|  |
| --- |
| Table S1. A description of how covariates were derived and operationalised in analysis. |
| **Covariate** | **Question(s) in MENE pertaining to covariate** | **Operationalisation in analysis** | **Reference category (if applicable)** |
| **Individual-level covariates** |  |  |  |
| Sex | Interviewer self-assessed whether the respondent appeared male or female. | Two categories: Male and female. | Females |
|  |  |  |  |
| Age | "What was your age last birthday?"Interviewer then enters age in one of eight age brackets: 16-17, 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, or 75 and over. | Collapsed into three categories: 16-34, 35-64, and 65 and over. | 16-34 |
|  |  |  |  |
| Ethnicity | "Which of these best describes your ethnic group?" (*Prompt:* "By this I mean your cultural background").White-British,White-Irish,Any other White background,White & Black Caribbean,White & Black African,White & Asian,Any other mixed background,Indian,Pakistani,Bangladeshi,Any other Asian Background,Caribbean,African,Any other Black background,Chinese,Any other. | Dichotomised into "White-British" and "All other ethnicities". This is both to create more uniform sample sizes, and is also consistent with previous work on the MENE dataset which analyses physical activity in natural environment (Elliott et al., 2015). | All other ethnicities |
|  |  |  |  |
| Social grade | Participants are classified in line with the Ipsos-MORI classification: A, B, C1, C2, D, and E. | Four categories are used: AB, C1, C2, and DE. These have revealed distinct patterns with physical activity attainment in this data set previously (White et al., 2014). | AB |
|  |  |  |  |
| Disability | "Do you have any long standing illness, health problem or disability that limits your daily activities or the kind of work you can do?"Yes,No. | Two categories: Yes and No. | No |
|  |  |  |  |
| Marital status | Interviewers ask participants to classify themselves into one of three categories:Married/living as married,Single,Widowed/divorced/separated. | Dichotomised into "Married" (i.e. married/living as married) and "Not married" (i.e. single or widowed/divorced/separated). | Married |
|  |  |  |  |
| Work status | Interviewers ask participants to classify themselves into one of eight possible options:Full-time paid work (30+ hours per week),Part-time paid work (8-29 hours per week),Part-time paid work (under 8 hours per week),Retired,Still at school,In full time higher education,Unemployed (seeking work),Not in paid employment (not seeking work). | Five categories are used:"Not working" (i.e. unemployed or not in paid employment),"Full-time" (i.e. full-time paid work),"Part-time" (i.e. either part-time option),"In education" (i.e. still at school or in full time higher education),"Retired" (i.e. retired). | Not working |
|  |  |  |  |
| Number of children in the household | "And how many children under the age of 16 are there in the household?"N.B this is contingent on the respondent answering more than "1" to the previous question: "How many people are there in your household altogether, including any children and yourself?" | Dichotomised into "None" and "At least one". | None |
|  |  |  |  |
| Physical activity attainment | "In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate?This may include sport, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job."The respondent answers with a number between 0 and 7. | This was entered into regression models as a continuous variable. | Not applicable |
|  |  |  |  |
| **Visit-level covariates** |  |  |  |
| Whether the visit was on a weekend or a weekday | The CAPI device that interviewers used randomly selects one visit that the respondent mentions embarking on in the last seven days. In the MENE dataset this visit is ascribed a date. | We used date extraction functions to deduce whether the visit was on a weekday (Monday-Friday) or weekend (Saturday-Sunday). | Weekday |
|  |  |  |  |
| Whether the visit was "local" or "further afield". | This covariate was created from two questions in MENE. The first asks:"And did this journey start from…"Your home,Someone else's home,Work,Holiday accommodation,Somewhere else.The second question asks:"Approximately how far, in miles, did you travel to reach this place? By that I mean the one way distance from where you set off to the place visited."Less than 1 mile1 or 2 miles3 to 5 miles6 to 10 miles11 to 20 miles21 to 40 miles41 to 60 miles61 to 80 miles81 to 100 milesMore than 100 miles | Two categories were created:Visits which started from "your home" and were "less than 1 mile" away were classified as "local".All other combinations of start point and distance travelled were classified as "further afield". | Local |

|  |
| --- |
| Table S2. Percentage of respondents making recreational visits to natural environments at least once a week as a function of month (of interview) |
| Month of interview (pooled) | % | Month and year of interview | % |
| January | 33.71  | Mar-09 | 45.63  |
| February | 34.94  | Apr-09 | 47.68  |
| March | 40.73  | May-09 | 46.65  |
| April | 43.64  | Jun-09 | 48.24  |
| May | 43.25  | Jul-09 | 46.23  |
| June | 43.42  | Aug-09 | 49.02  |
| July | 43.47  | Sep-09 | 44.10  |
| August | 44.92  | Oct-09 | 40.58  |
| September | 42.38  | Nov-09 | 37.26  |
| October | 39.44  | Dec-09 | 30.48  |
| November | 36.12  | Jan-10 | 32.07  |
| December | 29.02 | Feb-10 | 33.19  |
|  |  | Mar-10 | 38.83  |
|  |  | Apr-10 | 44.30  |
|  |  | May-10 | 41.89  |
|  |  | Jun-10 | 41.54  |
|  |  | Jul-10 | 42.44  |
|  |  | Aug-10 | 41.92  |
|  |  | Sep-10 | 39.88  |
|  |  | Oct-10 | 35.93  |
|  |  | Nov-10 | 33.92  |
|  |  | Dec-10 | 24.73  |
|  |  | Jan-11 | 30.91  |
|  |  | Feb-11 | 34.93  |
|  |  | Mar-11 | 37.75  |
|  |  | Apr-11 | 44.03  |
|  |  | May-11 | 43.48  |
|  |  | Jun-11 | 43.31  |
|  |  | Jul-11 | 44.55  |
|  |  | Aug-11 | 46.68  |
|  |  | Sep-11 | 42.80  |
|  |  | Oct-11 | 41.47  |
|  |  | Nov-11 | 36.67  |
|  |  | Dec-11 | 29.46  |
|  |  | Jan-12 | 34.98  |
|  |  | Feb-12 | 35.41  |
|  |  | Mar-12 | 40.39  |
|  |  | Apr-12 | 38.44  |
|  |  | May-12 | 40.36  |
|  |  | Jun-12 | 39.93  |
|  |  | Jul-12 | 41.03  |
|  |  | Aug-12 | 42.22  |
|  |  | Sep-12 | 42.46  |
|  |  | Oct-12 | 39.60  |
|  |  | Nov-12 | 36.59  |
|  |  | Dec-12 | 31.99  |
|  |  | Jan-13 | 36.31 |
|  |  | Feb-13 | 36.19  |
|  |  | Mar-13 | 40.07  |

|  |
| --- |
| Table S3. Descriptive statistics for energy expenditure and meteorological/daylight variables in different natural environments. |
|  | Energy expenditure (MET-minutes)a | Maximum temperature during daylight hours (°C)b | Maximum wind speed during daylight hours (m/s)b | Maximum rainfall during daylight hours (mm/hour)b | Daylight hoursb |
| Overall (n=47613) | 300.00 (528.35) | 13.68 (6.01) | 6.15 (2.31) | 0.49 (1.15) | 13.82 (3.16) |
| Park (n=11988) | 265.80 (371.27) | 14.01 (6.09) | 5.91 (2.19) | 0.46 (1.09) | 13.93 (3.14) |
| Woodland (n=2947) | 270.00 (468.30) | 12.99 (6.10) | 6.19 (2.43) | 0.46 (1.09) | 13.46 (3.17) |
| Inland waters (n=2561) | 360.00 (719.67) | 14.00 (5.97) | 6.12 (2.27) | 0.47 (1.08) | 14.05 (3.15) |
| Coast (n=4271) | 420.00 (709.68) | 14.47 (5.89) | 6.39 (2.37) | 0.47 (1.16) | 14.25 (3.10) |
| a Medians and standard deviations are presented due to high positive skew (hence the log-transformation of MET-minutes in models presented below).b Means and standard deviations are presented.N.B Daylight hours includes civil twilight time. |

|  |
| --- |
| Table S4. Frequencies of respondents within the predictors included in regression models. |
|  | Frequencies in models where n=47613 | Frequencies in models where n=21767 | Frequencies in "parks" model (n=11988) | Frequencies in "woodlands" model (n=2947) | Frequencies in "inland waters" model (n=2561) | Frequencies in "coast" model (n=4271) |
| Max. temperature during daylight (°C) | 47613 | 21767 | 11988 | 2947 | 2561 | 4271 |
| Max. wind speed during daylight (m/s) | 47613 | 21767 | 11988 | 2947 | 2561 | 4271 |
| Daylight hours | 47613 | 21767 | 11988 | 2947 | 2561 | 4271 |
| Rainfall (No rainfall=ref) | 17437 | 8093 | 4364 | 1092 | 950 | 1687 |
| Light rain (>0mm to 0.5mm) | 19302 | 8842 | 4940 | 1190 | 1049 | 1663 |
| Moderate/heavy rain (>0.5mm) | 10874 | 4832 | 2684 | 665 | 562 | 921 |
| Type of natural environment (Parks=ref) | - | 11988 | - | - | - | - |
| Woodland | - | 2947 | - | - | - | - |
| Inland waters | - | 2561 | - | - | - | - |
| Coast | - | 4271 | - | - | - | - |
| Temperature x Park | - | 11988 | - | - | - | - |
| Temperature x Woodland | - | 2947 | - | - | - | - |
| Temperature x Inland waters | - | 2561 | - | - | - | - |
| Temperature x Coast | - | 4271 | - | - | - | - |
| Wind speed x Park | - | 11988 | - | - | - | - |
| Wind speed x Woodland | - | 2947 | - | - | - | - |
| Wind speed x Inland waters | - | 2561 | - | - | - | - |
| Wind speed x Coast | - | 4271 | - | - | - | - |
| Daylight x Park | - | 11988 | - | - | - | - |
| Daylight x Woodland | - | 2947 | - | - | - | - |
| Daylight x Inland waters | - | 2561 | - | - | - | - |
| Daylight x Coast | - | 4271 | - | - | - | - |
| No rain x Park | - | 4364 | - | - | - | - |
| No rain x Woodland | - | 1092 | - | - | - | - |
| No rain x Inland waters | - | 950 | - | - | - | - |
| No rain x Coast | - | 1687 | - | - | - | - |
| Light rain x Park | - | 4940 | - | - | - | - |
| Light rain x Woodland | - | 1190 | - | - | - | - |
| Light rain x Inland waters | - | 1049 | - | - | - | - |
| Light rain x Coast | - | 1663 | - | - | - | - |
| Moderate/heavy rain x Park | - | 2684 | - | - | - | - |
| Moderate/heavy rain x Woodland | - | 665 | - | - | - | - |
| Moderate/heavy rain x Inland waters | - | 562 | - | - | - | - |
| Moderate/heavy rain x Coast | - | 921 | - | - | - | - |
| Sex (Females=ref) | 24755 | 11300 | 6357 | 1540 | 1171 | 2232 |
| Males | 22858 | 10467 | 5631 | 1407 | 1390 | 2039 |
| Age (16-34=ref) | 13534 | 7180 | 4900 | 644 | 570 | 1066 |
| 35-64 | 24298 | 10748 | 5406 | 1787 | 1396 | 2159 |
| 65 and over | 9781 | 3839 | 1682 | 516 | 595 | 1046 |
| Social grade (AB=ref) | 11535 | 4761 | 2255 | 822 | 658 | 1026 |
| C1 | 13810 | 6456 | 3584 | 910 | 740 | 1222 |
| C2 | 9675 | 4399 | 2360 | 591 | 532 | 916 |
| DE | 12593 | 6151 | 3789 | 624 | 631 | 1107 |
| Ethnicity (All other ethnicities=ref) | 6312 | 3911 | 3251 | 167 | 209 | 284 |
| White-British | 41301 | 17856 | 8737 | 2780 | 2352 | 3987 |
| Long term illness or disability (No=ref) | 40141 | 18535 | 10308 | 2542 | 2132 | 3553 |
| Yes | 7472 | 3232 | 1680 | 405 | 429 | 718 |
| Marital status (Not married=ref) | 18143 | 8807 | 5348 | 928 | 930 | 1601 |
| Married | 29470 | 12960 | 6640 | 2019 | 1631 | 2670 |
| Work status (Not working=ref) | 7493 | 3742 | 2446 | 394 | 320 | 582 |
| Full-time | 18184 | 8460 | 4470 | 1315 | 1080 | 1595 |
| Part-time | 6925 | 3168 | 1789 | 453 | 355 | 571 |
| In education | 2754 | 1580 | 1162 | 104 | 92 | 222 |
| Retired | 12257 | 4817 | 2121 | 681 | 714 | 1301 |
| Children in household (None=ref) | 32404 | 14392 | 7291 | 2027 | 1963 | 3111 |
| At least one | 15209 | 7375 | 4697 | 920 | 598 | 1160 |
|  |  |  |  |  |  |  |
| Days of physical activity | 47613 | 21767 | 11988 | 2947 | 2561 | 4271 |
|  |  |  |  |  |  |  |
| Visit day (Weekday=ref) | 30266 | 13702 | 7707 | 1817 | 1602 | 2576 |
| Weekend | 17347 | 8065 | 4281 | 1130 | 959 | 1695 |
| Visit type (Local visit=ref) | 17484 | 8815 | 6314 | 954 | 745 | 802 |
| Further afield visit | 30129 | 12952 | 5674 | 1993 | 1816 | 3469 |

|  |
| --- |
| Table S5. Minimally-adjusted, adjusted, and adjusted (with interaction) full results for generalised additive models predicting energy expenditure (MET-minutes) from meteorological conditions and daylight hours. |
| Untransformed | Minimally-adjusted modeln=47613R2=.01 | Adjusted for covariatesn=47613R2=.09(*F*=380.76, *p*<.001)a | Additionally adjusted for meteorology x environment interactionsn=21767R2=0.10(*F*=25.31, *p*<.001)b |
|  | edf | res df | *F*-test | edf | res df | *F*-test | edf | res df | *F*-test |
| Max. temperature during daylight (°C)c | 4.50 | 5.58 | \*\*\*10.06 | 1.02 | 1.03 | \*\*\*46.76 | 1.00 | 1.00 | \*\*\*37.89 |
| Max. wind speed during daylight (m/s) c | 1.01 | 1.03 | \*4.33 | 1.01 | 1.01 | \*\*\*11.66 | 1.00 | 1.00 | \*\*8.54 |
| Daylight hours c | 6.17 | 7.33 | \*\*\*12.41 | 5.63 | 6.78 | \*\*\*12.02 | 1.00 | 1.00 | \*\*\*13.04 |
|  | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI |
| (Intercept) | 457.14 | 448.90 | 465.38 | 265.60 | 241.10 | 290.09 | 240.57 | 205.53 | 275.61 |
| Rainfall (No rainfall=ref) | / | / | / | / | / | / | / | / | / |
| Light rain (>0mm to 0.5mm) | -5.65 | -16.88 | 5.57 | -0.08 | -10.74 | 10.58 | -1.10 | -21.94 | 19.73 |
| Moderate/heavy rain (>0.5mm) | -12.46 | -26.42 | 1.50 | 5.96 | -19.06 | 7.14 | -1.39 | -27.15 | 24.36 |
| Type of natural environment (Parks=ref) | / | / | / | / | / | / | / | / | / |
| Woodland | - | - | - | - | - | - | 17.14 | -17.87 | 52.15 |
| Inland waters | - | - | - | - | - | - | \*\*\*143.83 | 107.36 | 180.30 |
| Coast | - | - | - | - | - | - | \*\*\*124.79 | 95.41 | 154.17 |
|  | edf | res df | *F*-test | edf | res df | *F*-test | edf | res df | *F*-test |
| Interaction terms | / | / | / | / | / | / | / | / | / |
| Temperature x Park c | - | - | - | - | - | - | 1.00 | 1.00 | \*\*\*15.21 |
| Temperature x Woodland c | - | - | - | - | - | - | 1.00 | 1.00 | \*\*\*19.25 |
| Temperature x Inland waters c | - | - | - | - | - | - | 1.00 | 1.00 | \*\*7.87 |
| Temperature x Coast c | - | - | - | - | - | - | 0.00 | 0.00 | 0.10 |
| Wind speed x Park c | - | - | - | - | - | - | 1.00 | 1.00 | 2.45 |
| Wind speed x Woodland c | - | - | - | - | - | - | 1.00 | 1.00 | 2.33 |
| Wind speed x Inland waters c | - | - | - | - | - | - | 0.00 | 0.00 | 0.02 |
| Wind speed x Coast c | - | - | - | - | - | - | 1.00 | 1.00 | 2.64 |
| Daylight hours x Park c | - | - | - | - | - | - | 1.00 | 1.00 | \*\*7.35 |
| Daylight hours x Woodland c | - | - | - | - | - | - | 1.00 | 1.00 | 0.39 |
| Daylight hours x Inland waters c | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 |
| Daylight hours x Coast c | - | - | - | - | - | - | 1.00 | 1.00 | 3.71 |
|  | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI |
| Light rain x Woodland | - | - | - | - | - | - | 3.78 | -43.42 | 50.97 |
| Light rain x Inland waters | - | - | - | - | - | - | 31.58 | -17.73 | 80.89 |
| Light rain x Coast | - | - | - | - | - | - | 40.01 | -0.45 | 80.47 |
| Moderate/heavy rain x Woodland | - | - | - | - | - | - | -28.98 | -87.38 | 29.42 |
| Moderate/heavy rain x Inland waters | - | - | - | - | - | - | 29.24 | -32.23 | 90.71 |
| Moderate/heavy rain x Coast | - | - | - | - | - | - | 15.42 | -34.59 | 65.42 |
| Sex (Females=ref) | / | / | / | / | / | / | / | / | / |
| Males | - | - | - | \*\*\*92.62 | 83.01 | 10.25 | \*\*\*85.17 | 71.18 | 99.16 |
| Age (16-34=ref) | / | / | / | / | / | / | / | / | / |
| 35-64 | - | - | - | \*\*\*-31.05 | -43.04 | -19.05 | \*\*\*-40.00 | -56.98 | -23.03 |
| 65 and over | - | - | - | \*\*\*-52.29 | -73.29 | -31.26 | \*\*\*-72.96 | -104.79 | -41.14 |
| Social grade (AB=ref) | / | / | / | / | / | / | / | / | / |
| C1 | - | - | - | \*\*-17.61 | -30.19 | -5.02 | -3.94 | -22.74 | 14.87 |
| C2 | - | - | - | \*-14.39 | -28.10 | -0.68 | 0.90 | -19.62 | 21.41 |
| DE | - | - | - | \*-14.96 | -28.61 | -1.31 | 13.81 | -6.40 | 34.01 |
| Ethnicity (All other ethnicities=ref) | / | / | / | / | / | / | / | / | / |
| White-British | - | - | - | 3.74 | -10.04 | 17.52 | -15.08 | -33.48 | 3.32 |
| Long term illness or disability (No=ref) | / | / | / | / | / | / | / | / | / |
| Yes | - | - | - | \*\*\*-26.45 | -39.62 | -13.29 | -1.41 | -21.14 | 18.33 |
| Marital status (Not married=ref) | / | / | / | / | / | / | / | / | / |
| Married | - | - | - | \*\*\*-21.06 | -31.43 | -10.69 | \*\*-19.98 | -35.06 | -4.90 |
| Work status (Not working=ref) | / | / | / | / | / | / | / | / | / |
| Full-time | - | - | - | 11.75 | -3.24 | 26.73 | 18.31 | -3.03 | 39.64 |
| Part-time | - | - | - | 4.85 | -12.34 | 22.03 | 15.83 | -8.74 | 40.40 |
| In education | - | - | - | 31.47 | 7.60 | 55.34 | 30.67 | -1.29 | 62.64 |
| Retired | - | - | - | 12.72 | -7.95 | 33.39 | 7.39 | -23.62 | 38.39 |
| Children in household (None=ref) | / | / | / | / | / | / | / | / | / |
| At least one | - | - | - | \*13.59 | 2.58 | 24.61 | \*\*\*30.73 | 14.89 | 46.56 |
|  |  |  |  |  |  |  |  |  |  |
| Days of physical activity | - | - | - | \*-2.13 | -3.85 | -0.41 | -0.94 | -3.48 | 1.61 |
|  |  |  |  |  |  |  |  |  |  |
| Visit day (Weekday=ref) | / | / | / | / | / | / | / | / | / |
| Weekend | - | - | - | \*\*\*28.16 | 18.71 | 37.61 | \*\*\*34.55 | 20.80 | 48.29 |
| Visit type (Local visit=ref) | / | / | / | / | / | / | / | / | / |
| Further afield visit | - | - | - | \*\*\*280.64 | 271.13 | 290.15 | \*\*\*229.30 | 215.17 | 243.44 |
|  |  |  |  |  |  |  |  |  |  |
| Log-transformed | Unadjusted modeln=47613R2=.02 | Adjusted for covariatesn=47613R2=.16(*F*=743.11, *p*<.001)a | Additionally adjusted for meteorology x environment interactionsn=21767R2=.15(*F*=22.82, *p*<.001)b |
|  | edf | res df | *F*-test | edf | res df | *F*-test | edf | res df | *F*-test |
| Max. temperature during daylight (°C) c | 4.83 | 5.95 | \*\*\*13.36 | 1.00 | 1.01 | \*\*\*67.91 | 1.00 | 1.00 | \*\*\*43.38 |
| Max. wind speed during daylight (m/s) c | 1.01 | 1.02 | \*\*\*16.96 | 1.01 | 1.01 | \*\*\*29.61 | 1.00 | 1.00 | \*\*7.43 |
| Daylight hours c | 6.19 | 7.35 | \*\*\*17.88 | 5.94 | 7.11 | \*\*\*15.76 | 1.88 | 2.34 | \*\*4.58 |
|  | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI |
| (Intercept) | 5.72 | 5.71 | 5.74 | 5.38 | 5.34 | 5.41 | 5.37 | 5.32 | 5.43 |
| Rainfall (No rainfall=ref) | / | / | / | / | / | / | / | / | / |
| Light rain (>0mm to 0.5mm) | -0.02 | -0.03 | 0.00 | -0.00 | -0.02 | 0.01 | -0.00 | -0.04 | 0.03 |
| Moderate/heavy rain (>0.5mm) | -0.03 | -0.05 | \*-0.01 | -0.01 | -0.03 | 0.01 | -0.01 | -0.05 | 0.03 |
| Type of natural environment (Parks=ref) | / | / | / | / | / | / | / | / | / |
| Woodland | - | - | - | - | - | - | 0.01 | -0.05 | 0.06 |
| Inland waters | - | - | - | - | - | - | \*\*\*0.19 | 0.13 | 0.25 |
| Coast | - | - | - | - | - | - | \*\*\*0.22 | 0.17 | 0.26 |
|  | edf | res df | *F*-test | edf | res df | *F*-test | edf | res df | *F*-test |
| Interaction terms | / | / | / | / | / | / | / | / | / |
| Temperature x Park c | - | - | - | - | - | - | 1.00 | 1.00 | \*\*\*12.80 |
| Temperature x Woodland c | - | - | - | - | - | - | 1.00 | 1.00 | \*\*\*21.06 |
| Temperature x Inland waters c | - | - | - | - | - | - | 1.00 | 2.34 | \*\*7.54 |
| Temperature x Coast c | - | - | - | - | - | - | 0.00 | 1.00 | 0.03 |
| Wind speed x Park c | - | - | - | - | - | - | 1.00 | 1.00 | 0.71 |
| Wind speed x Woodland c | - | - | - | - | - | - | 1.00 | 1.00 | 0.71 |
| Wind speed x Inland waters c | - | - | - | - | - | - | 0.00 | 0.00 | 0.14 |
| Wind speed x Coast c | - | - | - | - | - | - | 1.00 | 1.00 | 1.78 |
| Daylight hours x Park c | - | - | - | - | - | - | 1.00 | 1.00 | 0.71 |
| Daylight hours x Woodland c | - | - | - | - | - | - | 1.00 | 1.00 | 0.00 |
| Daylight hours x Inland waters c | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 |
| Daylight hours x Coast c | - | - | - | - | - | - | 1.00 | 1.00 | 0.68 |
|  | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI |
| Light rain x Woodland | - | - | - | - | - | - | 0.02 | -0.05 | 0.09 |
| Light rain x Inland waters | - | - | - | - | - | - | 0.03 | -0.05 | 0.10 |
| Light rain x Coast | - | - | - | - | - | - | 0.01 | -0.05 | 0.08 |
| Moderate/heavy rain x Woodland | - | - | - | - | - | - | -0.02 | -0.11 | 0.07 |
| Moderate/heavy rain x Inland waters | - | - | - | - | - | - | 0.05 | -0.05 | 0.14 |
| Moderate/heavy rain x Coast | - | - | - | - | - | - | 0.01 | -0.07 | 0.08 |
| Sex (Females=ref) | / | / | / | / | / | / | / | / | / |
| Males | - | - | - | \*\*\*0.17 | 0.16 | 0.19 | \*\*\*0.15 | 0.13 | 0.17 |
| Age (16-34=ref) | / | / | / | / | / | / | / | / | / |
| 35-64 | - | - | - | \*\*\*-0.08 | -0.10 | -0.06 | \*\*\*-0.09 | -0.12 | -0.06 |
| 65 and over | - | - | - | \*\*\*0.14 | -0.17 | -0.11 | \*\*\*0.16 | -0.21 | -0.12 |
| Social grade (AB=ref) | / | / | / | / | / | / | / | / | / |
| C1 | - | - | - | \*\*-0.03 | -0.05 | -0.01 | -0.00 | -0.03 | 0.03 |
| C2 | - | - | - | \*\*\*-0.04 | -0.07 | -0.02 | 0.01 | -0.02 | 0.04 |
| DE | - | - | - | \*\*\*-0.04 | -0.07 | -0.02 | 0.02 | -0.01 | 0.05 |
| Ethnicity (All other ethnicities=ref) | / | / | / | / | / | / | / | / | / |
| White-British | - | - | - | \*\*\*-0.07 | -0.09 | -0.05 | \*\*\*-0.09 | -0.11 | -0.06 |
| Long term illness or disability (No=ref) | / | / | / | / | / | / | / | / | / |
| Yes | - | - | - | \*\*\*-0.10 | -0.12 | -0.08 | \*\*\*-0.06 | -0.09 | -0.03 |
| Marital status (Not married=ref) | / | / | / | / | / | / | / | / | / |
| Married | - | - | - | \*\*\*-0.04 | -0.06 | -0.02 | \*\*\*-0.04 | -0.07 | -0.02 |
| Work status (Not working=ref) | / | / | / | / | / | / | / | / | / |
| Full-time | - | - | - | -0.00 | -0.02 | 0.02 | 0.00 | -0.03 | 0.04 |
| Part-time | - | - | - | 0.00 | -0.03 | 0.03 | 0.02 | -0.02 | 0.06 |
| In education | - | - | - | \*0.04 | 0.00 | 0.08 | 0.04 | -0.01 | 0.09 |
| Retired | - | - | - | \*\*0.05 | 0.02 | 0.08 | \*0.05 | 0.01 | 0.10 |
| Children in household (None=ref) | / | / | / | / | / | / | / | / | / |
| At least one | - | - | - | \*\*\*0.06 | 0.05 | 0.08 | \*\*\*0.10 | 0.07 | 0.12 |
|  |  |  |  |  |  |  |  |  |  |
| Days of physical activity | - | - | - | \*-0.00 | -0.01 | -0.00 | -0.00 | -0.01 | 0.00 |
|  |  |  |  |  |  |  |  |  |  |
| Visit day (Weekday=ref) | / | / | / | / | / | / | / | / | / |
| Weekend | - | - | - | \*\*\*0.09 | 0.07 | 0.10 | \*\*\*0.10 | 0.08 | 0.12 |
| Visit type (Local visit=ref) | / | / | / | / | / | / | / | / | / |
| Further afield visit | - | - | - | \*\*\*0.63 | 0.62 | 0.65 | \*\*\*0.51 | 0.48 | 0.53 |
| a Test of model fit compared to unadjusted model.b Test of model fit compared to adjusted model (NB to facilitate this comparison, the adjusted model sample size was reduced to only include the same respondents as were present in the adjusted model with interactions).c Smoothed regression terms fitted with thin-plate regression splines (NB instead of an environment reference category for interaction terms, a smooth is run for each environment with smoothness penalties duplicated for each).\*\*\**p*<.001\*\**p*<.01\**p*<.05 |

|  |
| --- |
| Table S6. Maximally-adjusted linear regression models predicting energy expenditure (MET-minutes) from meteorological conditions and daylight hours stratified by the type of environment the respondent visited. |
| Untransformed | Parkn=11988R2=.08 | Woodlandn=2947R2=.08 | Inland watersn=2561R2=.10 | Coastn=4271R2=.06 |
|  | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI |
| (Intercept) | -598.60 | -1024.39 | -172.81 | 86.54 | -42.25 | 215.34 | -135.74 | -346.82 | 75.34 | 117.38 | -51.71 | 286.46 |
| Max. temperature during daylight (°C) | \*\*\*3.08 | 1.50 | 4.66 | -1.16 | -5.18 | 2.85 | 2.73 | -3.96 | 9.42 | \*\*\*12.22 | 6.94 | 17.50 |
| Max. wind speed during daylight (m/s) | \*\*-5.14 | -8.26 | -2.02 | -4.03 | -11.26 | 3.20 | \*-13.43 | -25.83 | -1.04 | -4.26 | -13.52 | 5.00 |
| Daylight hours | \*3.20 | 0.12 | 6.27 | \*\*12.61 | 4.81 | 20.40 | \*\*16.99 | 4.27 | 29.72 | 4.15 | -5.86 | 14.16 |
| Rainfall (No rainfall=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Light rain (>0mm to 0.5mm) | -2.76 | -17.72 | 12.20 | 4.24 | -34.06 | 42.52 | 37.66 | -23.76 | 99.08 | 39.22 | -8.84 | 87.28 |
| Moderate/heavy rain (>0.5mm) | -3.17 | -21.67 | 15.33 | -25.24 | -72.70 | 22.23 | 37.99 | -38.81 | 114.78 | 13.96 | -45.40 | 73.33 |
| Sex (Females=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Males | \*\*\*56.86 | 43.26 | 70.45 | \*\*\*98.51 | 64.11 | 132.91 | \*\*\*196.20 | 140.37 | 252.04 | \*\*\*77.48 | 33.78 | 121.18 |
| Age (16-34=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| 35-64 | \*\*\*-36.55 | -52.20 | -20.89 | -43.75 | -88.02 | 0.52 | -27.59 | -101.30 | 46.12 | -57.05 | -114.73 | 0.62 |
| 65 and over | \*\*\*-65.48 | -98.68 | -32.28 | -73.34 | -149.08 | 2.41 | \*-120.01 | -238.61 | -1.4 | -51.68 | -145.59 | 42.23 |
| Social grade (AB=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| C1 | -9.00 | -30.00 | 10.00 | 4.81 | -37.77 | 47.28 | 20.59 | -51.78 | 92.96 | -31.26 | -88.81 | 26.29 |
| C2 | -9.37 | -30.11 | 11.36 | -19.95 | -67.57 | 27.68 | 58.79 | -19.94 | 137.52 | -17.31 | -79.09 | 44.47 |
| DE | -5.15 | -25.18 | 14.87 | -0.06 | -49.86 | 49.75 | 59.23 | -21.19 | 139.64 | 29.37 | -31.95 | 90.69 |
| Ethnicity (All other ethnicities=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| White-British | \*\*-22.95 | -38.00 | -7.90 | 21.30 | -48.98 | 91.58 | \*122.59 | 24.14 | 221.04 | \*-89.83 | -173.65 | -6.01 |
| Long term illness or disability (No=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Yes | -7.36 | -27.04 | 12.33 | -45.95 | -95.10 | 3.21 | 11.10 | -63.48 | 85.69 | 31.45 | -27.32 | 90.22 |
| Marital status (Not married=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Married | \*\*\*-26.29 | -40.90 | -11.68 | -34.28 | -72.53 | 3.96 | -40.07 | -99.56 | 19.42 | 18.89 | -27.67 | 65.45 |
| Work status (Not working=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Full-time | -4.91 | -24.65 | 14.84 | 26.64 | -28.89 | 82.17 | 73.67 | -20.34 | 167.68 | 61.68 | -9.54 | 132.90 |
| Part-time | -2.29 | -24.97 | 20.39 | 15.14 | -48.18 | 78.46 | 38.68 | -70.19 | 147.54 | \*83.39 | 1.05 | 165.72 |
| In education | \*35.60 | 8.08 | 63.13 | 40.50 | -62.37 | 143.37 | 14.97 | -154.95 | 184.90 | -13.55 | -129.82 | 102.72 |
| Retired | 18.29 | -13.38 | 49.95 | 59.94 | -14.40 | 134.28 | 61.16 | -60.98 | 183.21 | -58.70 | -152.06 | 34.66 |
| Children in household (None=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| At least one | \*\*\*32.32 | 17.36 | 47.28 | 7.33 | -31.13 | 45.79 | 21.96 | -46.62 | 90.53 | 33.50 | -18.51 | 85.51 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Days of physical activity | \*2.92 | 0.44 | 5.41 | -4.18 | -10.28 | 1.91 | \*\*-14.29 | -24.47 | -4.12 | 1.41 | -6.45 | 9.28 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Visit day (Weekday=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Weekend | \*\*\*24.85 | 11.47 | 38.23 | \*\*\*67.40 | 33.86 | 100.94 | \*\*73.91 | 18.74 | 129.07 | 12.28 | -30.13 | 54.70 |
| Visit type (Local visit=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Further afield visit | \*\*\*172.53 | 159.63 | 185.43 | \*\*\*238.65 | 203.85 | 273.45 | \*\*\*381.87 | 322.78 | 440.97 | \*\*\*350.77 | 297.80 | 403.74 |
| Log-transformed | Parkn=11988R2=.11 | Woodlandn=2947R2=.14 | Inland watersn=2561R2=.17 | Coastn=4271R2=.12 |
|  | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI |
| (Intercept) | 5.24 | 5.15 | 5.34 | 5.16 | 4.95 | 5.37 | 4.94 | 4.68 | 5.20 | 5.09 | 4.89 | 5.29 |
| Max. temperature during daylight (°C) | \*\*\*0.01 | 0.00 | 0.01 | -0.00 | -0.01 | 0.01 | 0.01 | -0.00 | 0.01 | \*\*\*0.02 | 0.01 | 0.03 |
| Max. wind speed during daylight (m/s) | \*\*\*-0.01 | -0.02 | -0.01 | -0.01 | -0.02 | 0.00 | \*\*-0.02 | -0.04 | -0.00 | -0.01 | -0.02 | 0.00 |
| Daylight hours | \*\*\*0.01 | 0.01 | 0.02 | \*\*0.02 | 0.00 | 0.03 | \*0.02 | 0.00 | 0.03 | 0.01 | -0.00 | 0.02 |
| Rainfall (No rainfall=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Light rain (>0mm to 0.5mm) | -0.01 | -0.04 | 0.02 | 0.02 | -0.05 | 0.08 | 0.03 | -0.05 | 0.10 | 0.01 | -0.05 | 0.06 |
| Moderate/heavy rain (>0.5mm) | -0.01 | -0.05 | 0.02 | -0.02 | -0.10 | 0.06 | 0.05 | -0.04 | 0.15 | -0.01 | -0.08 | 0.06 |
| Sex (Females=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Males | \*\*\*0.13 | 0.10 | 0.16 | \*\*\*0.19 | 0.13 | 0.24 | \*\*\*0.26 | 0.19 | 0.33 | \*\*\*0.11 | 0.06 | 0.16 |
| Age (16-34=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| 35-64 | \*\*\*-0.10 | -0.14 | -0.07 | -0.07 | -0.14 | 0.01 | -0.02 | -0.11 | 0.07 | \*\*-0.09 | -0.16 | -0.02 |
| 65 and over | \*\*\*-0.16 | -0.23 | -0.09 | \*\*-0.19 | -0.31 | -0.07 | \*-0.15 | -0.29 | -0.00 | \*-0.14 | -0.25 | -0.03 |
| Social grade (AB=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| C1 | -0.03 | -0.07 | 0.01 | 0.03 | -0.04 | 0.10 | 0.03 | -0.06 | 0.12 | 0.01 | -0.06 | 0.08 |
| C2 | -0.03 | -0.07 | 0.02 | \*-0.08 | -0.16 | -0.00 | \*0.10 | 0.00 | 0.20 | 0.06 | -0.02 | 0.13 |
| DE | -0.03 | -0.07 | 0.01 | 0.01 | -0.07 | 0.09 | 0.09 | -0.01 | 0.19 | \*0.09 | 0.02 | 0.16 |
| Ethnicity (All other ethnicities=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| White-British | \*\*\*-0.11 | -0.14 | -0.07 | -0.02 | -0.14 | 0.09 | 0.11 | -0.01 | 0.23 | -0.08 | -0.18 | 0.02 |
| Long term illness or disability (No=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Yes | \*\*\*-0.07 | -0.11 | -0.03 | \*-0.10 | -0.18 | -0.02 | -0.00 | -0.09 | 0.09 | -0.03 | -0.10 | 0.04 |
| Marital status (Not married=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Married | \*\*-0.05 | -0.08 | -0.02 | \*-0.08 | -0.14 | -0.02 | -0.04 | -0.12 | 0.03 | -0.00 | -0.06 | 0.05 |
| Work status (Not working=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Full-time | -0.01 | -0.05 | 0.03 | -0.02 | -0.11 | 0.07 | 0.02 | -0.09 | 0.14 | 0.04 | -0.04 | 0.13 |
| Part-time | 0.02 | -0.03 | 0.06 | -0.02 | -0.12 | 0.09 | 0.00 | -0.13 | 0.14 | 0.07 | -0.02 | 0.17 |
| In education | \*0.06 | 0.00 | 0.12 | -0.04 | -0.20 | 0.13 | 0.02 | -0.19 | 0.23 | -0.03 | -0.17 | 0.11 |
| Retired | \*0.07 | 0.00 | 0.13 | 0.11 | -0.01 | 0.23 | 0.04 | -0.11 | 0.19 | -0.01 | -0.13 | 0.10 |
| Children in household (None=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| At least one | \*\*\*0.13 | 0.10 | 0.16 | 0.03 | -0.04 | 0.09 | 0.03 | -0.06 | 0.11 | \*0.07 | 0.01 | 0.13 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Days of physical activity | \*0.01 | 0.00 | 0.01 | -0.01 | -0.02 | 0.00 | \*\*\*-0.02 | -0.03 | -0.01 | -0.00 | -0.01 | 0.01 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Visit day (Weekday=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Weekend | \*\*\*0.09 | 0.06 | 0.11 | \*\*\*0.14 | 0.08 | 0.19 | \*\*\*0.13 | 0.06 | 0.20 | \*\*0.08 | 0.03 | 0.13 |
| Visit type (Local visit=ref) | / | / | / | / | / | / | / | / | / | / | / | / |
| Further afield visit | \*\*\*0.44 | 0.41 | 0.47 | \*\*\*0.56 | 0.50 | 0.61 | \*\*\*0.68 | 0.61 | 0.76 | \*\*\*0.61 | 0.55 | 0.68 |
| \*\*\**p*<.001\*\**p*<.01\**p*<.05 |  |  |  |  |  |  |  |  |  |  |  |  |

|  |
| --- |
| Table S7. Generalised variance inflaction factors adjusted for the dimensions of confidence ellipsoids (i.e. adjusted for the degrees of freedom associated with each regression term) for each of the stratified models. |
|  | Degrees of freedom of regression term | Park | Woodland | Inland waters | Coast |
| Max. temperature during daylight (°C) | 1 | 1.50 | 1.51 | 1.51 | 1.51 |
| Max. wind speed during daylight (m/s) | 1 | 1.07 | 1.08 | 1.07 | 1.06 |
| Daylight hours | 1 | 1.51 | 1.53 | 1.52 | 1.51 |
| Rainfall | 2 | 1.04 | 1.05 | 1.04 | 1.04 |
| Sex | 1 | 1.06 | 1.06 | 1.05 | 1.06 |
| Age | 2 | 1.36 | 1.28 | 1.32 | 1.35 |
| Social grade | 3 | 1.04 | 1.03 | 1.04 | 1.03 |
| Ethnicity | 1 | 1.05 | 1.00 | 1.02 | 1.01 |
| Long-term illness or disability | 1 | 1.07 | 1.05 | 1.06 | 1.07 |
| Marital status | 1 | 1.14 | 1.10 | 1.08 | 1.09 |
| Work status | 4 | 1.21 | 1.17 | 1.19 | 1.20 |
| Children in household | 1 | 1.14 | 1.10 | 1.10 | 1.12 |
| Days of physical activity | 1 | 1.01 | 1.01 | 1.01 | 1.01 |
| Visit day | 1 | 1.00 | 1.01 | 1.01 | 1.01 |
| Visit type | 1 | 1.01 | 1.01 | 1.02 | 1.00 |
| N.B Calculated as GVIF1/(2\*df) where GVIF is the generalised variance inflation factor (i.e. the inflated size of the confidence ellipse/ellipsoid for the coefficients of the term in comparison with what would be obtained for orthogonal data, if such data existed) and df is the degrees of freedom associated with the regression term. See Table 2 on page 182 of the following manuscript where this calculation was first introduced: Fox, J., Monette, G., 1992. Generalized Collinearity Diagnostics. Journal of the American Statistical Association 87, 178–183. <https://doi.org/10.1080/01621459.1992.10475190>.  |

|  |
| --- |
| Table S8. Abbreviated results from subsidiary analyses which examine the potential moderating effect of dog ownership on relationships between meteorological conditions and daylight on energy expenditure (MET-minutes) across the four key natural environment types. |
| Untransformed | Parkn=11988R2=.09 | Woodlandn=2947R2=.14 | Inland watersn=2561R2=.12 | Coastn=4271R2=.07 |
|  | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI |
| (Intercept) | 247.19 | 197.69 | 296.70 | 29.30 | -123.78 | 182.38 | -191.55 | -424.30 | 41.20 | 134.36 | -52.12 | 320.85 |
| Max. temperature during daylight (°C)\*owns dog | 0.42 | -3.03 | 3.88 | 5.70 | -2.10 | 13.51 | -0.30 | -14.23 | 13.62 | -3.35 | -14.56 | 7.85 |
| Max. wind speed during daylight (m/s) \*owns dog | 2.47 | -4.12 | 9.06 | -7.17 | -21.26 | 6.92 | 0.41 | -25.63 | 26.46 | -8.32 | -27.98 | 11.34 |
| Daylight hours\*owns dog | -2.41 | -9.06 | 4.24 | \*\*-22.36 | -37.48 | -7.24 | -16.70 | -43.16 | 9.77 | 5.90 | -15.29 | 27.10 |
| Rainfall (No rainfall=ref) |  |  |  |  |  |  |  |  |  |  |  |  |
| Light rain (>0mm to 0.5mm) \*owns dog | 9.56 | -22.90 | 42.03 | 24.17 | -50.21 | 98.54 | -38.92 | -167.53 | 89.68 | -68.89 | -172.00 | 34.21 |
| Moderate/heavy rain (>0.5mm) \*owns dog | 3.83 | -36.17 | 43.82 | \*96.86 | 4.44 | 189.27 | -8.87 | -168.61 | 150.87 | -81.01 | -206.29 | 44.27 |
| Log-transformed | ParkR2=.16 | WoodlandR2=.24 | Inland watersR2=.21 | CoastR2=.15 |
|  | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI | *b* | LCI | UCI |
| (Intercept) | 5.24 | 5.14 | 5.35 | 5.19 | 4.95 | 5.43 | 4.93 | 4.64 | 5.21 | 5.23 | 5.01 | 5.45 |
| Max. temperature during daylight (°C) \*owns dog | 0.00 | -0.00 | 0.01 | -0.00 | -0.01 | 0.01 | -0.01 | -0.02 | 0.01 | -0.00 | -0.02 | 0.01 |
| Max. wind speed during daylight (m/s) \*owns dog | 0.01 | -0.01 | 0.02 | -0.01 | -0.03 | 0.01 | -0.01 | -0.04 | 0.02 | -0.01 | -0.04 | 0.01 |
| Daylight hours\*owns dog | -0.01 | -0.02 | 0.00 | -0.02 | -0.04 | 0.01 | -0.00 | -0.04 | 0.02 | \*0.03 | 0.00 | 0.05 |
| Rainfall (No rainfall=ref) |  |  |  |  |  |  |  |  |  |  |  |  |
| Light rain (>0mm to 0.5mm) \*owns dog | 0.02 | -0.04 | 0.09 | 0.00 | -0.12 | 0.12 | -0.05 | -0.20 | 0.11 | -0.05 | -0.17 | 0.07 |
| Moderate/heavy rain (>0.5mm) \*owns dog | 0.03 | -0.05 | 0.11 | 0.14 | -0.01 | 0.29 | -0.01 | -0.20 | 0.19 | -0.06 | -0.21 | 0.09 |
| \*\*\**p*<.001\*\**p*<.01\**p*<.05 |  |  |  |  |  |  |  |  |  |  |  |  |
| N.B These models also control for the fixed effects of all meteorological and daylight variables, as well as dog ownership, and all other covariates listed in Table S6. |



*Figure S1. Hours of sunshine on recreational visits to natural environments across the sampling period. Hours of sunshine data were derived from the Met Office’s numerical weather prediction models (*<https://www.metoffice.gov.uk/research/modelling-systems/unified-model/weather-forecasting>).