age group and gender from the ALS as covariates in the model and then, for each MSOA, generating a set of predicted prevalences for each age and gender group. These were then combined to give the estimate of prevalence for all adults.

## 2.2 The MSOA-level measures

The set of MSOA-level measures was produced when the small area estimates were produced previously for the ALS 2015/16 dataset. They were obtained from a range of sources: Census data; ACORN data, the Index of Multiple Deprivation and urban/rural classification. Additional administrative variables were also taken from the Neighbourhood Statistics website and from the Active Places dataset.

A full list of the variables considered is given in Appendix A.

## 2.3 Modelling the data

The three individual-level outcome measures (participation, inactivity and activity) were extracted from the ALS 2017/18 for participants aged 16 or older, along with gender and age group. This ALS data was then merged with the set of MSOA-level measures.

For each outcome measure, a stepwise logistic regression model was fitted in Stata with the individual-level measures of age group and gender forced into the model and the area-level covariates selected using the forward stepwise procedure. The aim of the regression model is to explain as much of the area-level variance as possible, so those area-level covariates that are the most significantly associated with the outcome measures are included in the final model. In other words, the models are not fitted with the aim of examining relationship, merely to minimise the residual area-level variation. It is for this reason that with small area estimation it is standard that no attempt is made to describe the model.

Multilevel logistic regression models were then fitted in Stata for each of the three outcome measures (see Appendix B). The models contained the individual-level ALS measures of age group and gender, the set of area-level covariates that were identified by the stepwise logistic regression models and a random effect for the MSOAs.

## 2.4 Generating the small area estimates

The parameter estimates in the models are used to generate estimates of prevalence in each MSOA for the three outcome measures for each age and gender group. In practice this is done by generating predicted estimates directly from Stata after running the multilevel model. This command multiplies each parameter estimate in the model by its MSOA-level estimate, summing all the MSOA-level terms and then adding the intercept term and appropriate age and gender group parameter estimate; the final sum is then transformed using the inverse logit function.

The final MSOA-level measure is then the weighted average of the MSOA-level prevalence estimates for each age and gender group.

# Appendix A: Potential MSOA-level covariates

| Variable name | Variable label | Source |
|---|---|---|
| IMDscore | Index of Multiple Deprivation (IMD) Score | Deprivation indices 2015, and sources |
| INCscore | Income Score (rate) | Deprivation indices 2015, and sources |
| EMPscore | Employment Score (rate) | Deprivation indices 2015, and sources |
| EDUscore | Education, Skills and Training Score | Deprivation indices 2015, and sources |
| HLTscore | Health Deprivation and Disability Score | Deprivation indices 2015, and sources |
| CRIscore | Crime Score | Deprivation indices 2015, and sources |
| HOUscore | Barriers to Housing and Services Score | Deprivation indices 2015, and sources |
| ENVscore | Living Environment Score | Deprivation indices 2015, and sources |
| IDACIscore | Income Deprivation Affecting Children Index (IDACI) Score (rate) | Deprivation indices 2015, and sources |
| IDAOPIscore | Income Deprivation Affecting Older People (IDAOPI) Score (rate) | Deprivation indices 2015, and sources |
| CYPSDscore | Children and Young People Sub-domain Score | Deprivation indices 2015, and sources |
| SKILLSDscore | Adult Skills Sub-domain Score | Deprivation indices 2015, and sources |
| GEOSDscore | Geographical Barriers Sub-domain Score | Deprivation indices 2015, and sources |
| BARSDscore | Wider Barriers Sub-domain Score | Deprivation indices 2015, and sources |
| INDSDscore | Indoors Sub-domain Score | Deprivation indices 2015, and sources |
| OUTSDscore | Outdoors Sub-domain Score | Deprivation indices 2015, and sources |
| educationpost16 | Staying on in education post 16 indicator | Deprivation indices 2015, and sources |
| entryhighered | Entry to higher education indicator | Deprivation indices 2015, and sources |
| adult_english_prof | Adult skills and English language proficiency indicators - combined | Deprivation indices 2015, and sources |
| lifelostindicator | Years of potential life lost indicator | Deprivation indices 2015, and sources |
| disabilityindicator | Comparative illness and disability ratio indicator | Deprivation indices 2015, and sources |
| morbidityindicator | Acute morbidity indicator | Deprivation indices 2015, and sources |
| anxietyindicator | Mood and anxiety disorders indicator | Deprivation indices 2015, and sources |
| kmto_post | Road distance to a post office indicator (km) | Deprivation indices 2015, and sources |
| kmto_school | Road distance to a primary school indicator (km) | Deprivation indices 2015, and sources |
| kmto_store | Road distance to general store or supermarket indicator (km) | Deprivation indices 2015, and sources |
| knto_gp | Road distance to a GP surgery indicator (km) | Deprivation indices 2015, and sources |
| overcrowing | Household overcrowding indicator | Deprivation indices 2015, and sources |
| homelessness | Homelessness indicator | Deprivation indices 2015, and sources |
| houseafford | Housing affordability indicator | Deprivation indices 2015, and sources |

| | | |
|---|---|---|
| housepoor | Housing in poor condition indicator | Deprivation indices 2015, and sources |
| housenoheat | Houses without central heating indicator | Deprivation indices 2015, and sources |
| airquality | Air quality indicator | Deprivation indices 2015, and sources |
| roadaccidents | Road traffic accidents indicator | Deprivation indices 2015, and sources |
| RUC11CD | Urban rural indicator - code | ONS |
| Child_development | Children achieving a good level of development at age 5 | Public Health England website |
| Crude_fertility_rate | Crude fertility rate, 2010-14 | Public Health England |
| GCSE_achievement | GCSE achievement (5 A*-C incl. Eng & Maths) | Public Health England |
| Low_birth_weight | Births with birth weight less than 2500g as a proportion of live and still births with valid weight, 2010-14 | Public Health England |
| Obese_Y6_kids | Percentage of measured children in Year 6 who were classified as obese, 2012/13-2014/15 | Public Health England |
| OutOfWork_claimants | % of the working age population who are claiming out of work benefit, 2015/16 | Public Health England |
| English_proficiency | Proficiency in English (% of people who cannot speak English well or at all) | Public Health England |
| Provide_care | Provision of Unpaid Care - 1 or more hours per week | Public Health England |
| healthy_life_m | Healthy life expectancy at birth (male) | Public Health England |
| Hospital_stays_alcohol | Hospital Admissions for Alcohol Attributable Harm (narrow definition) | Public Health England |
| Admissions_all | Emergency Admissions, All Causes | Public Health England |
| Incidence_cancer_all | Incidence of all cancers | Public Health England |
| census_0_15 | proportion population age 0-15 | Census 2011 data |
| census_16_24 | proportion population age 16-24 | Census 2011 data |
| census_25_34 | proportion population age 25-34 | Census 2011 data |
| census_35_44 | proportion population age 35-44 | Census 2011 data |
| census_45_54 | proportion population age 45-54 | Census 2011 data |
| census_55_64 | proportion population age 55-64 | Census 2011 data |
| census_65_74 | proportion population age 65-74 | Census 2011 data |
| census_75plus | proportion population age 75+ | Census 2011 data |
| census_males | proportion males | Census 2011 data |
| census_white | proportion from white ethnic background | Census 2011 data |
| census_ukborn | proportion born in UK | Census 2011 data |
| census_christian | proportion christianity | Census 2011 data |
| census_noreligion | proportion with no religion | Census 2011 data |
| census_working | proportion working - Ft, PT or self employed | Census 2011 data |
| census_unemployed | proportion unemployed | Census 2011 data |
| census_retired | proportion retired | Census 2011 data |
| census_student | proportion student ft | Census 2011 data |
| census_homemaker | proportion home/family | Census 2011 data |
| census_SIC_A | proportion SIC_A | Census 2011 data |
| census_SIC_B | proportion SIC_B | Census 2011 data |
| census_SIC_C | proportion SIC_C | Census 2011 data |
| census_SIC_D | proportion SIC_D | Census 2011 data |
| census_SIC_E | proportion SIC_E | Census 2011 data |
| census_SIC_F | proportion SIC_F | Census 2011 data |
| census_SIC_G | proportion SIC_G | Census 2011 data |
| census_SIC_H | proportion SIC_H | Census 2011 data |

| | | |
|---|---|---|
| census_SIC_I | proportion SIC_I | Census 2011 data |
| census_SIC_J | proportion SIC_J | Census 2011 data |
| census_SIC_K | proportion SIC_K | Census 2011 data |
| census_SIC_L | proportion SIC_L | Census 2011 data |
| census_SIC_M | proportion SIC_M | Census 2011 data |
| census_SIC_N | proportion SIC_N | Census 2011 data |
| census_SIC_O | proportion SIC_O | Census 2011 data |
| census_SIC_P | proportion SIC_P | Census 2011 data |
| census_SIC_Q | proportion SIC_Q | Census 2011 data |
| census_llti | proportion long term illness | Census 2011 data |
| census_noQual | proportion no qualifications | Census 2011 data |
| census_level1Qual | proportion level 1 qualifications | Census 2011 data |
| census_level2Qual | proportion level 2 qualificaiton | Census 2011 data |
| census_ApprenticeQual | proportion apprenticeships | Census 2011 data |
| census_level3Qual | proportion level 3 qualifications | Census 2011 data |
| census_level4Qual | proportion level 4 qualifications | Census 2011 data |
| census_nssec_1_2 | proportion NSSEC 1&2 (professiona/managerial) | Census 2011 data |
| census_NSSEC_3 | proportion NSSEC_3 | Census 2011 data |
| census_NSSEC_4 | proportion NSSEC_4 | Census 2011 data |
| census_NSSEC_5 | proportion NSSEC_5 | Census 2011 data |
| census_NSSEC_6 | proportion NSSEC_6 | Census 2011 data |
| census_NSSEC_7 | proportion NSSEC_7 | Census 2011 data |
| census_NSSEC_8 | proportion NSSEC_8 | Census 2011 data |
| census_ownerocc | proportion owner occupiers/buying with mortgage | Census 2011 data |
| census_rent_socal | proportion social renters | Census 2011 data |
| census_rent_private | proportion private renters | Census 2011 data |
| census_Dwelling_Detached | proportion individuals in Detached | Census 2011 data |
| census_Dwelling_Semidetached | proportion individuals in Semidetached | Census 2011 data |
| census_Dwelling_Terrace | proportion individuals in Terrace | Census 2011 data |
| census_Dwelling_Flat_Purpose | proportion individuals in Flat_Purpose | Census 2011 data |
| census_Dwelling_Flat_Converted | proportion individuals in Flat_Converted | Census 2011 data |
| census_Dwelling_Flat_Commercial | proportion individuals in Flat_Commercial | Census 2011 data |
| census_Dwelling_Mobile | proportion individuals in Mobile | Census 2011 data |
| census_depchildren | proportion families without dependent children | Census 2011 data |
| census_nocars | proportion households with no car | Census 2011 data |
| census_TTW_home | proportion_mode of travel to work_home | Census 2011 data |
| census_TTW_underground_tram | proportion_mode of travel to work_underground_tram | Census 2011 data |
| census_TTW_train | proportion_mode of travel to work_train | Census 2011 data |
| census_TTW_bus_coach | proportion_mode of travel to work_bus_coach | Census 2011 data |
| census_TTW_taxi | proportion_mode of travel to work_taxi | Census 2011 data |
| census_TTW_motorbike | proportion_mode of travel to work_motorbike | Census 2011 data |
| census_TTW_car_van | proportion_mode of travel to work_car_van | Census 2011 data |

| | | |
|---|---|---|
| census_TTW_passenger | proportion_mode of travel to work_passenger | Census 2011 data |
| census_TTW_bike | proportion_mode of travel to work_bike | Census 2011 data |
| census_TTW_foot | proportion_mode of travel to work_foot | Census 2011 data |
| census_TTW_Other | proportion_mode of travel to work_Other | Census 2011 data |
| census_TTW_No_Work | proportion_mode of travel to work_Do not work | Census 2011 data |
| Acorn_Category | Acorn_Category | ACORN 2016 |
| Acorn_pCat1 | Proportion in ACORN cat A | ACORN 2016 |
| Acorn_pCat2 | Proportion in ACORN cat B | ACORN 2016 |
| Acorn_pCat3 | Proportion in ACORN cat C | ACORN 2016 |
| Acorn_pCat4 | Proportion in ACORN cat D | ACORN 2016 |
| Acorn_pCat5 | Proportion in ACORN cat E | ACORN 2016 |
| Acorn_pCat6 | Proportion in ACORN cat F | ACORN 2016 |
| popdens | Population density of MSOA (households/area in hectares) | Census/Geog info |
| SupergroupName | ONS area classification - Supergroup Name | ONS |
| ave_fac_per_site | average number of facilities per site in MSOA | ACTIVE PLACES DATA |
| proprefurb | proportion of facilities in MSOA that have been refurbished | ACTIVE PLACES DATA |
| propdisabaccess | proportion of facilities in MSOA that have disabled access | ACTIVE PLACES DATA |
| accessfree_per000 | number of free access facilities per 1000 residents | ACTIVE PLACES DATA |
| accesspay_per000 | number of pay to play access facilities per 1000 residents | ACTIVE PLACES DATA |
| accessclub_per000 | number of club access facilities per 1000 residents | ACTIVE PLACES DATA |
| accessmember_per000 | number of members only access facilities per 1000 residents | ACTIVE PLACES DATA |
| facpitch_per000 | number of pitches (grass or astroturf) per 1000 residents | ACTIVE PLACES DATA |
| factrack_per000 | number of tracks per 1000 residents | ACTIVE PLACES DATA |
| facpool_per000 | number of pools per 1000 residents | ACTIVE PLACES DATA |
| facgym_per000 | number of gyms (studios or health centres) per 1000 residents | ACTIVE PLACES DATA |
| facsportshall_per000 | number of sports halls per 1000 residents | ACTIVE PLACES DATA |
| facgolf_per000 | number of golf courses per 1000 residents | ACTIVE PLACES DATA |
| factennis_per000 | number of tennis courts (outdoors and in) per 1000 residents | ACTIVE PLACES DATA |
| disabfacs_per000 | number of disabled access facilities per 1000 residents | ACTIVE PLACES DATA |
| mgtocalauth_per000 | number of facilities managed by the LA per 1000 residents | ACTIVE PLACES DATA |
| mgtcommercial_per000 | number of facilities managed by a commercial company per 1000 residents | ACTIVE PLACES DATA |
| mgteducation_per000 | number of facilities managed by an education establishment per 1000 residents | ACTIVE PLACES DATA |
| MYPE2015_allages | Total MSOA population | 2015 mid-year population estimates |
| lake_count | Total number of lakes in the MSOA | lake geo file |

# Appendix B: Multilevel logistic regression models

Table B1 Model output for sports participation

| Variable name | Description | b | SE(b) | z | P > z | Lower 95% CI | Upper 95% CI |
|---|---|---|---|---|---|---|---|
| ***Individual measures:*** | | | | | | | |
| cons | intercept | -0.076 | 0.353 | -0.220 | 0.828 | -0.768 | 0.615 |
| age8 (3) | age: 24-34 (baseline = male aged: 16 - 24) | -0.161 | 0.109 | -1.470 | 0.141 | -0.376 | 0.053 |
| age8 (4) | age: 36-44 | -0.243 | 0.106 | -2.290 | 0.022 | -0.450 | -0.035 |
| age8 (5) | age: 45-54 | -0.430 | 0.104 | -4.160 | <0.001 | -0.633 | -0.227 |
| age8 (6) | age: 55-64 | -0.524 | 0.101 | -5.190 | <0.001 | -0.722 | -0.326 |
| age8 (7) | age: 65-74 | 0.145 | 0.103 | 1.400 | 0.161 | -0.058 | 0.347 |
| age8 (8) | age: 75+ | -0.551 | 0.105 | -5.240 | <0.001 | -0.757 | -0.345 |
| Gend3 | female | -0.044 | 0.054 | -0.810 | 0.416 | -0.149 | 0.062 |
| Gend3 X age8 (3) | female / age: 24-34 | 0.033 | 0.065 | 0.510 | 0.609 | -0.094 | 0.160 |
| Gend3 X age8 (4) | female / age: 36-44 | 0.082 | 0.063 | 1.310 | 0.190 | -0.041 | 0.205 |
| Gend3 X age8 (5) | female / age: 45-54 | 0.119 | 0.061 | 1.940 | 0.052 | -0.001 | 0.239 |
| Gend3 X age8 (6) | female / age: 55-64 | 0.034 | 0.060 | 0.570 | 0.566 | -0.083 | 0.152 |
| Gend3 X age8 (7) | female / age: 65-74 | -0.129 | 0.061 | -2.100 | 0.036 | -0.249 | -0.008 |
| Gend3 X age8 (8) | female / age: 75+ | -0.386 | 0.063 | -6.160 | <0.001 | -0.509 | -0.263 |
| ***MSOA measures:*** | | | | | | | |
| census_65_74 | proportion population age 65-74 | 1.569 | 0.431 | 3.640 | <0.001 | 0.724 | 2.414 |
| SKILLSDscore | Adult Skills Sub-domain Score | -1.167 | 0.308 | -3.790 | <0.001 | -1.770 | -0.564 |
| census_noreligion | proportion with no religion | 1.399 | 0.118 | 11.860 | <0.001 | 1.168 | 1.630 |
| census_level4Qual | proportion level 4 qualifications | 1.603 | 0.254 | 6.320 | <0.001 | 1.106 | 2.101 |
| census_25_34 | proportion population age 25-34 | -1.810 | 0.321 | -5.640 | <0.001 | -2.439 | -1.181 |
| census_TTW_foot | proportion mode of travel to work on foot | 0.941 | 0.229 | 4.100 | <0.001 | 0.492 | 1.391 |
| census_SIC_L | proportion SIC=L | 8.595 | 1.738 | 4.950 | <0.001 | 5.189 | 12.001 |
| census_unemployed | proportion unemployed | -3.256 | 0.770 | -4.230 | <0.001 | -4.766 | -1.747 |
| census_Dwelling_Terrace | proportion individuals in Terrace | 0.265 | 0.059 | 4.530 | <0.001 | 0.150 | 0.380 |
| census_SIC_I | proportion SIC=I | 1.913 | 0.371 | 5.150 | <0.001 | 1.185 | 2.641 |
| census_NSSEC_3 | proportion NSSEC=3 | 0.812 | 0.393 | 2.060 | 0.039 | 0.041 | 1.583 |
| census_TTW_bike | proportion mode of travel to work by bike | 2.219 | 0.480 | 4.620 | <0.001 | 1.278 | 3.160 |
| census_males | proportion male | 2.483 | 0.564 | 4.400 | <0.001 | 1.377 | 3.589 |
| census_rent_private | proportion rent privately | -0.692 | 0.148 | -4.670 | <0.001 | -0.982 | -0.401 |

| Variable name | Description | b | SE(b) | z | P > z | Lower 95% CI | Upper 95% CI |
|---|---|---|---|---|---|---|---|
| census_Dwelling_Flat_Converted | proportion individuals in converted flat | 0.559 | 0.169 | 3.310 | 0.001 | 0.228 | 0.890 |
| census_TTW_motorbike | proportion mode of travel to work by motorbike | -10.05 | 2.964 | -3.390 | 0.001 | -15.86 | -4.24 |
| census_TTW_train | proportion mode of travel to work by train | 0.577 | 0.208 | 2.780 | 0.005 | 0.170 | 0.985 |

Table B2 Model output for activity (excluding gardening)

| Variable name | Description | b | SE(b) | z | P > z | Lower 95% CI | Upper 95% CI |
|---|---|---|---|---|---|---|---|
| ***Individual measures:*** | | | | | | | |
| cons | intercept | 0.308 | 0.208 | 1.480 | 0.139 | -0.100 | 0.716 |
| age8 (3) | age: 24-34 (baseline = male aged: 16 - 24) | -0.277 | 0.094 | -2.940 | 0.003 | -0.462 | -0.092 |
| age8 (4) | age: 36-44 | -0.403 | 0.091 | -4.440 | <0.001 | -0.581 | -0.225 |
| age8 (5) | age: 45-54 | -0.466 | 0.089 | -5.210 | <0.001 | -0.642 | -0.291 |
| age8 (6) | age: 55-64 | -0.540 | 0.088 | -6.160 | <0.001 | -0.712 | -0.368 |
| age8 (7) | age: 65-74 | -0.734 | 0.087 | -8.460 | <0.001 | -0.904 | -0.564 |
| age8 (8) | age: 75+ | -1.323 | 0.093 | -14.19 | <0.001 | -1.506 | -1.140 |
| Gend3 | female | -0.144 | 0.046 | -3.120 | 0.002 | -0.235 | -0.054 |
| Gend3 X age8 (3) | female / age: 24-34 | 0.045 | 0.055 | 0.820 | 0.413 | -0.063 | 0.154 |
| Gend3 X age8 (4) | female / age: 36-44 | 0.082 | 0.054 | 1.530 | 0.126 | -0.023 | 0.187 |
| Gend3 X age8 (5) | female / age: 45-54 | 0.080 | 0.053 | 1.520 | 0.128 | -0.023 | 0.184 |
| Gend3 X age8 (6) | female / age: 55-64 | 0.010 | 0.052 | 0.190 | 0.851 | -0.092 | 0.111 |
| Gend3 X age8 (7) | female / age: 65-74 | -0.044 | 0.051 | -0.850 | 0.395 | -0.144 | 0.057 |
| Gend3 X age8 (8) | female / age: 75+ | -0.274 | 0.056 | -4.870 | <0.001 | -0.384 | -0.163 |
| ***MSOA measures:*** | | | | | | | |
| census_25_34 | proportion population age 25-34 | -1.297 | 0.264 | -4.910 | <0.001 | -1.816 | -0.779 |
| SKILLSDscore | Adult Skills Sub-domain Score | -1.527 | 0.272 | -5.610 | <0.001 | -2.060 | -0.993 |
| Supergroup (2) | ONS Supergroup: Cosmopolitans (basline = Constrained City Dwellers) | 0.029 | 0.052 | 0.540 | 0.586 | -0.074 | 0.131 |
| Supergroup (3) | ONS Supergroup: Ethnicity Central | 0.162 | 0.054 | 3.010 | 0.003 | 0.057 | 0.267 |
| Supergroup (4) | ONS Supergroup: Hard-Pressed Living | 0.014 | 0.035 | 0.410 | 0.684 | -0.054 | 0.082 |
| Supergroup (5) | ONS Supergroup: Multicultural Metropolitans | 0.034 | 0.039 | 0.860 | 0.387 | -0.043 | 0.110 |
| Supergroup (6) | ONS Supergroup: Rural Residents | -0.031 | 0.040 | -0.770 | 0.444 | -0.109 | 0.048 |
| Supergroup (7) | ONS Supergroup: Suburbanites | 0.031 | 0.039 | 0.800 | 0.424 | -0.045 | 0.107 |
| Supergroup (8) | ONS Supergroup: Urbanites | 0.025 | 0.036 | 0.680 | 0.496 | -0.046 | 0.095 |
| houseafford | Housing affordability indicator | 0.028 | 0.007 | 3.800 | <0.001 | 0.014 | 0.043 |
| census_ukborn | proportion born in UK | 1.009 | 0.169 | 5.970 | <0.001 | 0.678 | 1.340 |
| census_SIC_I | proportion SIC=I | 1.474 | 0.306 | 4.820 | <0.001 | 0.875 | 2.073 |
| census_level4Qual | proportion level 4 qualifications | 1.448 | 0.196 | 7.400 | <0.001 | 1.064 | 1.831 |
| census_noreligion | proportion with no religion | 0.908 | 0.124 | 7.300 | <0.001 | 0.664 | 1.152 |
| census_SIC_L | proportion SIC=L | 5.885 | 1.461 | 4.030 | <0.001 | 3.021 | 8.749 |
| census_TTW_foot | proportion mode of travel to work on foot | 0.600 | 0.193 | 3.110 | 0.002 | 0.221 | 0.979 |
| census_retired | proportion retired | 0.417 | 0.229 | 1.820 | 0.068 | -0.031 | 0.866 |

| Variable name | Description | b | SE(b) | z | P > z | Lower 95% CI | Upper 95% CI |
|---|---|---|---|---|---|---|---|
| census_TTW_bike | proportion mode of travel to work by bike | 0.843 | 0.359 | 2.350 | 0.019 | 0.139 | 1.548 |
| census_SIC_Q | proportion SIC=Q | -0.887 | 0.225 | -3.940 | <0.001 | -1.328 | -0.446 |
| English_proficiency | Proficiency in English (% of people who cannot speak English well or at all) | 0.025 | 0.007 | 3.640 | <0.001 | 0.011 | 0.038 |
| educationpost16 | Staying on in education post 16 indicator | 0.447 | 0.182 | 2.460 | 0.014 | 0.090 | 0.803 |
| airquality | Air quality indicator | -0.118 | 0.039 | -3.010 | 0.003 | -0.195 | -0.041 |
| census_homemaker | proportion home/family | -2.147 | 0.674 | -3.180 | 0.001 | -3.469 | -0.826 |
| census_TTW_taxi | proportion mode of travel to work by taxi | 7.103 | 2.575 | 2.760 | 0.006 | 2.056 | 12.150 |

Table B3 Model output for inactivity (excluding gardening)

| Variable name | Description | b | SE(b) | z | P > z | Lower 95% CI | Upper 95% CI |
|---|---|---|---|---|---|---|---|
| ***Individual measures:*** | | | | | | | |
| cons | intercept | -0.342 | 0.335 | -1.020 | 0.307 | -0.999 | 0.315 |
| age8 (3) | age: 24-34 (baseline = male aged: 16 - 24) | 0.130 | 0.111 | 1.180 | 0.238 | -0.086 | 0.347 |
| age8 (4) | age: 36-44 | 0.214 | 0.107 | 2.010 | 0.045 | 0.005 | 0.424 |
| age8 (5) | age: 45-54 | 0.409 | 0.104 | 3.910 | <0.001 | 0.204 | 0.614 |
| age8 (6) | age: 55-64 | 0.541 | 0.102 | 5.310 | <0.001 | 0.341 | 0.740 |
| age8 (7) | age: 65-74 | 0.709 | 0.100 | 7.070 | <0.001 | 0.512 | 0.906 |
| age8 (8) | age: 75+ | 1.362 | 0.104 | 13.050 | <0.001 | 1.158 | 1.567 |
| Gend3 | female | 0.043 | 0.054 | 0.790 | 0.430 | -0.064 | 0.149 |
| Gend3 X age8 (3) | female / age: 24-34 | -0.010 | 0.065 | -0.160 | 0.873 | -0.138 | 0.118 |
| Gend3 X age8 (4) | female / age: 36-44 | -0.052 | 0.063 | -0.820 | 0.415 | -0.176 | 0.072 |
| Gend3 X age8 (5) | female / age: 45-54 | -0.090 | 0.062 | -1.460 | 0.145 | -0.212 | 0.031 |
| Gend3 X age8 (6) | female / age: 55-64 | -0.023 | 0.060 | -0.390 | 0.698 | -0.142 | 0.095 |
| Gend3 X age8 (7) | female / age: 65-74 | 0.058 | 0.060 | 0.970 | 0.334 | -0.059 | 0.174 |
| Gend3 X age8 (8) | female / age: 75+ | 0.289 | 0.062 | 4.620 | <0.001 | 0.166 | 0.411 |
| ***MSOA measures:*** | | | | | | | |
| census_SIC_I | proportion SIC=I | -1.887 | 0.354 | -5.330 | <0.001 | -2.581 | -1.193 |
| SKILLSDscore | Adult Skills Sub-domain Score | 1.158 | 0.331 | 3.500 | <0.001 | 0.510 | 1.805 |
| census_noreligion | proportion with no religion | -0.987 | 0.137 | -7.200 | <0.001 | -1.256 | -0.718 |
| census_level4Qual | proportion level 4 qualifications | -1.397 | 0.237 | -5.900 | <0.001 | -1.861 | -0.933 |
| morbidityindicator | acute morbidity indicator | 0.002 | 0.001 | 2.790 | 0.005 | 0.000 | 0.003 |
| census_ukborn | proportion born in UK | -1.191 | 0.169 | -7.060 | <0.001 | -1.522 | -0.861 |
| census_25_34 | proportion population age 25-34 | 0.968 | 0.301 | 3.220 | 0.001 | 0.378 | 1.558 |
| census_TTW_car_van | proportionmode of travel to work by car or van | 0.743 | 0.137 | 5.430 | <0.001 | 0.475 | 1.011 |
| census_unemployed | proportion unemployed | 3.453 | 0.817 | 4.230 | <0.001 | 1.853 | 5.054 |
| English_proficiency | Proficiency in English (% of people who cannot speak English well or at all) | -0.029 | 0.007 | -4.000 | <0.001 | -0.044 | -0.015 |
| census_SIC_L | proportion SIC=L | -7.039 | 1.664 | -4.230 | <0.001 | -10.30 | -3.778 |
| census_TTW_bike | proportion mode of travel to work by bike | -1.118 | 0.437 | -2.560 | 0.011 | -1.975 | -0.261 |
| Obese_Y6_kids | % children classified as obese (Year 6) | 0.005 | 0.002 | 2.620 | 0.009 | 0.001 | 0.009 |
| census_homemaker | proportion home/family | 3.032 | 0.777 | 3.900 | <0.001 | 1.510 | 4.555 |
| Crude_fertility_rate | Crude fertility rate | -0.002 | 0.001 | -3.080 | 0.002 | -0.004 | -0.001 |
| census_rent_private | proportion rent privately | 0.490 | 0.135 | 3.630 | <0.001 | 0.225 | 0.755 |
| census_males | proportion male | -1.522 | 0.540 | -2.820 | 0.005 | -2.580 | -0.463 |
| census_Dwelling_Semidetached | proportion individuals in semi-detached house | 0.150 | 0.057 | 2.620 | 0.009 | 0.038 | 0.262 |

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