RAMBLERS

NEW ECONOMICS FOUNDATION

ROUTES TO NATURE

UNLOCKING LOCAL ACCESS IN ENGLAND AND WALES

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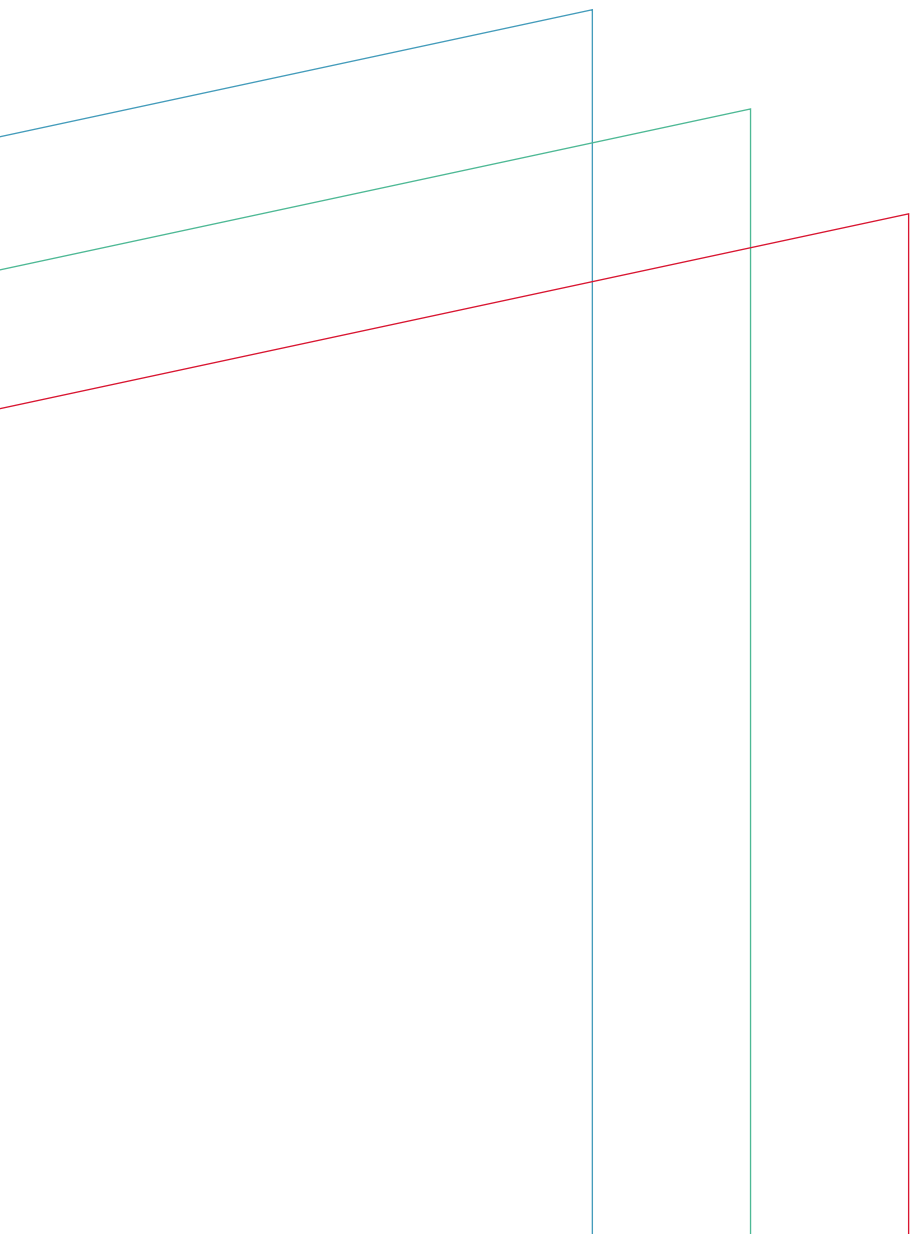

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EXECUTIVE SUMMARY

Public understanding of the critical role played by the infrastructure that connects people, places, and nature has developed rapidly in recent years. In our last report, we advanced further, developing a deeper understanding of how one key component of the infrastructure of access to nature, the public right of way (PRoW) network is distributed across neighbourhoods and socioeconomic groups in England and Wales. We highlighted that PRoW provision is deeply unequal across England and Wales with lower-income and more ethnically diverse communities having less access to PRoW. In this report, we explore further what this inequality means for health and wellbeing outcomes in England and Wales, and how government policy solutions might close the gap.

As PRoW represent only one component of the wider 'walkable network', which also includes pavements and other paths provided on a permissive (ie non-statutory) basis, alongside open access land and parks, isolating the impact of the presence of PRoW presents challenges. Here we use a logistic regression model to build a statistical relationship between PRoW provision and visits to green spaces using active travel modes (walking, cycling, and mobility aids) as reported in national surveys. We show that after controlling for other key influences on visits to green space such as dog ownership, income level, and age, the presence (or lack) of PRoW has a strong statistical correlation with physical activity in green space. We further highlight that the greenness of the walking route itself, and the surrounding area, are also associated with greater physical activity in nature. Given the known health and wellbeing benefits of physical activity in nature, this suggests that the inequality in PRoW provision in England and Wales likely drives inequity in social outcomes.

Having strengthened the evidence on this link, we then focus on how our database of PRoW provision, and the preferred features of paths, might be used to support targeting of government interventions aiming to improve the social outcomes derived from nature. In particular, we highlight the communities across England and Wales deprived of access to PRoW, and/or access to green walking experiences. These communities include deep urban communities, mostly in the north, as well as some rural communities found particularly on the east coast of England. While these communities represent good areas to focus policy activity and funding, expanding access to the benefits of physical activity in nature is a complex matter, and always highly context specific.

To build on our data-led understanding of the relationship between people and their paths we dive deeper into four case study regions: south-east Wales, West and South Yorkshire, Devon and Dorset, and the West Midlands Combined Authority (CA). Through these case studies, informed by further data on local physical activity derived from the Strava Metro dataset, we show the features of paths and PRoW which seem to encourage physical activity. In particular, we highlight the importance of off-road, linear green corridors, connecting the inner city with the rural periphery, and often running beside water courses, for the population's physical activity in nature. We highlight that PRoW are generally the public's favoured form of path (where they are available), seemingly because they are more likely to hold some or all of these features. Despite this, some key areas of England and Wales are critically deprived of PRoW. We highlight the case of the West Midlands CA, where PRoW are often lacking and, where available, are generally fragmented and less green than some of the other urban case studies we highlight.

Inadequate provision of paths, as evidenced through PRoW, clearly represents a key barrier to communities' physical activity in nature in deprived areas of England and Wales. We show that this lost value can be put in monetary terms, using established 'wellbeing valuation' metrics. While attempts to put a pound value on social and natural goods should be approached with caution, the levels of value we illustrate further reinforce the case for proactive policy intervention.

We present our proposed Green Walking Fund. This fund aims to resource local places to equalise and expand access to nature through the provision of walking infrastructure. Where the PRoW

network can be expanded, it should be prioritised in supporting people's ability to access nature closer to home. However, for places where PRoW expansion might not always be possible, notably in deep-urban communities where barriers are physical (ie availability of space), social, and political, future improvements to the walkable network should include the preferred features of paths, as identified, which drive physical activity in nature.

We set out a call for £650m of funding per year (£12 per person), and equivalent, additional, Barnett consequentials for the devolved nations, targeted at several key policy objectives, including:

- **Resourcing placed-based understanding and intervention on access to nature.** Central government funding provided to every local authority in the country sufficient to cover the costs of two Rights of Way officers per local authority, or two Rights of Way officers per 100,000 people, whichever is greater.

- **Equalising access.** Central government funding, distributed based on need, aimed at equalising access to nature in areas currently underserved by the existing walkable network. We are calling for an investment fund of £400m per year, sufficient to construct and maintain 2km of new footpath, develop green walking routes for urban communities, and bring paths in disrepair back into use in 'hard to build' areas in 100 local authorities every year (ie. 200km in total).

- **Restoring access.** Central government funding, distributed competitively by application, to local authorities seeking support to bring lost historic and obstructed paths back into use, or replace lost paths in strategically valuable locations. We are calling for an investment funding pot of £100m per year, sufficient to construct and maintain 400km of new PRoW or urban green routes, and sufficient funds to improve the existing network in 'easy to build' locations every year.

1. INTRODUCTION

Public paths are critical infrastructure of community life in England and Wales. In Part One of this report series we analysed the provision of public rights of way (PRoW) across neighbourhoods in England and Wales.[1] We developed a new database collating PRoW routes covering 98% of the surface area of England and Wales and built a novel set of indicators including the total length of PRoW provided, the distance to PRoW of a minimum continuous length, the 'greenness' of PRoW (ie natural vegetation in the vicinity of the route), and the proximity and accessibility (via PRoW) of open access land, all measured at the local neighbourhood level.

Through our analysis of this dataset, we showed that PRoW provision is deeply unequal between regions and social groups, with those groups experiencing the highest levels of economic and social deprivation also often provided with the lowest length of PRoW. While evidence available in secondary research suggests it is highly likely that this deficit is a causal driver of worse social outcomes, we have thus far only proven a correlation.

Proving causation between additional path infrastructure provision and additional physical activity in nature (itself a known driver of multiple positive social outcomes) is difficult due to the complexity and incompleteness of the data. While in this instance we are working with perhaps the most complete digitalised PRoW map yet assembled, PRoW represent just one component, albeit a very important one, of paths in England and Wales, or what might be termed the 'walkable network'. Pavements beside public highways and paths without statutory protection also play a key role in facilitating the access to nature of communities. Besides paths, the public also has the freedom to roam on designated (or mapped) areas of open countryside in England and Wales.

In this report, we look to isolate the social value generated by the walkable network in England and Wales. We seek to understand what characteristics of a path maximise its value, and hence what policy actions might best expand the positive social benefits of walking in nature. This research focuses on England and Wales; Scotland and Northern Ireland are excluded due to data limitations and the complex differences between legislative and cultural approaches to paths. More work is needed to understand the value of paths to people and places in both countries.

1.1 RESEARCH QUESTIONS

- **Barriers to usage:** What are the main barriers to walking in nature in England and Wales, and what role do paths and access provision play?
- **Connecting paths and access provision to usage:** Can we isolate the specific impact of inadequate paths and access provision on usage?
- **Paths and access provision as a barrier:** Where are paths and access provision a problem?
- **Case studies:**
    - What are the subregional dynamics of walking infrastructure provision and usage?
- **Policy prescriptions:** What policy approaches might lift barriers to path usage and walking in nature?

2. EXISTING EVIDENCE

In Part One of this report series, we reviewed the evidence on walking as a connection between communities and nature, the importance of access to green space, and inequities in the provision of green space. Through our analysis, we highlighted how these inequities extend to the public rights of way (PRoW) and wider access to walking in nature. Here, to understand how, when, and where infrastructure provision delivers social outcomes, we review the evidence on the primary barriers to walking in nature faced by individuals, as well as evidence on how those barriers can be lifted.

2.1 BARRIERS TO WALKING IN NATURE

The University of Edinburgh conducted a comprehensive literature review of the barriers to recreational walking for Ramblers Scotland. The review divides the barriers faced into individual, social, and environmental.[2] Perhaps the most critical component of the environmental barriers is the provision of paths and access points to nature, as measured in (i) proximity, (ii) length, and (iii) the extent of the paths and access lands available, and aspects of their quality both in terms of (iv) design and (v) maintenance. Points i–iii were discussed in some detail in Report One, albeit limited to the provision of PRoW. Issues of design and maintenance were not addressed primarily due to the lack of robust data available to assess such issues at a national scale.

Better data is available on design and maintenance issues in relation to public green space provision. Notably, deterioration in the perceived quality of local green spaces, as documented over recent years,[3] can be a barrier to use,[4] which is particularly relevant for deprived and minority communities who, among other issues, often live in local authorities less well-resourced to address such issues. In these contexts, the unavailability or unaffordability of transportation options to reach higher-quality spaces also becomes a secondary barrier.[5] Evidence on the issues specifically related to infrastructure quality and its impact on walking in natural environments is more limited.

Known barriers to walking more broadly and specifically to 'recreational walking' may apply. Evidence suggests that individuals living in deprived urban areas, who are disproportionately from minority ethnic and religious groups, have greater exposure to hazardous walking environments, including higher volumes of traffic and air pollution, as well as on-street parking, and therefore encounter greater barriers to walking in general.[6]

When asking an individual to report on the barriers to walking they experience, the line of questioning and framing of the question can elicit different responses from participants. For example, a common factor cited as a barrier is 'cost'. Research by Leeds Beckett University presents survey results in which 29% of respondents in England and Wales cite cost as a reason for not participating in recreational walking activities (n=2,480). This rose to 40% of respondents in the Black, Asian and Minority Ethnic (BAME) grouping (n=78).[7] Additional factors mentioned included lack of time and transportation (20%, respectively). Both of these factors have overlap with the issue of cost, with transportation representing a cost, and pressure to increase earnings, and slow transportation, a drain on time.

While 'hard' factors such as provision levels, finances, and transportation can be barriers to recreational walking and use of green space, studies are keen to emphasise that even in the presence of good quality provision, other structural and social barriers can mean that minority and deprived communities are less likely to avail of the benefits of recreational walking. One study identifies "fear of crime, antisocial behaviour and accidents" as the "overriding barriers" to participation.[8] Additionally, experiences of the path and/or green space itself are only one part of the picture; perceptions of the route to the green infrastructure, and its safety and attractiveness, can be as important.[9]

Alongside safety issues, other more complex social and cultural dynamics are important in determining levels of physical activity, walking, and interaction with green space. The system of features that make up a healthy, dynamic, local community all play a role. This includes the availability of sufficient

amenities in the local area, including play facilities, shops, and eateries to enable communities to stay local and combine their physical activity and access to nature with their everyday chores. In heavily time-constrained communities, the absence of this capacity can lead to the sacrifice of activity in nature and recreational walking in favour of travelling further afield to access other amenities.[10] Such issues are at the heart of the case for the 15-minute city and the 20-minute neighbourhood.[11] Many studies have demonstrated that bringing amenities within a 10-minute walking range can significantly increase walking rates.[12]

The aforementioned features all contribute to building a sense of place. Perceptions of the sense of place and sense of community, ie whether space is 'for me', can be important. Noël et al. (2021) describe the issue of "not feeling in place because of the dominance of a specific group of users or because of community perceptions".[13] Where communities are weak, social isolation and loneliness prevail, and these too can act as barriers to walking in nature.[14] This factor is of particular importance to understanding how and why some minority communities experience greater barriers to activity in nature.[15]

To understand safety and sense of place in minority experiences of walking in nature, racism and institutional discrimination cannot be ignored.[16] Participatory research, facilitated by NEF and CPRE, the countryside charity, highlights some of the specific barriers experienced by ethnic minority groups seeking to enjoy nature in the countryside. These include experiences of racism, which impact safety and fear in rural areas and away from the safety of home, as well as the loss of connection with nature, which can occur when an individual is separated from their heritage (or where relevant their country of origin). The general lack of visibility of ethnic minority representation in the countryside and nature sectors continues to impact how welcome some individuals feel in nature.[17]

Other dynamics which drain the sense of place and community cohesion include neighbourhood transience and the unaffordability of housing types. Where families are forced to relocate to satisfy their housing needs due to prohibitive costs in a local area, community churn emerges, which can reverse the painstaking process of developing the community, knowledge, cohesion, and sense of place that bring people out into public spaces. When asked about barriers, the simple issue of knowledge and access to information about local green spaces and green routes and how to access them remains a commonly cited factor.[18]

The aforementioned University of Edinburgh review highlights a range of studies emphasising the general population's lack of knowledge about where they can legally and safely walk and their desire for better availability of maps.[19] Signage is an important factor in enhancing knowledge and hence confidence to explore nature, yet lack of signage and difficulties finding the way accounted for almost half of the negative reports in Ramblers' Pathwatch programme assessing the quality of paths across England and Wales.[20] A final consideration to make is the reinforcing effect of low access to nature. Habits formed during childhood have been shown to ingrain into adult life, reducing base levels of engagement with nature.[21]

2.2 INCREASING ENGAGEMENT WITH WALKING IN NATURE

The complexity of measuring the additionality of any changes (ie in changes in comparison to a control group or similar) presents obstacles to effective measurement of interventions aimed at generating public physical activity. As such, careful attention must be paid to the robustness of studies reporting impacts. One systematic review brings together evidence on the effectiveness of interventions across the domains of (i) media, (ii) economic incentives, (iii) public institution initiatives (ie activity in schools and workplaces), (iv) environmental/infrastructural changes, and (v) mandates. Interventions i-iv were all associated with at least some incidences of effectiveness, albeit with varying significance and effect size. The relative cost-effectiveness is not analysed.[22]

Our focus in this report is primarily on lifting infrastructure-related barriers to walking. More recent UK-focused studies have provided more concrete evidence of the effectiveness of new infrastructure/routes in increasing walking and cycling rates. The wide-reaching Connect2 programme, a five-year project run by Sustrans, involved the creation of new walking and cycling routes at 84 UK locations and was analysed using pre-post user data collection, and longitudinal

cohort data. The study demonstrates the performance of the routes in generating new activity, including an average 38% increase in usage rates, and higher usage increases where baseline usage rates were lowest.[23] Specifically in the domain of PRoW creation, the UK government's Paths for Communities programme, involving the creation/improvement of 183km of PRoW, was subjected to evaluation. Three case study projects were analysed in detail, involving 17km of new PRoW. At the time of evaluation, the projects were estimated to have created around 1,500 new unique path users, and 44,000 new trips per year, driving significant health and community benefits.[24]

3. CONNECTING PROVISION LEVELS TO USAGE RATES

Here we look to build on our new understanding of the geography of path provision, developed in Report One,[25] to better understand path usage at a large scale. Tracking the use of a national network of paths and open access land presents a range of significant methodological challenges and data availability obstacles. Capturing primary data on the usage of such a large network represented too great a resourcing challenge; as such, we conducted a review of secondary data available in national datasets. Our review aimed to identify publicly available datasets which measured rates of physical activity and/or visits to green space at a sufficiently localised spatial scale to connect neighbourhood usage rates to neighbourhood provision in (almost) every neighbourhood across England and Wales.

The large majority of the official datasets that capture data in domains relevant to walking in nature, such as the Active Lives and Taking Part Surveys, do not release data at geographies lower than the local authority level. This level of local specificity is insufficient to track the impact of infrastructure provision. We identified three sources with such precision. In the domain of visits to green space, Natural England's survey Monitor of Engagement with the Natural Environment (MENE) – spanning 2009–2019 – provides data at Lower Super Output Area (LSOA) level for England only.[i] Natural England's successor survey, The People and Nature Survey, following a change to data protection arrangements, no longer provides location data at this level. As such, we used the MENE survey for analysing rates of visits to green space with reference to local public rights of way (PRoW) provision in England. Comparable data is needed in Wales (and indeed Scotland and Northern Ireland) and the development of such a dataset should be a priority for the government.

In the domain of broader physical activity, Strava Metro, the social enterprise arm of the Strava mobile application, provides anonymised data on the physical activity of Strava app users. A partnership was arranged with Strava Metro to supply anonymised county-level physical activity data on their users across walking, hiking, and running for 2021. This data was only supplied for subnational regions, and not for the country as a whole; as such this data informs the case studies presented later in this report, but not the following national analysis.

3.1 PROW AS A DRIVER OF VISITS TO GREEN AND NATURAL SPACES AT THE NATIONAL LEVEL

3.1.1 Method

We built a logistic regression model designed to statistically analyse the relationship between the provision of PRoW at the neighbourhood level (as characterised in Report One of this series) and rates of visitation of public green and natural spaces. From the outset, it is important to note that this analysis only looks at the proportion of England's walkable network which is designated as PRoW. In many locations, it will be possible to walk in nature via other non-PRoW paths. If, in general, where PRoW are absent, access to nature is fulfilled by other categories of path, we would not expect to see a statistical relationship between the provision of PRoW and rates of physical activity in nature. On the other hand, if PRoW provide a distinct service increasing connectivity with nature, a statistical relationship should prevail.

Rates of visitation and physical activity in green space were taken from Natural England's MENE survey, Years 1 to 10. The full MENE respondent dataset contains 468,371 individual survey responses collected between 2009 and 2019. As the MENE dataset only covers residents of England, the results derived from this analysis apply only to the relationship between people and nature in England, but we would expect there to be some transferability of some of the trends reported.

We aimed to connect the MENE dataset with our database of PRoW provision using location identifiers. The public MENE dataset contains one primary location identifier, the 'postcode sector'. Unfortunately, it is not possible to accurately align

i Lower Super Output Areas (LSOAs) are small areas used to geographically group neighbourhoods in the UK. The average population of an LSOA is around 1,500 people.

a postcode sector to an LSOA. Postcode sectors span multiple LSOAs. However, the public MENE dataset also contains, for most respondents, their local neighbourhood's rank on the government's Index of Multiple Deprivation (IMD) (2015). These ranks are linked to uniquely identifiable LSOAs and as such, with a simple lookup, it was possible to assign an LSOA code to most respondents in the MENE dataset. Not all respondents provided valid location of residence data and as such, the final LSOA-coded dataset included 349,611 complete responses. This formed our analysis dataset. Using simple lookup functions we were able to assign to each respondent the corresponding data about their local PRoW and green space provision derived from our primary neighbourhood-level provision dataset detailed in Report 1.

We conducted our analysis using a multivariate logistic regression model, an approach established as robust practice in the academic literature on the analysis of use rates of green and natural spaces.[26,27] This regression tested the influence of different independent variables on the variable of interest – in this case, a respondent's frequency of visits to green space. The definition of green space used in the MENE survey is shown in Box 1. It is important to note that this definition of green space is not limited to officially designated green spaces and includes farmland.

For our model setup, we simplified the frequency of MENE respondents' visitation of green and natural spaces to a binary yes/no test against whether a respondent visited green space in the seven days prior to survey (the MENE survey's primary indicator of visitation rates). We further filtered this data to only include those visits that were conducted by foot, bicycle, or mobility aid. The objective was to capture only those visits that took place in a respondent's local area. It is possible that by excluding visits with a primary mode of transport of car, bus, or train, we did in fact exclude visits that took place in a respondent's local area. For example, a respondent with a disability may use a car to travel to a green space only a mile or two away. However, this would apply to a small proportion of respondents, and their exclusion is unlikely to have a material impact on a national analysis such as this.

We tested multiple model setups to identify the setup with the most explanatory power on this binary outcome. Independent variables included in the final model were respondent age, the IMD rank of the area, dog ownership, and our variables of interest representing paths and access provision. These independent variables are identified in the academic literature as those with the most power when it comes to explaining whether an individual will have visited green space in the past seven days.[28]

To measure the overall explanatory power of the logistic regression model, we used McFadden's pseudo-R^2,[29] widely regarded as one of the best measures of logistic model fit. McFadden's R^2 will typically produce a lower estimate than would a traditional R^2 measure. Values below 0.2 can still be associated with a good model fit.

3.1.2 Results

Initial descriptive analysis of the MENE dataset identified that some 44% of respondents had visited green space in the seven days prior to interview. Further analysis reveals that the majority of the remaining 56% of the population do visit green spaces but at a frequency lower than weekly. Of these visits, our analysis suggests some 56% are made on foot, by bicycle, or mobility aid. This proportion seems somewhat low but derives directly from the MENE visit data. Using these assumptions, we can estimate that the population

BOX 1: DEFINITION OF GREEN SPACE PROVIDED TO RESPONDENTS OF THE MENE SURVEY

By out-of-doors we mean open spaces in and around towns and cities, including parks, canals and nature areas; the coast and beaches; and the countryside including farmland, woodland, hills, and rivers. This could be anything from a few minutes to all day. It may include time spent close to your home or workplace, further afield or while on holiday in England.

However, this does not include routine shopping trips or time spent in your garden.

of England and Wales takes somewhere in the region of 2.8bn trips to green spaces every year, by foot, bicycle, or mobility aid.

3.1.2.1 Model 1

Provision of PRoW, ie within 800m of a postcode (Indicator 1) proved to be highly statistically significant ($P<0.001$) in its correlation with higher rates of visitation to green and natural spaces. Model 1 had a relatively low McFadden's R^2 of 0.090, as was expected, but still implying a model with some explanatory power. This finding suggests that PRoW (or at least paths with PRoW features) do indeed play a unique role in facilitating access to green space, and their absence is not simply substituted by other types of paths. The output of Model 1 (Table A1, Appendix) suggests that doubling the average local neighbourhood provision of PRoW could lead to a 6.2% increase in the proportion of individuals visiting green space every week. While this may sound modest, this change equates to at least an additional 1.5m visits in any given week at the England and Wales level or 78.5m visits per year.

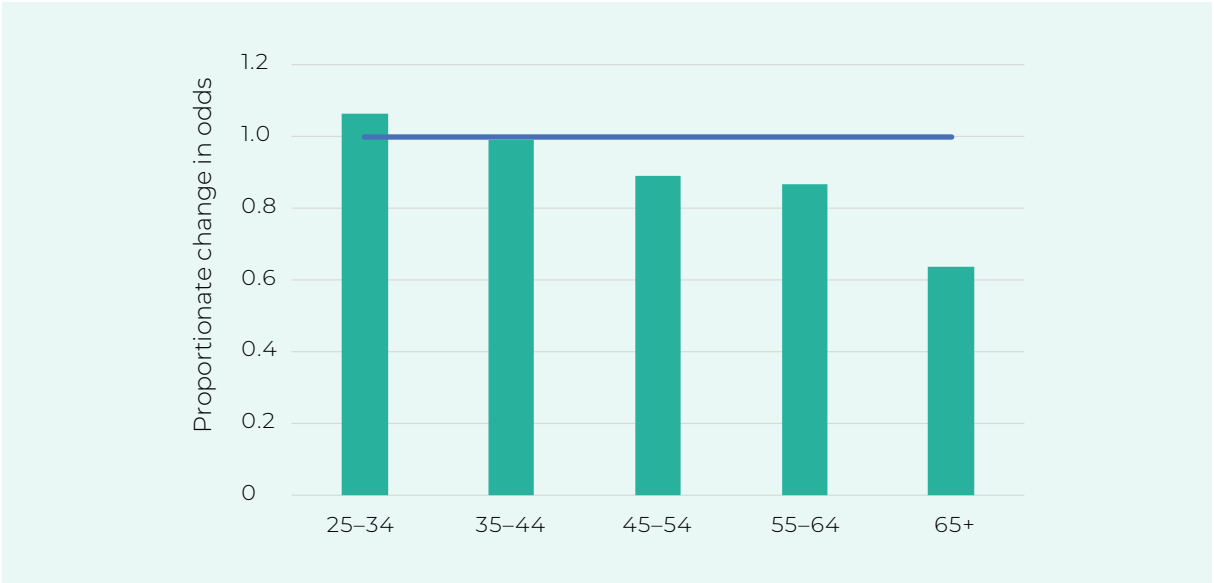
All of our other independent variables also proved to be highly statistically significant, and influential in their effect on visitation of green space. Dog ownership more than doubled the probability of an individual visiting green space in the past seven days. Perhaps unsurprisingly, dog ownership appears the strongest factor influencing whether an individual visits green space weekly.

Other factors are important too, specifically, moving up one decile rank on the IMD (ie moving 10 percentage points towards the least deprived end of the spectrum) – a useful composite indicator of living standards and poverty within the local area – was associated with a 5.4% increase in the probability of visiting a green and natural space in the past seven days. Being aged between 16 and 44 also increased the probability of visiting green and natural spaces in the past seven days (Figure 1). Someone of age 65+ was around 35% less likely to visit than someone aged 16–44. Further details on Model 1 are set out in the appendix.

3.1.2.2 Model 2

In Model 2, we introduced a measure of the greenness of the area within which a PRoW sits – indicator 4C in the database developed in Report One – to our set of independent variables. This indicator describes the percentage of greenness of the land the PRoW passes through. Greenness is derived from satellite observations of land cover measured in 250m grid cells and the data was originally sourced from Natural England.[30] We included this indicator in our analysis to explore the possibility that the greenness and the total length of PRoW provision perform distinct functions, and impact visits to green and natural spaces in different ways. This produced a very marginal improvement in the model's explanatory

FIGURE 1: PROPORTIONATE CHANGE IN THE ODDS OF AN INDIVIDUAL VISITING A GREEN OR NATURAL SPACE WHEN COMPARING DIFFERENT AGE GROUPS WITH THE 16–24 GROUP
(a blue line is added to emphasise the 16–24 reference level)



power, with a McFadden's R^2 = 0.092. PRoW greenness was shown to be highly statistically significant in its influence on visits to green space.

When we introduced PRoW greenness to the model as a separate variable, the influence of PRoW length (Indicator 1) on visits to green and natural spaces remained similar (in fact, it became very slightly stronger). However, PRoW greenness (Indicator 4C) also had a significant impact on an individual's probability of visiting green and natural spaces. Just a 10% increase in PRoW greenness correlated with a 1.9% increase in the probability an individual would report visiting green and natural spaces in the past seven days. On this basis, a 10% increase in the greenness of the national PRoW network could result in around 19 million additional trips annually. Put alternatively, switching the PRoW in an individual's local area from an entirely 'grey' or 'non-green' environment to a completely green environment (such as a forest) increased their chances of visiting green space within the past week by around 20%.

Caution is required when interpreting this analysis of greenness. In particular, the co-dependence of variables needs to be considered. For example, if a path (PRoW) is greener, the local area in general is likely greener. Therefore, some of the impact that the model is picking up, may relate to the general greenness of the local area, not just the greenness of the area immediately surrounding the PRoW. Further research would be required to isolate this effect. For the time being, the safest conclusion would seem to be that increasing the length of local PRoW can increase visits to green and natural spaces, further ensuring that PRoW are green will significantly enhance the benefit of the additional PRoW, but to access the full benefit described by this model, wider greening of the local neighbourhood might also be required. Further details on Model 2 are set out in the appendix.

3.1.2.3 Additional model tests

As part of the validation process of our statistical models, we also tested several additional factors that may influence physical activity in green and natural spaces (ie independent variables). We tested the effect of distance from a PRoW of at least 3km in length (Indicator 3), another measure of the quality of path provision in a local area. As expected, when tested in isolation, greater distances from PRoW were associated with lower rates of green and natural space visitation, with high significance ($P<0.001$). However, when tested in combination with Indicator 1 (length of PRoW), Indicator 3 lost its statistical significance. The direction of the effect remained constant (ie greater distances reduced visitation), but the P-value rose to 0.44, a non-statistically significant level. The explanatory power of the combined model remained constant. In summary, the total length of PRoW in the local neighbourhood appears to be a marginally better explainer of green and natural space visitation than the precise distance to a long (3km+) PRoW. This makes sense, as a degree of consideration of distance is already baked into Indicator 1, which measures the total length of PRoW within an 800m radius, ie these indicators overlap, but one is a slightly better explainer of individual behaviour.

In addition to testing other PRoW indicators, we explored the impact of a range of variables related to access and physical activity in green and natural spaces. Specifically, we tested the impact of formal green space provision, as measured in the combined size of public parks and gardens in the local neighbourhood and the average distance to the nearest park, as recorded by the Office for National Statistics (ONS). In both cases, our primary indicator of PRoW provision, Indicator 1, remained highly statistically significant, with minimal change to the effect size irrespective of whether formal green space provision was included. The explanatory power of the model (as measured by McFadden's $R^{2)}$ also did not change. The implication is that PRoW provision is important in its own right, and plays a different role in explaining public visits to green spaces than that of the provision of formally recognised green spaces. As might be expected, the shorter the distance to the nearest officially recognised green space, the higher the probability a respondent would report visiting green space in the past seven days, but the effect size was limited, and this was not a statistically significant finding.

In a further test, we looked at the introduction of local housing stock age as an independent variable in our model. Housing stock age is a useful indicator of different eras of town and countryside planning; it allows us to explore the legacy of different approaches to path provision. Introducing housing stock age did not materially

improve the model fit (McFadden's $R^{2)}$ but it did reveal that residents in neighbourhoods dominated by housing built pre-1929 were significantly more likely ($P<0.05$) to visit green space than residents in all other development classes. Introducing housing stock age, however, had minimal impact on the significance or effect size of our PRoW provision indicator. Plain language summaries of how different household characteristics influenced a respondent's likelihood of having visited green space in the past seven days (by foot, bicycle, or mobility aid) are shown in Table 1.

While our McFadden's R^2 remained relatively low across all of our models, this was to be expected given the complexity of the research question. Further research is required to dig deeper into the role of PRoW provision as a facilitator of green space visitation. While it remains possible that the PRoW variable in our model may be explaining visitation behaviour only partially driven by PRoW provision and partially by other co-dependent factors, we have ruled out several potential factors in this analysis, such as the role of green space and the age of the housing development. As such, the weight of evidence strongly suggests that the creation of new and additional paths with the preferred PRoW characteristics would likely result in a strong increase in walking, cycling, and mobility in green spaces, and in resultant social benefits. In other words, while many factors affect physical activity and access to nature, the provision of paths matters.

TABLE 1: PLAIN LANGUAGE SUMMARY OF KEY RESULTS

Variable	Example	**Response** (ie proportionate increase in the probability an individual will have visited green space in the past seven days by foot, bicycle, or mobility aid)
Metres of PRoW within 800m of a postcode	Increase the length of PRoW within an 800m radius of an individual's postcode by 1,600m (1 mile)	4.1%
Percentage greenness of area surrounding PRoW	Increase the greenness of PRoW within an 800m radius of an individual's postcode by 10%	1.9%
Deprivation of the local area	Reduce the deprivation of an individual's local area by 1 decile rank (ie 10 percentage points)	6.4%
Dog ownership	Switch an individual from a confirmed non-dog owner to a dog owner	140%
Housing stock age	Move an individual from an area dominated by housing built post-2000 to an area dominated by housing built between 1900 and 1919	27%
Average probability an individual in the MENE survey will have visited a green space in the past seven days by foot, bicycle, or mobility aid		24.5%

4. WHERE IS ACTION NEEDED? IDENTIFYING A POLICY TARGET GROUP

We have presented strong evidence that provision of green local public rights of way (PRoW) drives walking and visits to green spaces and as such, policy targeting improved provision of PRoW (or similar paths) can drive positive social outcomes. Given the significant variability in the levels of PRoW provision across England and Wales, a valuable exercise is to isolate those areas with particularly acute deficits in provision. With the evidence in Report One highlighting the significant inequities between demographics and deprivation levels, any programme of intervention targeting the most PRoW-deprived areas is likely to also benefit some of the UK's most marginalised communities.

We developed two initial targeting systems for identifying areas of acute PRoW deprivation. These were grouped as Target Group A, communities with low overall PRoW provision, and Target Group B, communities with poor access to green walking environments, including green PRoW, and PRoW located in designated nature-rich areas.

4.1 TARGET GROUP A: PROW DEPRIVATION

To identify Target Group A, we segmented our neighbourhood (LSOA) dataset into deciles ranked by PRoW provision. From these deciles, we then created an index of provision, which aggregated communities' net scores across three indicators from the dataset developed in Report One:

- Indicator 1: Total provision of PRoW within an 800m radius of a postcode
- Indicator 3: Distance to the nearest PRoW of continuous length 3km+
- Indicator 10: Distance to an access land plot of at least 5ha in size with a PRoW connection

This approach identified 569,000 people, spread across 333 neighbourhoods, which score in the bottom decile across all three indicators. These communities are concentrated in several UK towns and cities, notably Blackpool (Map 1), Derby (Map 2), Doncaster (Map 3), and Liverpool (Map 4) as well as parts of the West Midlands CA, particularly Birmingham. Of this group, one-third, or 193,000 people, also live in a neighbourhood ranked among the top 10% most deprived in the country. In other words, the most deprived communities in England and Wales are considerably more prevalent in our PRoW-deprived group than would be expected if it were purely down to random variability.

Target Group A highlights a clear correlation between deprivation and low PRoW provision. This disconnect raises questions about how the everyday experience of physical activity and connection with nature might differ in these communities. It seems likely that in some places, the absence of PRoW will be substituted by the presence of other types of path but, even where this is the case, these paths will not enjoy the same protections as PRoW, potentially increasing the likelihood that these paths are lost to development or otherwise closed off. The statistical analysis described suggests, however, that in many cases this substitution will not occur and communities are experiencing lowered levels of physical activity in nature as a result of inadequate infrastructure. Finding the appropriate policy prescription to close these provision gaps will require deep local knowledge, careful consideration of competing pressures, and sometimes bold action to prioritise paths and access to nature higher in the development hierarchy than is commonplace in the UK today.

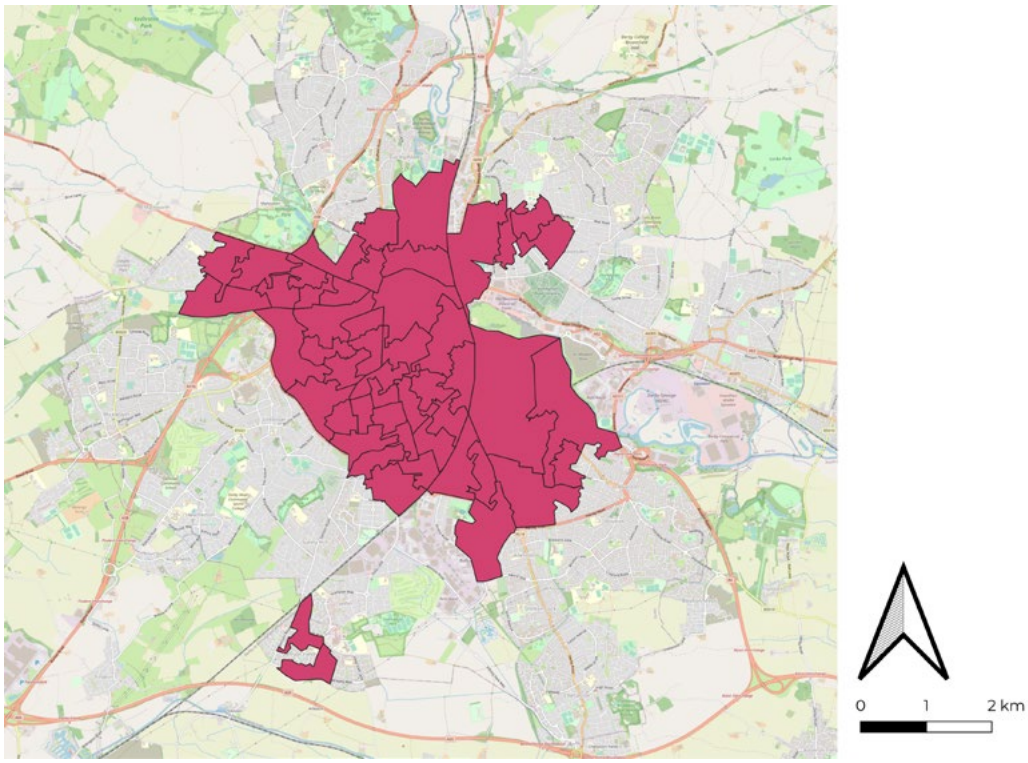
4.2 TARGET GROUP B: GREEN WALKING DEPRIVATION

To identify Target Group B, we segmented our neighbourhood (LSOA) dataset into deciles ranking different indicators of green infrastructure provision. From these deciles, we then created an index of provision, which aggregated communities' net scores across three indicators:

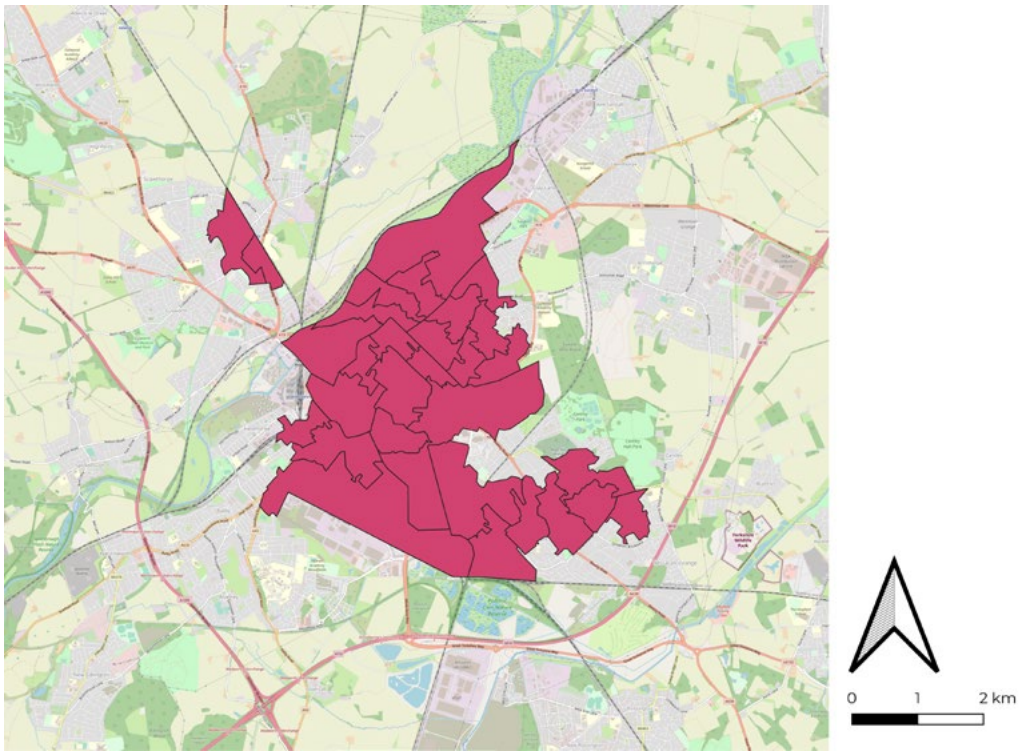
- Indicator 4a: Total provision of PRoW within a radius of 1,600m of a postcode, weighted by the greenness of the land cover
- Indicator 6: Total provision of PRoW within a radius of 3,200m of a postcode in, or next to, nature-rich habitats
- Total provision of green space within 1,000m of a postcode (ONS).

MAP 1: NEIGHBOURHOODS IN TARGET GROUP A IN BLACKPOOL, OPEN STREET MAP

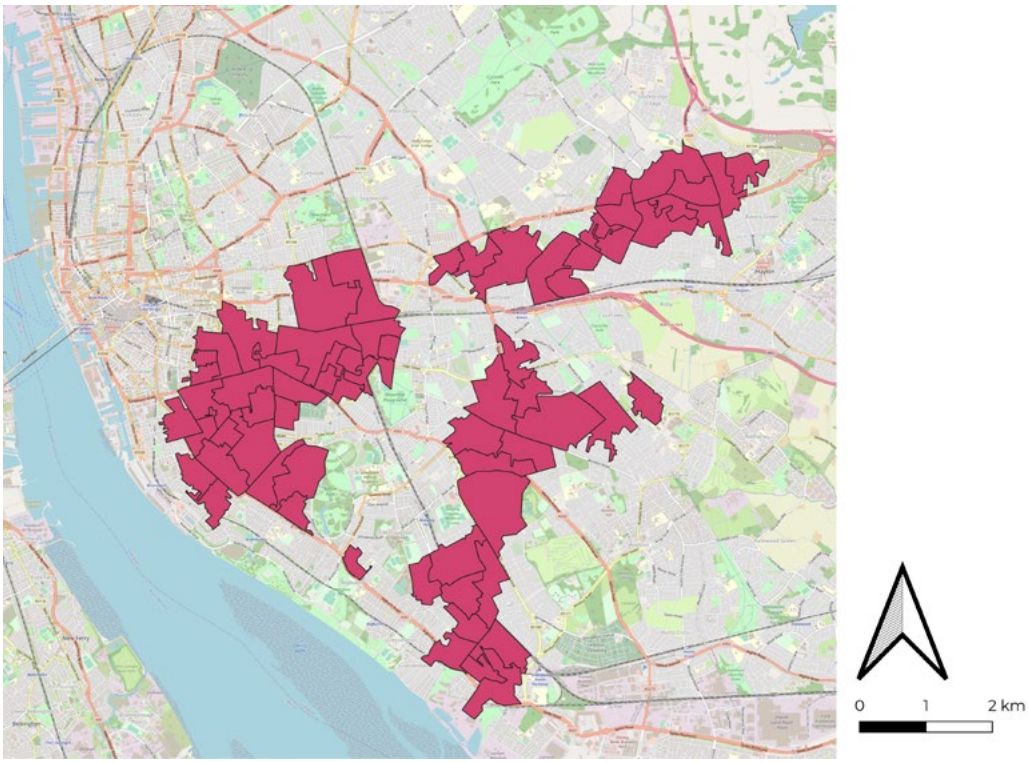
MAP 2: NEIGHBOURHOODS IN TARGET GROUP A IN DERBY, OPEN STREET MAP



MAP 3: NEIGHBOURHOODS IN TARGET GROUP A IN DONCASTER, OPEN STREET MAP



MAP 4: NEIGHBOURHOODS IN TARGET GROUP A IN LIVERPOOL, OPEN STREET MAP

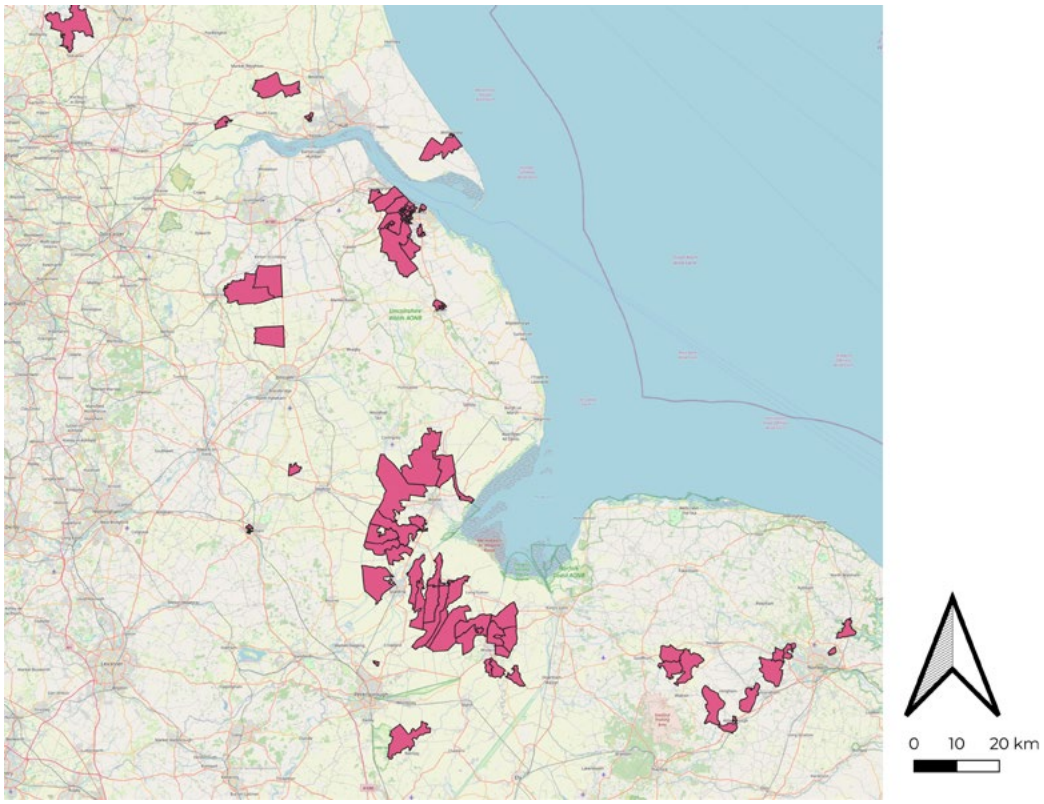


As the Natural England greenness dataset is only available for England, Wales is excluded from this section of the analysis.

Using this approach, we isolated 350,000 people, spread across 195 neighbourhoods that experience the lowest levels of provision of green walking options in England. The communities identified by this process fall into two categories. The first group are what might be termed 'deep-urban' communities in England. Specifically, neighbourhoods in the core areas of Birmingham, Manchester, Leeds, Bradford, and Portsmouth. This form of PRoW deprivation, relating to greenness and represented by Target Group B, therefore focuses particularly on ethnic minorities who are more represented in deep-urban communities (and once again, experience above-average rates of deprivation). This implies that a different everyday experience of nature is had within these communities.

Another subgroup represented within Target Group B is a selection of more rural communities running along the east coast of England (Map 5). This second group includes areas such as Grimsby, where above-average levels of deprivation can once again be found, but also some relatively affluent rural communities. The presence of rural communities within this target group, focused on deficits in green walking experiences, might seem counter-intuitive. However, being in a rural area does not pre-determine the presence of recognised or accessible green walking routes, nature reserves, or green spaces. Further research could help to better understand experiences of, and barriers to, green walking experiences in these communities.

MAP 5: NEIGHBOURHOODS IDENTIFIED IN TARGET GROUP B ON THE EAST COAST OF ENGLAND, OPEN STREET MAP



5. SUBREGIONAL DYNAMICS OF PATH PROVISION AND ACCESS TO NATURE

With a system for identifying areas in public rights of way (PRoW) deprivation developed, we sought to test the usefulness of this system by focusing on some different subregions of England and Wales. We looked to explore PRoW usage and physical activity in nature across a range of different settings in England and Wales. Our case study locations included regions identified as being home to significant numbers of PRoW-deprived households, in both target groups, West Midlands Combined Authority (CA), and West and South Yorkshire CAs . In contrast, we also looked at two regions relatively well supplied with PRoW: south-east Wales and Dorset. In these regions, we explore what path provision looks like, when and where PRoW provision drives physical activity in nature, and what particular features constitute a useful path more broadly.

5.1 METHOD

Strava Metro provides anonymised data on the walking, running, and hiking activities of their app's users which is broken down into route segments. Each route segment is typically in the range of 10–200m but this is highly variable as each route segment only ends when it reaches an intersection with another route segment. Routes are determined by the movements of the users and not by the existence of formal travel infrastructure (eg a path or road). While the vast majority of routes will follow formal travel infrastructure, some may follow user-established routes across any form of landscape. Strava effectively provides a map of the entire walkable network of a region, as measured by the presence of at least one Strava trip passing a point. A very significant number of trips and users are registered each year with the Strava app. For example, activity (ie at least one person-movement) was logged on 185,462 sections of the walkable network in gthe West Midlands CA in 2021. These segments were traversed a total of 181.5m times in 2021 (an average of 980 traversals per segment). The most visited segment was traversed some 65,000 times by 6,200 app users over the year. It seems likely that if a location is walkable, it will have been walked by at least one app user. We therefore refer to the Strava map as an area's walkable network. This approach is not infallible, particularly in areas with lower rates of app registration, but it should provide useful insights into running and walking behaviour and locations in local areas.

The data Strava Metro provides attributes several unique trips and unique individuals crossing each route segment. This includes outward and return journeys, as well as data on the traveller's gender, age, and journey purposes. Journey purpose is limited to 'leisure', which designates trips taken for exercise or to visit nature, and 'commuting', which designates any form of travel with another 'utilitarian' objective, such as shopping, travelling to work, or visiting friends. Assignment of trip purposes is performed by Strava's bespoke trip model, which estimates a trip's purpose based on data collected from a subset of Strava users (around 20%) who specifically report their journey purposes. The majority (around 88%) of trips recorded by Strava are for leisure purposes.

The Strava Metro data is subject to several limitations, not least, biases within the sample. Usage data reflects both the habits and residence locations of a sample, which is typically from a more affluent demographic, and a demographic which is more likely to be engaged with technology and show interest in outdoor physical activity. App usage rates may vary across the UK based on social and market-related factors as well as factors directly pertaining to engagement with physical activity. Readers will note in the following sections, that female travellers are under-represented in all of the Strava data, and that the extent to which they are represented varies between regions from around 28% of users in the West Midlands CA to around 46% in Devon. This is, in part, because men are more likely to use the Strava app. However, the inter-region variability may relate to other social factors which encourage and discourage female residents to take part in recreational active

travel in their area. Further research is required to understand this trend.

Given the limitations of the dataset and the significant challenge that would be presented by any attempt to apply statistical controls or weights to adjust the sample to better reflect the wider UK population, we concluded that usage of the data would be restricted to comparative, within-sample, analysis. Specifically, we looked at the relative usage of the PRoW network compared with the wider path network, and the characteristics of the most popular PRoW routes. We conducted an overlap analysis of the PRoW network in QGIS to identify (i) all of the routes within the Strava network which might be considered to be on PRoW and, conversely, (ii) all of the PRoW network segments used by Strava users. Data availability and processing power limitations meant this analysis was restricted to our case study regions.

5.2 SOUTH-EAST WALES

South-east Wales (population 1.9m)[ii] is famous for its natural beauty. Some parts of the region are popular destinations for tourists engaging in walking and other outdoor activities. Despite this, many communities in the region experience very high levels of deprivation, across, social, economic, and health indicators and life expectancy at birth is typically around two years lower than the average in England.[31] Given the known benefits of access to nature for health and wellbeing outcomes, this begs the question: does this deprivation prevail despite widespread engagement with nature, or are barriers holding back access for local communities to the benefits of nature? Public records suggest south-east Wales is characterised by a denser PRoW network than most areas of England. In theory, high levels of officially designated PRoW are found close to home, and these PRoW are linked with long networks of continuous PRoW, also close to home (Table 2), but whether local people are really able to access this infrastructure deserves scrutiny.

The level of recorded PRoW in south-east Wales is not reflected in the proportion of Strava activity that takes place on PRoW. Just 19% of the Strava network is on PRoW, while only 18% of trips appear to take place on PRoW. A greater proportion of Strava trips take place on PRoW in South (23%) and West (20%) Yorkshire CAs (see later Table 9), for example, both areas with lower overall designated lengths of PRoW.

TABLE 2: PROW PROVISION IN SOUTH-EAST WALES

Region/nation	Length of PRoW (m) within an 800m buffer	Length of PRoW (m) within a 1,600m buffer	Distance (m) to nearest PRoW of 3km continuous length	Proportion of neighbourhoods with a PRoW of 3km continuous length intersecting a 400m buffer
South-east Wales	3,273	13,506	290	81.3%
South-east Wales excl. Cardiff	3,784	15,461	190	90.6%

ii Inclusive of the following local authorities: Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Merthyr Tydfil, Monmouthshire, Neath Port Talbot, Newport, Rhondda Cynon Taff, Swansea, Torfaen, and Vale of Glamorgan.

TABLE 3: OVERLAP BETWEEN THE PROW AND STRAVA NETWORKS IN SOUTH-EAST WALES

Region	Proportion of Strava network on PRoW	Proportion of Strava trips on PRoW
South-east Wales	19.2%	17.8%
South-east Wales (excl. Cardiff)	20.3%	20.9%

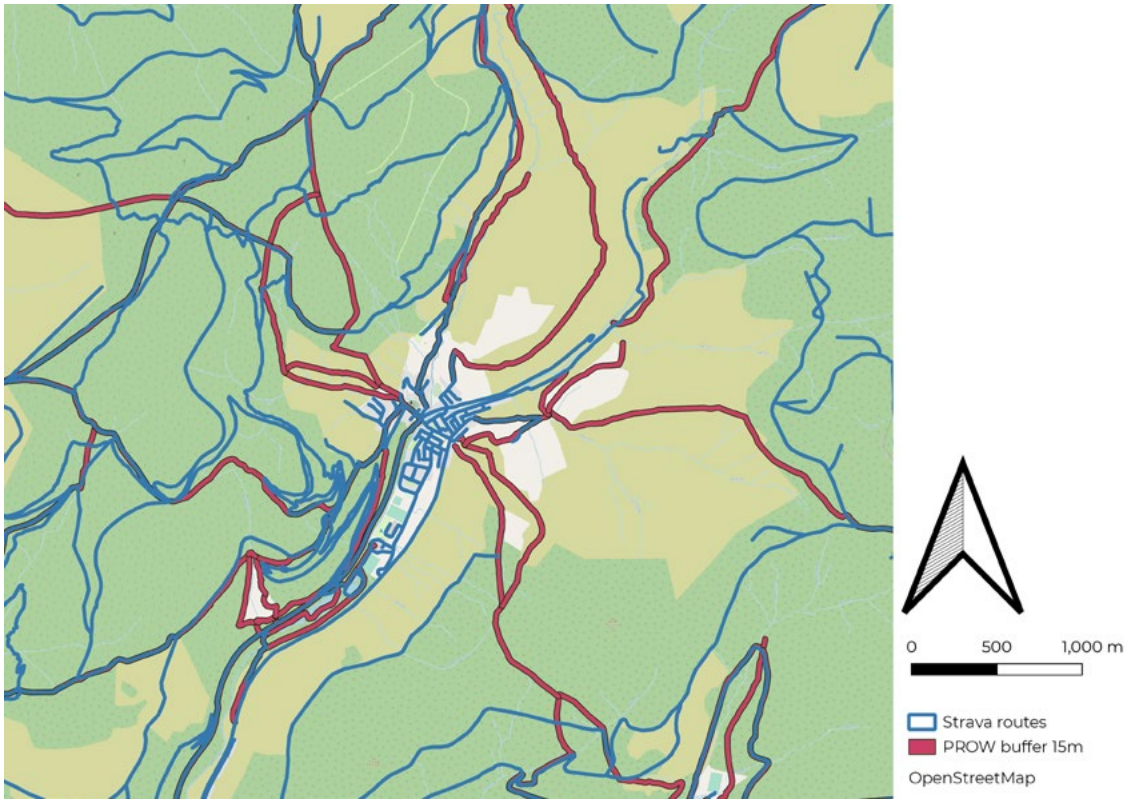
With the notable exceptions of Monmouthshire and Neath Port Talbot, the proportion of Strava trips taking place on PRoW is comparatively low across the region's authorities.

At first, these trends might seem counterintuitive but, on closer inspection, a rationale can be established. A very large proportion of south-east Wales's PRoW routes are associated with zero Strava trips. The first example (Map 6) shows the village of Glyncorrwg in Neath Port Talbot. Despite several PRoW-designated routes emanating from the centre of the village (orange) and routing up

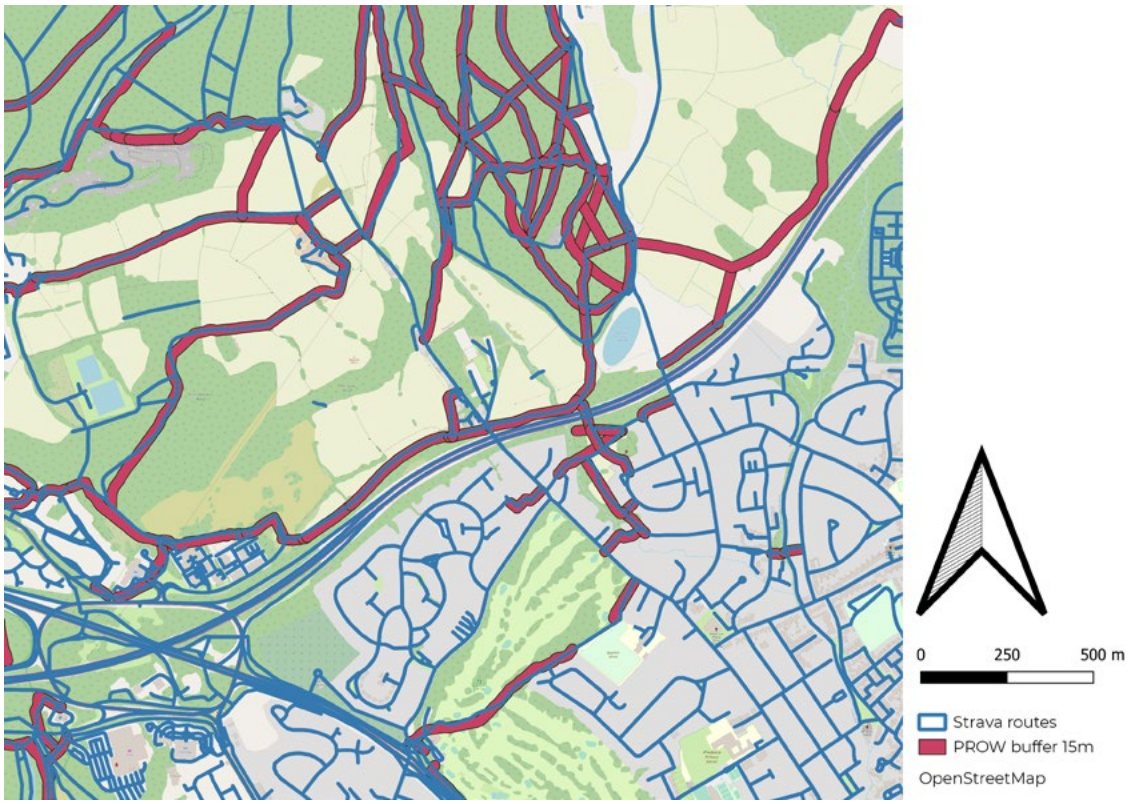
TABLE 4: PROPORTION OF STRAVA TRIPS TAKING PLACE ON PROW ACROSS SOUTH-EAST WALES AUTHORITIES

Local Authority	Proportion of network on PRoW	Proportion of trips on PRoW
Blaenau Gwent	16.5%	13.6%
Bridgend	17.7%	16.8%
Caerphilly	21.8%	22.1%
Cardiff	4.3%	2.3%
Merthyr Tydfil	13.0%	21.8%
Monmouthshire	32.6%	39.2%
Neath Port Talbot	23.3%	30.9%
Newport	14.7%	20.6%
Rhondda Cynon Taff	15.7%	14.6%
Swansea	19.2%	19.0%
Torfaen	15.8%	23.2%
Vale of Glamorgan	15.0%	11.0%

MAP 6: PROW PROVISION AND STRAVA ROUTES IN GLYNCORRWG, NEATH PORT TALBOT



MAP 7: PROW PROVISION AND STRAVA ROUTES IN NORTH CARDIFF



into the surrounding hills, the majority are not used by Strava users. App users instead use non-PRoW-designated routes (blue), which more commonly run parallel to the valley.

While we might expect there to be several PRoW with very low usage (at least according to the Strava dataset), the proportion in the areas of England we explore in subsequent sections is notably lower than in south-east Wales. The example in Map 7 of an area of north Cardiff illustrates what might normally be expected. Here the majority of PRoW routes (orange) are associated with at least some Strava trips (blue). A disused PRoW route can be seen on the right-hand side of Map 7, running parallel to the M4 motorway. Either the route's accessibility or its comparative attractiveness, mean Strava users do not traverse the route.

The area in question (Map 7) however, has many other PRoW routes, which appear to be in use. In addition, the bottom right, south-eastern portion of Map 7 highlights the size of the non-PRoW walkable route network in suburban areas which is made up of pavements beside local roads. These, alongside the general deficit in PRoW in central Cardiff, explain the notably lower proportion of Strava activity taking place in Cardiff (Table 4). It is not, however, a foregone conclusion that these non-PRoW routes replace the function provided by PRoW. Our statistical analysis suggests otherwise, and additionally, Map 7 illustrates the different types of routes that are typically PRoW. These are off-road and usually cross areas with closer proximity to nature. These features are not exclusive to PRoW, but they are much more commonly found.

To further investigate the contradiction between provision and use in south-east Wales, we conducted an additional round of map-based analysis. We assessed the extent to which the PRoW network in south-east Wales is overlapped by the Strava network. We found a very significant difference between areas. Just 41% of the PRoW network in south-east Wales had at least one Strava trip registered (Table 5). By contrast, 68% and 71% of West and South Yorkshire CAs' PRoW networks registered at least one Strava trip in 2021 (Table 9).

TABLE 5: OVERLAP BETWEEN THE PROW AND STRAVA NETWORKS IN SOUTH-EAST WALES

Region	Proportion of PRoW with at least one Strava trip
South-east Wales	41.4%
South-east Wales (excl. Cardiff)	40.9%

This suggests that the official PRoW maps held by south-east Wales local authorities do not reflect the PRoW routes that are truly available to the public for use. From a series of random spot tests, comparing the official location of disused PRoW with satellite imagery of the area we can hypothesise that a large number of these PRoW either do not exist on the ground or are so overgrown as to be unrecognisable and unusable for walking activities. As shown in Map 8, the non-PRoW routes used by Strava users are often far more visible in Google Satellite imagery than the disused south-east Wales PRoW. In some cases, such as the PRoW shown running left-right across the middle of Map 8, there is no satellite evidence of a path at all. A second feature identified of south-east Wales's disused (in the Strava database) rural routes is that they very often cross open access land. This applies to many of the disused PRoW routes shown in both Map 6 and Map 8. As such, the public is within their legal right to walk these non-PRoW routes, but an open question remains as to whether PRoW management responsibilities (which still apply to routes over open access land) are being adhered to by land owners.

The findings of this case study leave some open questions. Further work is needed to understand why south-east Wales's major recorded PRoW network does not have recorded activity on Strava. In some cases, the routes it follows may not be easily traversable, either due to topography or to inadequate maintenance standards. The existence of a longer documented PRoW network may be a credit to south-east Wales's better record keeping

MAP 8: AN EXAMPLE OF WHERE DESIGNATED PROW ROUTES (LEFT) DO NOT ALIGN WITH THE STRAVA WALKABLE NETWORK (RIGHT), NEAR CWMTILLERY, BLAENAU GWENT, WALES

Source: Map data ©2022 Google

as, across England and Wales a very large network of 'lost rights of way' has been identified by the Ramblers. Many of these PRoW routes are neither documented by local authorities nor always usable by the public in any realistic sense.

There is little difference to the public, however, between an unrecorded PRoW and an unusable PRoW. A key difference between the disused PRoW network in south-east Wales and the 'lost' PRoW network in England is that for England, a large proportion of the lost network is irreversibly unavailable for use. Many sections have been built over with housing developments or otherwise blocked. For example, while 73% of the PRoW network in the West Midlands CA may be in use, many kilometres of PRoW were lost over the twentieth century. Map 9 shows an area in south-west Bromwich, West Midlands CA where lost rights of way significantly out-number current rights of way. Some of these lost ways might still be accessible to walkers but are not currently afforded the protection and maintenance standards they deserve. A minority of these lost rights of way pass through park land or run beside a road, and therefore might theoretically be restored. A significant proportion passes through what is now private residential land (homes and gardens).

By contrast, many of Wales's documented, yet disused (at least on Strava), PRoW could potentially be restored as viable routes crossing different countryside land cover. There are also many cases where these routes do not cross open access land, and as such, alternative routes will be more difficult for the public to access. One category of disused PRoW, for example, is PRoW crossing golf courses. It is not clear why these routes are disused but, as many golf courses occupy premium land in the vicinity of residential areas, there could be a case for investigating whether golf course owners are correctly applying their legal responsibilities in relation to PRoW, and whether local authorities are adequately enforcing PRoW obligations. Our observational assessment suggests, however, that another large group of these disused PRoW applies to routes which take extremely steep inclines up hills in the Welsh valleys. Perhaps these routes are, at least in part, disused because they are physically challenging to travel.

MAP 9: CURRENT AND LOST RIGHTS OF WAY IN SOUTH-WEST BROMWICH, WEST MIDLANDS CA

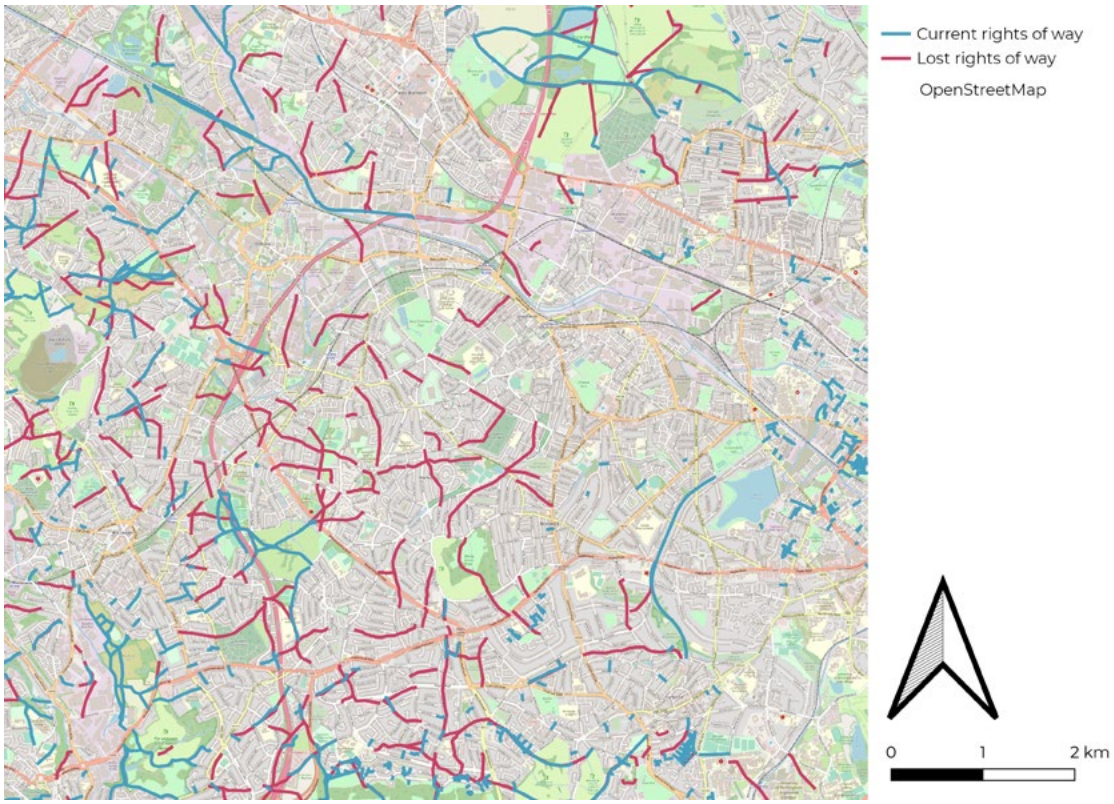


TABLE 6: SPLIT OF USES AND USERS, AS RECORDED BY STRAVA, BETWEEN PROW AND NON-PROW ROUTES IN SOUTH-EAST WALES

	Commuting		Females		Aged 65+	
Region/nation	Non-PRoW	PRoW	Non-PRoW	PRoW	Non-PRoW	PRoW
South-east Wales	6.1%	7.2%	29.2%	29.9%	2.2%	3.0%

The accessibility of nature walking routes to individuals with mobility issues, both in terms of the physical condition of the path and its incline, is a key challenge for addressing health inequities. Our statistical analysis highlighted that individuals in the 65+ age category were considerably less likely to have visited green and natural spaces in the past seven days. This is a particular concern given the vulnerability of this age group to health problems, which might be mitigated by the benefits of green space visitation. Furthermore, several south-east Wales's local authorities experience population life expectancies well below average. Life expectancy at 65 years is, for example, 1.6 years shorter in Merthyr Tydfil than the England average and one year shorter than the Wales average.

We analysed the split of users, recorded by the Strava app, by demographics and journey purpose, and between PRoW and non-PRoW routes. This analysis revealed that the PRoW network in south-east Wales appears to be more attractive to older-aged walkers. The proportion of the population in the 65+ category making trips (distance weighted) with Strava is low, so inferences from the data must be made with caution. However, as shown in Table 6, individuals aged 65+ were around 36% more prevalent on PRoW routes compared with non-PRoW routes. A small differential was also seen in the presence of women on PRoW, who were around 2.4% more prevalent on PRoW than non-PRoW routes.

Clues as to what might be driving these differences in PRoW vs non-PRoW use can be found in the types of routes that make up the most popular PRoW routes in south-east Wales. Table 7 describes the top five most popular PRoW routes in south-east Wales. All of these routes are waterside, typically covering relatively long linear stretches of path with high green cover. These routes are all off-road, and located in relatively public areas, with good quality surfaces, low or no incline, and without barriers. They are safe and very easy to access and use. The Strava dataset also provides some insights into walkers' journey purpose. The Strava dataset, which categorises trips as for 'commuting' and 'leisure' purposes, identifies that PRoW in south-east Wales are marginally favoured for commuting purposes. This bucks the

TABLE 7: SOUTH-EAST WALES'S TOP FIVE MOST POPULAR PROW ROUTES BASED ON STRAVA USER DATA

Authority	Route	Description
Neath Port Talbot	Beach front	Off-road promenade
Rhondda Cynon Taff / Cardiff	Banks of the River Taff, north-west edge of Cardiff	Tree-lined, riverside, off-road leisure route
Newport	Banks of the River Usk	Riverside, off-road, urban leisure route combining green space and promenade-style sections
Porthcawl, Bridgend	Seaside route at Trecco Bay	Off-road promenade
Rogerstone and Risca, Caerphilly	Monmouthshire canal	Off-road, canalside, tree-lined, leisure route

trend seen in two of our other case study areas and challenges the prevailing narrative that PRoW routes are exclusively for leisure walking. In south-east Wales, where non-PRoW routes across access land are popular for leisure purposes, some PRoW routes represent key urban routes used for everyday commuting purposes.

BOX 2: INSIGHTS FROM SOUTH-EAST WALES

- Health and wellbeing outcomes in south-east Wales are below average. Targeted intervention to increase the local benefit derived from walking in nature could help to reduce inequities.
- PRoW are better documented in south-east Wales than in most parts of England.
- Despite having a larger network of documented PRoW, PRoW are less used than in parts of England.
- Some lesser-used PRoW are not maintained and/or are challenging to navigate, but others might be good candidates for restoration.
- The benefits of open access land, as a means for the public to access nature when officially designated routes are not available/traversible, are highlighted.
- Particular attention is needed in areas where PRoW accessibility responsibilities are not being observed by businesses and landowners.
- PRoW in use in south-east Wales have properties slightly favoured by older-age and female walkers.
- PRoW use is not purely recreational; there is some evidence that they also make an outsized contribution to active travel for everyday commuting and chores.
- Given the evidence presented that better PRoW provision drives more use, and that PRoW provide greater benefits to female and older walkers, priority should be given to expanding the accessible PRoW network in south-east Wales as a means of improving and equalising social outcomes.
- New and restored routes should prioritise green corridor routes close to residential areas and water bodies as these appear to be the most popular.

5.3 WEST AND SOUTH YORKSHIRE COMBINED AUTHORITIES

Areas of West and South Yorkshire CAs such as Bradford, Calderdale, Kirklees, Barnsley, Doncaster, and Rotherham are all identified in NEF's research as some of England's most held-back areas, and most in need of levelling-up.[32] Yet, located on the doorstep of the Yorkshire Dales and Peak District, when it comes to accessing the benefits of nature and green spaces these areas might be expected to excel. Our analysis paints a more nuanced picture.

West and South Yorkshire CAs are both comparatively well supplied with PRoW at the aggregate level, as shown in Table 8. As is common, provision is lower in the most densely urbanised areas and several neighbourhoods were flagged as PRoW-deprived target groups in the preceding section. Doncaster and Bradford are notable as islands with very limited PRoW provision. Doncaster is home to 32, or roughly 10%, of the 333 communities identified in Target Group A as having exceptionally low levels of access to PRoW.

In Bradford, neighbourhood PRoW provision is some 35% lower on average than the wider west Yorkshire region. Provision would be lower still if it were not for a small number of PRoW routes running through woodland at the boundary between Bradford and Leeds. Bradford is notable for having a significant length of lost PRoW, particularly on its western side. Neighbourhood provision would be approximately two-thirds (66%) higher if all lost PRoW were still in place. Assessing the accessibility of existing PRoW might also be a worthwhile endeavour as several PRoW routes to the south-west of Bradford appear unused. Both of these areas are home to relatively deprived communities.

In Doncaster, there are also a larger number of lost PRoW routes. One key lost route runs along the northern bank of the River Don from the centre to the northern edge of the city. This section is notable as there appears to be no riverside route presently available, and again, this area borders several relatively deprived communities. By contrast, the riverside walk heading southward, which connects Doncaster with Conisbrough via the Don is one of the area's most used routes.

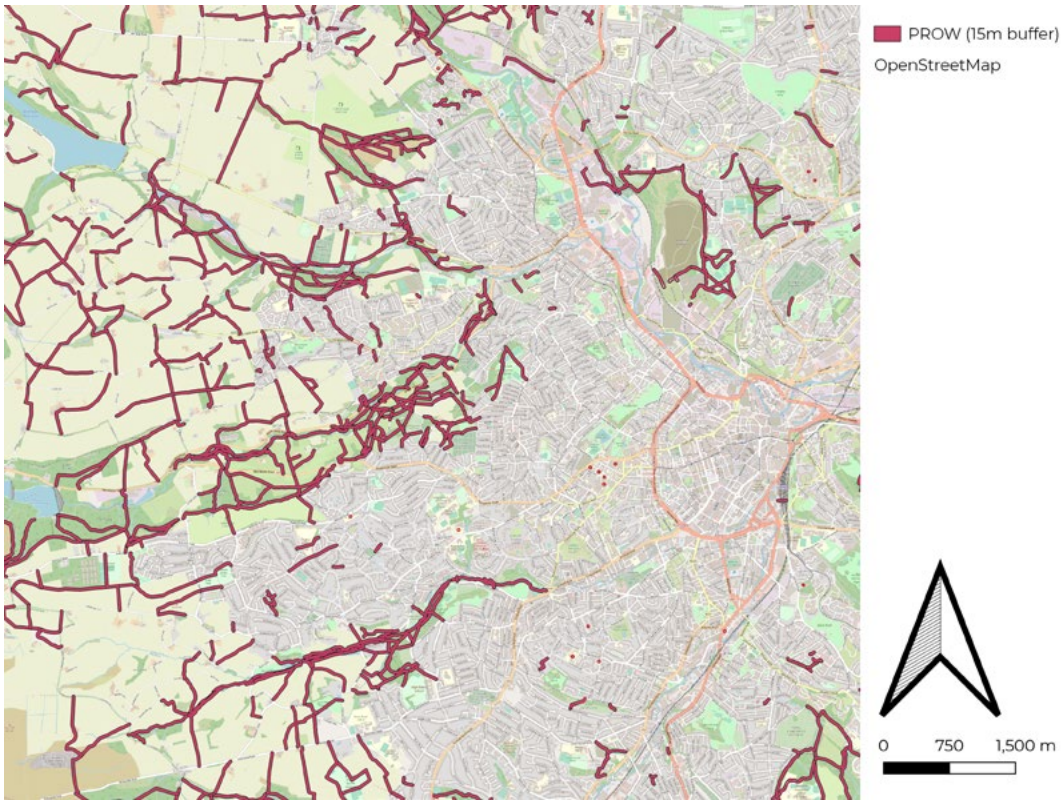
Our analysis suggests that around 16.2% of the walkable network in South Yorkshire CA and 20.3% in West Yorkshire CA are PRoW (Table 9). In comparison, 23.1% and 19.7% of walking activity respectively (weighted by trip distance and frequency) takes place on the PRoW network. In West Yorkshire CA, PRoW are used at approximately the rate that might be expected, all things being equal. The PRoW network in South Yorkshire CA, however, appears to provide a more favourable walking environment preferred by Strava users over the wider footpath network.

There appears to be a relatively simple explanation for the attractiveness of PRoW in South Yorkshire CA. While PRoW in West Yorkshire CA are concentrated in the area's rural authorities, its urban authorities rank low in the overall provision tables. In South Yorkshire CA, PRoW are much more widespread in densely populated cities and towns. In Sheffield, while PRoW are absent from the core of the city, they can be found in popular green corridors connecting the rural exterior with the suburban interior (Map 10).

TABLE 8: PROW PROVISION IN WEST AND SOUTH YORKSHIRE CAS

Region/nation	Length of PRoW (m) within an 800m buffer	Length of PRoW (m) within a 1,600m buffer	Distance (m) to nearest PRoW of 3km continuous length	Proportion of neighbourhoods with a PRoW of 3km continuous length intersecting a 400m buffer
West Yorkshire CA	3,220	13,844	290	80.9%
South Yorkshire CA	3,028	13,096	277	79.7%

MAP 10: PROW PROVISION IN WEST SHEFFIELD



The documented PRoW in West and South Yorkshire CAs are generally more widely used than in Wales, with around 70% of PRoW registering at least one Strava trip (Table 9). There are some anomalies, however, which could benefit from further investigation. In particular, the PRoW running along the banks of the River Dearne in Barnsley are notably underused by Strava users. A large number of routes with very close proximity to the city centre did not log a single Strava trip in 2021. Given the presence of Dearne Valley Park, this finding seems strange and should be treated with caution on the off chance that it represents an error in the Strava dataset.

Strava provides a modelled estimate of trip purpose within their activity dataset. This splits activity into a 'commute', which refers to all activity with a practical purpose (eg travelling to work, to the shops, or to visit friends), and 'leisure' which refers to activity undertaken for exercise and/or visiting nature. In South Yorkshire, around 4.9% of trips on PRoW are classed as commuting, while 6.9% of trips not on PRoW fall into this category. A similar trend is seen in West Yorkshire CA (Table 10). This suggests that PRoW is favoured for leisure trips in the region and likely reflects the dominance of PRoW in rural areas and the absence of PRoW in many urban areas.

TABLE 9: OVERLAP BETWEEN THE PROW AND STRAVA NETWORKS IN WEST AND SOUTH YORKSHIRE CAS

Region	Proportion of Strava network on PRoW	Proportion of Strava trips on PRoW	Proportion of PRoW with at least one Strava trip
West Yorkshire CA	20.3%	19.7%	70.6%
South Yorkshire CA	16.2%	23.1%	67.5%

TABLE 10: SPLIT OF USES AND USERS, AS RECORDED BY STRAVA, BETWEEN PROW AND NON-PROW ROUTES IN WEST AND SOUTH YORKSHIRE

	Commuting		Females		Aged 65+	
Region/nation	Non-PRoW	PRoW	Non-PRoW	PRoW	Non-PRoW	PRoW
South Yorkshire CA	6.9%	4.9%	41.7%	43.4%	2.6%	3.1%
West Yorkshire CA	6.2%	5.4%	29.4%	29.8%	2.9%	3.8%

Splits between PRoW and non-PRoW use can be seen in demographic breakdowns too. For example, the proportion of individuals aged 65+ using the non-PRoW network with the Strava app is just 2.6%. This rises to 3.1% for the PRoW network. This suggests, as seen in Wales, that PRoW routes are favoured by older walkers in the Strava dataset. A split is also seen in gender; 41.7% of users of the non-PRoW network are female, while 43.4% on the PRoW network are female. This suggests the PRoW network is favoured by female walkers. A notable gap can be seen in the Strava dataset (both PRoW and non-PRoW routes) between West and South Yorkshire CAs in the rates of female participation. At this stage, it is unclear if this relates to a true deficit in female physical activity in West Yorkshire CA or a feature of the dataset driven by lower female uptake of the Strava app.

We also looked at the most popular PRoW routes in the area. Within West Yorkshire CA, these are overwhelmingly the paths alongside the River Aire, the Leeds and Liverpool canal and the Calder, the Hebble Navigation, the Meanwood/Adel Beck, and the River Wharf (Ilkley). Other popular routes pass through woodland, often close to water courses, such as Hawksworth Wood in Horsforth. These paths all provide a nature-rich environment in an off-road setting, following long linear routes that connect the inner city with the outer city and the city boundary, much like those shown in Map 10.

A similar trend can be seen in South Yorkshire CA. Off-road, linear, waterside routes prevail. Notably, the banks of the Porter Brook in west Sheffield (indeed this is the most popular Strava route in South Yorkshire), the River Rother at Rother Valley Country Park, and the banks of the River Don to the west of Doncaster and running through Conisbrough. Additionally, the Transpennine trail features heavily where it passes through urban areas, such as Brampton, Wombwell, and Worsborough. The high public profile of the trail and its better signage may be contributing to its uptake.

BOX 3: INSIGHTS FROM WEST AND SOUTH YORKSHIRE CAS

- PRoW routes are unequally distributed across West and South Yorkshire CAs but are generally well-used.
- Some more socially and economically deprived urban areas are particularly lacking in PRoW, and these areas have also lost a significant length of PRoW over the twentieth century.
- As in Wales, PRoW routes are the preferred choice of older and female walkers and see heavier use for recreational purposes.
- The most used routes are green off-road urban corridors connecting the inner city with suburban areas and the surrounding countryside and most often follow rivers and canals.
- Targeted action, focused on areas with either unused PRoW or lost PRoW could potentially bring into use some high-value routes, which could deliver social outcomes for relatively deprived communities. We highlight potential target areas in Bradford and Doncaster.

5.4 DEVON AND DORSET

Devon and Dorset, south-west neighbours, share many features. Both are major tourist destinations and home to natural beauty including national parks and many of England's most popular beaches and coastlines. Yet a stark contrast can be seen in the PRoW provision levels in Devon and Dorset. Dorset is well supplied with PRoW, with 2,800m of PRoW within 800m of the average postcode. Conversely, Devon is relatively poorly supplied at the neighbourhood level, with an average provision of 1,800m within an 800m radius of a postcode, well below the English average of 2,700m (Table 11). Such significant variation seen between neighbouring counties suggests that difference may, at least partially, relate to different policies and governance approaches at the local level.

Unusually for rural local authorities, West, Mid, and East Devon are all found well into the bottom half of authorities ranked by PRoW provision. Perhaps counter-intuitively, 13 out of 195 neighbourhoods identified under Target Group B as having notably low access to walking routes within nature are found within Devon, compared to none in Dorset. Torbay and Plymouth are among the lowest-supplied authorities in England when it comes to basic PRoW provision (average length of PRoW within an 800m radius of a postcode), ranked 242nd and 299th out of 308 authorities. It so happens that these two particularly poorly connected local authorities are also among those local authorities identified as most in need of levelling up in NEF's 2022 index.[33] Plymouth, Exeter, and Bournemouth are notable also for the fact that over the past century, they have lost a greater length of neighbourhood PRoW provision than they have remaining (ie they have lost more than 50% of their early-twentieth-century PRoW provision). While populations have grown in these primary urban centres, PRoW appear to have lost out.

Devon's PRoW map contains some oddities. Very few continuous PRoW of a meaningful length can be found, barring the coastal path, the majority of which is part of the PRoW network, and some of the routes around the Dartmoor national park. Outside of these areas, the PRoW map contains many short and fragmented PRoW sections which discontinue upon intersection with a road (Map 11) – this could relate to Devon's exceptionally long road network. Residents of Plymouth live, on

MAP 11: PROW IN THE VICINITY OF THE VILLAGE OF UMBERLEIGH, DEVON

TABLE 11: PROW PROVISION IN DEVON AND DORSET

Region/nation	Length of PRoW (m) within an 800m buffer	Length of PRoW (m) within a 1,600m buffer	Distance (m) to nearest PRoW of 3km continuous length	Proportion of neighbourhoods with a PRoW of 3km continuous length intersecting a 400m buffer
Devon	1,805	6,730	338	71.6%
Dorset	2,806	10,604	201	89.2%

average, further from a PRoW of at least 3km in length than almost any other area of the country. The Strava dataset suggests that in much of East and Central Devon, these fragmented PRoW routes are nonetheless in use, with travellers typically bridging gaps between PRoW with short walks along minor roads. In rural west Devon, there are a moderate number of PRoW that appear not to be in use.

Overall, the PRoW network in Devon is very well used, with 84.4% of the documented network seeing at least one Strava trip in 2021. This is comfortably the highest proportion of any of our case study locations. The PRoW network is also favoured by walkers, receiving a disproportionately greater share of trips (Table 12). By contrast, Dorset's PRoW network is unfavoured (at least by Strava users), receiving a disproportionately lower share of trips, but making up a larger share (over a quarter) of the total walkable network. Alongside this evidence, data in the MENE survey suggests rates of green space visitation are relatively high in both counties, including in cities such as Plymouth and Exeter, suggesting that in this case, the deficit in PRoW may not be hindering green space access.

Demographic trends seen in Wales and Yorkshire are repeated. The PRoW network is favoured by older-age walkers and, marginally, by female walkers. There is once again a significant difference in the overall rate of female physical activity on both PRoW and non-PRoW routes between Devon and Dorset, a trend which is unexplained but potentially just a feature of Strava app usage rates. Interestingly, rates of commuting journeys are higher on PRoW than non-PRoW (Table 13). This serves as a reminder that PRoW are not exclusively leisure routes many, even in major tourist destinations such as Devon, play a role in day-to-day active travel. We can see from an observational assessment of the data that this may relate to the use of prime seafront PRoW routes for everyday shopping and commuting.

Riverside routes are again popular in Devon and

TABLE 12: OVERLAP BETWEEN THE PROW AND STRAVA NETWORKS IN DEVON AND DORSET

Region	Proportion of Strava network on PRoW	Proportion of Strava trips on PRoW	Proportion of PRoW with at least one Strava trip
Devon (excl. Plymouth and Torbay)	18.0%	22.2%	
Plymouth	2.0%	1.4%	
Torbay	9.0%	13.0%	
Devon	16.7%	18.6%	84.4%
Dorset (excl Bournemouth and Poole)	28.7%	26.1%	
Bournemouth	5.0%	3.1%	
Poole	4.6%	6.3%	
Dorset	26.1%	19.1%	71.7%

TABLE 13: SPLIT OF USES AND USERS, AS RECORDED BY STRAVA, BETWEEN PROW AND NON-PROW ROUTES IN DEVON AND DORSET

	Commuting		Females		Aged 65+	
Region/ nation	Non-PRoW	PRoW	Non-PRoW	PRoW	Non-PRoW	PRoW
Devon	6.6%	9.1%	45.8%	45.7%	3.6%	4.0%
Dorset	6.5%	7.7%	30.1%	30.7%	3.8%	4.6%

Dorset. PRoW routes on the banks of the River Exe in particular are among the most popular in Devon. As would be expected, seafront routes in places like Torbay also see very high use. In Dorset, seafront PRoW routes are also popular, in particular some seafront sections in Christchurch and neighbouring towns, as well as the coastal path in the vicinity of Weymouth, Swanage, and Bridport. Away from the water, the value of both Canford and Upton Heath nature reserves to the north-west of Bournemouth is underscored. PRoW running through both areas are very well used. These reserves are unusual for their size and proximity to densely populated areas.

BOX 4: INSIGHTS FROM DEVON AND DORSET

- Provision of PRoW in Devon is surprisingly low and paths are often very short and fragmented, and end at road junctions without an obvious option for continuation other than a road.
- The significant gap in PRoW provision between Devon and Dorset points to differences in local policy and governance.
- There is some evidence that despite lower rates of PRoW provision in Devon and some localised parts of Dorset, visitation of green spaces remains relatively high. There is some evidence to suggest that this trend is due to higher than average provision of good quality green space in the two counties.
- This highlights that despite the proven connection between better PRoW provision and higher usage, access to nature is a complex issue influenced by multiple local social and physical parameters.
- Strava data once again suggests that PRoW routes are marginally favoured by older and female walkers but a key area for further research is identified around the overall participation rates of female walkers.

TABLE 14: PROW PROVISION IN THE WEST MIDLANDS CA

Region/nation	Length of PRoW (m) within an 800m buffer	Length of PRoW (m) within a 1,600m buffer	Distance (m) to nearest PRoW of 3km continuous length	Proportion of neighbourhoods with a PRoW of 3km continuous length intersecting a400m buffer
West Midlands CA	2,044	8,301	258	83.8%

5.5 WEST MIDLANDS COMBINED AUTHORITY

Prior evidence suggests that the West Midlands CA area combines some of the highest levels of social and health deprivation and the need for 'levelling-up' with an acute accessibility to nature issue. Previous NEF research has already identified both the inadequate provision of good quality and well-sized green spaces and its intersection with deprived ethnic minority communities. Our analysis reveals that West Midlands CA also has some of the lowest rates of PRoW provision in the country. Within the authority, some 180,000 people live with less than 100m of PRoW (a length that can be walked in under two minutes) within an 800m radius of their home and the average provision is around 25% less than the national average. In particular, areas such as outer Birmingham and Coventry contain large islands where PRoW is largely absent, and where 26 of the 333 neighbourhoods identified as having exceptionally low access to PRoW under Target Group A can be found.

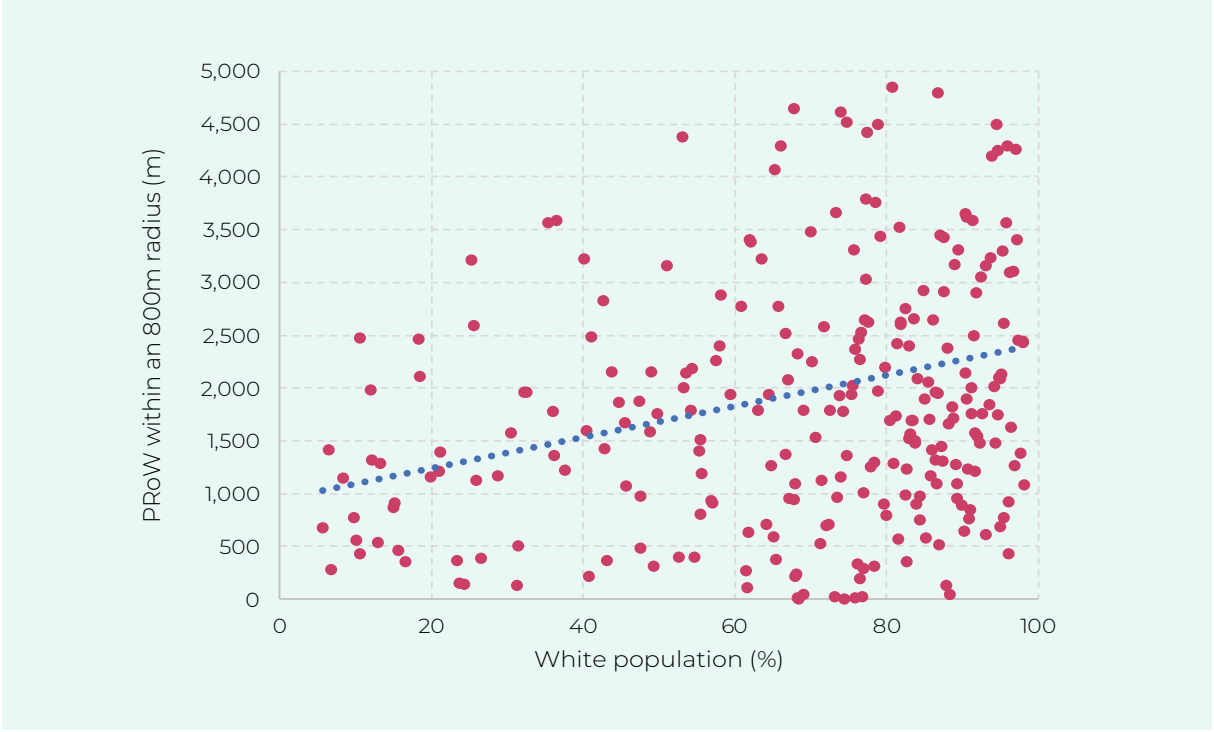
Overall, rates of green space visitation are also exceptionally low in the West Midlands CA area. The proportion of residents reporting visiting green space at least once per week in the raw MENE data that underpins our statistical analysis was below 50% in every constituent authority bar Dudley. By contrast, authorities in Devon and Dorset typically top 70%. This may relate to the lower rates of officially recognised green space, but could also relate to PRoW.

Not only does a deficit in PRoW reduce the connectivity of people with officially recognised green spaces, but a PRoW itself can be perceived as a green space. In general PRoW routes provide green and natural walking environments, and this is often something that separates them from other types of footpaths. The average greenness of local PRoW, based on Natural England's satellite categorisation approach, is 77%. In the West Midlands CA, this falls to 63%.

Our statistical analysis, set out earlier in this report, suggests that both lower levels of PRoW provision and fewer green PRoW are likely to reduce an individual's visitation of green spaces. This in turn can reduce the levels of physical and mental health benefit an individual receives from physical activity in nature and as such, could conceivably be contributing to the West Midlands CA area's above-average rates of health deprivation. One of the more straightforward policy solutions for this would be to 'green' the existing PRoW routes and other paths in the area.

An important feature of the PRoW provision levels in the West Midlands CA is its relationship with deprivation. While at the national level, higher PRoW provision is strongly correlated with lower deprivation (and this is supported by the West Midlands CA's overall position as highly deprived and poorly provided with PRoW), within the West Midlands CA there is no correlation with deprivation. Inequality in PRoW provision can be seen more starkly in the racial divide. Communities in the West Midlands CA with the largest ethnic minority populations have the lowest levels of PRoW provision (Figure 2). Indeed, on average, those communities with the highest proportions of white residents will have more than double the length of local PRoW provision than the areas with the lowest proportions.

FIGURE 2: PROVISION OF PROW WITHIN AN 800M RADIUS IN WEST MIDLANDS LSOAS VERSUS THE PROPORTION OF THE LOCAL POPULATION OF WHITE ETHNICITY, WITH A LINEAR TRENDLINE



Further analysing the role of the PRoW network in the West Midlands CA is challenging because the PRoW network documented by the constituent local authorities is extremely fragmented. Many small sections of PRoW, often only a few tens or hundreds of metres, cross residential estates but provide little in the way of a continuous walking experience. PRoW in the West Midlands CA make up just 7.3% of the walkable network, and just 5.8% of Strava trips (Table 15). This contrasts with our other English case study regions, which generally show that PRoW routes are favoured over non-PRoW. There is a suggestion here, worthy of further exploration, that there is a threshold in provision levels required before the full benefits of PRoW can be achieved, and the fragmented provision in the West Midlands CA is insufficient. However, at this point, uncertainty remains as to whether our modelled deficit in provision is a documentation/classification issue, versus a general deficit in provision.

Previous NEF analysis has highlighted the general deficit in green space provision in the West Midlands CA,[34] as well as the proportionately greater perception in the region that green spaces are of poor standard.[35] There is good reason, therefore, to suspect that the West Midlands CA has a deficit in the provision of all types of good quality green walking routes too. While at the national level, we have shown that PRoW can sometimes provide a substitute in communities lacking in formal green space, in the West Midlands CA this appears not to be the case. The region is poorly supplied with both green space and attractive PRoW routes. In both cases, ethnic minority communities are penalised most heavily.[36] Given the low usage and coverage of PRoW in the West Midlands CA area, the policy proposal of simply greening existing PRoW routes is likely to have a fairly marginal impact. Both extending the network and greening other non-PRoW routes could make a bigger difference.

Through a more detailed look at the types of PRoW and non-PRoW routes in the West Midlands CA, some further insights can be generated. Some short strips of PRoW cross public green space and it is these sections that are often the most used. Very few PRoW of the type seen, and most popular, in the other regions discussed can be found in the West Midlands CA. Linear PRoW of decent length, off-road, with green land cover are very rare. One such PRoW is the Harborne walkway, in south-west Birmingham which appears to be the most used PRoW in the region (of any reasonable

TABLE 15: OVERLAP BETWEEN THE PROW AND STRAVA NETWORKS IN WEST MIDLANDS CA

Region	Proportion of Strava network on PRoW	Proportion of Strava trips on PRoW	Proportion of PRoW with at least one Strava trip
West Midlands CA	7.3%	5.8%	72.9%

length). Also seeing significant use, and of key importance to the region, are the network of PRoW routes in and around Priory Woods Nature Reserve in West Bromwich. Other fairly well-used linear segments include the Worcester and Birmingham canal near King's Norton station and the Birmingham canal near Oldbury. These segments are shorter than comparable linear PRoW in other regions, and given the population of the area, usage rates are low.

There are, however, many non-PRoW routes, which might in other locations be designated as PRoW. Examples of key paths include long stretches of the Birmingham (new and old), Wyrley and Essington, Dudley, and Grand Union canal towpaths, as well as the River Cole, Hatchford Brook, and River Tame. Non-waterside, linear, off-road, green routes include the Kingswinford and South Staffordshire Railway Walks. These routes appear vital components of the limited off-road linear walking offer in the region and as such might benefit from the level of protection afforded by PRoW status. There is also a case for learning from the popular canal routes as to what makes an attractive path when designing new provision.

Despite the small and fragmented PRoW sample, the West Midlands CA PRoW network showed the same familiar demographic trends. Use of PRoW was proportionately higher among females and people over the age of 65 than on the non-PRoW network.

TABLE 16: SPLIT OF USES AND USERS, AS RECORDED BY STRAVA, BETWEEN PROW AND NON-PROW ROUTES IN THE WEST MIDLANDS CA

	Commuting		Females		Aged 65+	
Region/nation	Non-PRoW	PRoW	Non-PRoW	PRoW	Non-PRoW	PRoW
West Midlands CA	5.8%	5.1%	27.5%	28.7%	2.1%	2.8%

BOX 5: INSIGHTS FROM THE WEST MIDLANDS CA

- Rates of visitation of green spaces are critically low in West Midlands CA while deprivation is high.
- Very low rates of PRoW provision are likely contributing to this, as well as the fact that PRoW routes themselves are generally less green than elsewhere in the country.
- Very low proportions of physical activity in West Midlands CA take place on PRoW, less than would be expected were use in proportion to provision.
- The region has some key off-road, green, linear routes, most commonly alongside rivers and canals, which provide vital access to green walking, but these are not normally designated as PRoW. There could be a case for providing these routes with a PRoW designation and creating more routes of this type.
- Notably, areas with larger white populations are typically much better provided with PRoW in the West Midlands CA, emulating trends seen in green space provision.
- Overall, it is likely that poor green walking infrastructure is contributing both to poor health and social outcomes in the region, and to social inequities.

6. THE VALUE OF AN EXPANDED PROW NETWORK

Pinning down the value of the PRoW network and its potential expansion is a challenging task. A key issue is that the public rights of way (PRoW) network represents only part of the England and Wales walkable route network. Our Strava analysis suggests that PRoW within our case study areas (south-east Wales, West Midlands CA, West and South Yorkshire CAs, and Devon and Dorset) make up approximately 15%–20% of the walkable network. Any analysis of the PRoW value must accurately identify value that is additional to that provided by the wider walkable network.

We present evidence that the PRoW network is functionally different to the wider walkable network. Across our case study locations, we found evidence that users of the PRoW network were slightly more likely to be female, and more likely to be older (over 65 years of age) than users of the UK's wider walkable network. We also show that in some areas, specifically South Yorkshire, Devon, and south-east Wales (excluding Cardiff), walkers prefer to walk on PRoW than the non-PRoW walkable network. PRoW are almost exclusively off-road routes; some of the most popular PRoW routes are those that combine this with waterside or woodland locations, and long continuous routes that connect deep-urban areas with the suburban periphery and countryside.

Critically, we present evidence which suggests that the unique value of the PRoW network can be isolated in statistical terms. Evidence from our analysis suggests that greater provision of PRoW correlates with greater rates of visitation of green and natural spaces, when controlling for other key influences on green space visitation. While our analysis itself does not explicitly prove causation, a causal link between walking infrastructure provision and green space visitation is intuitive. However, we also present evidence that any such link is nuanced and that the design, management, and location of PRoW are likely critical to their performance incentivising green space visitation.

Through our case studies, we highlight the high prevalence of disused PRoW in south-east Wales, potentially connected to a mix of poor maintenance and signage, challenging terrain, and potential failures of landowners and local authorities to adhere to statutory duties. In addition, our statistical analysis shows that the greenness of an individual's local PRoW has some additional explanatory power when it comes to predicting their visitation of green and natural spaces. That is to say, increasing the length of PRoW provided, and increasing the greenness of the environment surrounding any PRoW provided both increase the likelihood of, and/or frequency with which individuals experience green spaces in their day-to-day life, and gain the associated benefits. While further research is required to better understand this relationship, it seems that the provision of a green and natural walking infrastructure in a local area increases usage rates and engagement with nature, and the corresponding health and social value for society.

Visits to green space can be valued in both health and, by proxy, economic terms, though such estimates should always be treated with caution due to the uncertainties associated with valuing non-monetary goods. Prior research has linked visitation of green space in England to the creation of an additional 109,164 quality-adjusted life years (QALYs), per annum.[37] QALYs represent a composite measure of an individual's health and wellbeing, including physical and mental wellbeing, and engagement with everyday activities. They might be regarded as an imperfect measure of how much the government, or health service, would be 'willing to pay' for a policy intervention that improves population health. In valuation terms, however, this is usually regarded as a lower bound for the true societal value of an effective health intervention. In this case, we are not valuing a large range of additional sources of benefit when making this calculation.

We can take the findings of our analysis, connecting PRoW provision to increased rates of green space visitation, and apply them to the workings of White *et al.* (2016). Initially, we can test approximately what benefit derives purely from the existence of the current PRoW network.

This approach suggests that the PRoW network contributes to the creation of at least an additional 3,054 QALYs per annum (Model 1). Further applying our findings from Model 2, which integrates the impact of PRoW 'greenness' on green space visitation rates, to the work of White et al. (2016) suggests that the PRoW network, in combination with local greenness could provide as many as 8,292 QALYs per annum or 8% of the total estimated by the authors.[38] This estimate comes with the caveat, however, that this analysis cannot distinguish the greenness of local PRoW from the greenness of the local area in general. Applying the standard QALY valuation approach (£20,000 per year), suggests the value of the PRoW network is at least £62.7m per year (Model 1). Applying the same value to our upper estimate (Model 2) would give a value of local PRoW, and greenness in the vicinity of the PRoW, at £167.3m per year. These figures apply to England only.

The QALY approach to health and wellbeing valuation is only one of a range of different methods for quantifying impacts in economic terms. Research by Fields in Trust puts the wellbeing value of each visit to green space at £8.92–£16.60 (inflated to 2021 values), with the authors recommending the lower value for use.[39] This value captures subjective measures of both mental and physical health using the MENE survey. On this basis, our lower estimate of the total wellbeing value of the visits to green spaces enabled by current levels of PRoW provision would come in at £794.4m per year, or £14.06 per person per year in England and £56.3m per year, or £18.14 per person per year in Wales. Using our model inclusive of PRoW greenness (with the same caveats as mentioned) suggests a value of around £1.8bn per year, or £32.20 per person per year in England. Greenness data is not available for Wales, but on the basis that the greenness of PRoW was similar to the level seen in England, the equivalent values would be £109m per year, or £35.30 per person per year.

This value is generated by a PRoW network that is not currently maximising its potential. With effectively targeted interventions, enhancing the accessibility, awareness, and cultural and heritage aspects of the network, significantly more value might be achieved. The targeting of interventions to increase the value derived from PRoW (or from new routes with the same characteristics as PRoW) can be supported by our new analysis of the neighbourhood provision across the country. This analysis shows that the provision of PRoW is extremely unequal, with many communities in more deprived neighbourhoods with extremely poor provision. Any targeting system, which invests in those areas most deprived of good quality PRoW provision, is likely to automatically benefit some of the UK's most deprived areas as well as some of its most marginalised groups.

7. RESEARCH CONCLUSIONS

With this research, we have evidenced a strong, and highly statistically significant relationship between the provision of public rights of way (PRoW) and physical activity (walking, cycling, and mobility aid) in green spaces. This relationship is identified having controlled for key deciding factors in an individual's visitation of green space, such as levels of deprivation, dog ownership, and age.

While our analysis is restricted to PRoW and does not include other types of paths and pavement, the nature of this statistical relationship suggests that, where PRoW is absent, other options for physical activity do not fully compensate for this deficit. This point is particularly salient in deep urban areas, where fewer PRoW are found but greater lengths of pavement and other types of paths exist. While these paths may facilitate movement, they do not (in general) appear to facilitate physical activity in nature to the extent that a PRoW can. It is important to note that this trend will relate to the preferable common characteristics of PRoW more so than the simple act of PRoW designation.

Concerning the physical characteristics of a path, our analysis highlights – perhaps unsurprisingly – that greener environments (ie natural land cover such as trees, grass, and shrubs) in the vicinity of walking routes (in this case PRoW) will increase the amount of physical activity in nature that members of the public report engaging in. PRoW are typically greener than other types of paths found in urban areas. Our case study analysis suggests that the most popular walking routes (not all of which have the protection of a PRoW) are linear routes that follow green corridors connecting central urban areas with the periphery, often alongside bodies of water, and usually off-road. These routes dominate physical activity in nature but are absent in many areas, including many, more deprived, communities.

As a result of their more desirable features, our case study analysis highlights that PRoW are more likely to be used by women, and older people – a group that is notably less likely to access green space on average. This analysis emphasises that in the urban context, where challenges may arise in the designation of PRoW, new green routes that connect deep urban areas to the periphery, should emulate the preferred characteristics of PRoW even where PRoW designation is not possible or appropriate. Doing so should ensure that more people currently underserved by the existing network of paths receive the benefits of walking in greener, safer, and cleaner environments.

Given the well-evidenced link between visits to, and physical activity in nature and positive health and social outcomes, the relationships we have evidenced highlight the important role played by PRoW across England and Wales today. They suggest that increasing the provision of paths with the preferred features of PRoW could increase physical activity in nature. Our analysis suggests that adding (or upgrading) around 2,700m of paths with these preferred features to a neighbourhood (ie within an 800m radius of an individual's home) could be sufficient to increase rates of physical activity in nature by 6.2%. While this may sound low, this would equate to an additional 78.5m annual visits at the England and Wales level.

Through a new targeting system built out of the database we developed in Report 1, we highlight areas of England and Wales that are notably underserved by PRoW, and note that these areas are more likely to be high-deprivation communities with worse health outcomes that might benefit most from improved access to nature. The case to protect, improve, and expand the UK's walking network in areas that are currently underserved is strong. Using established wellbeing valuation techniques, we can put the current wellbeing value of the PRoW network, and the access to nature it provides, at around £2bn per year, over £33 per person, in England and Wales, and estimate that the network adds at least 3,000 high-quality years of life to the population every year. Adding the network's additional functions, including as a transportation network and a facilitator of tourism, would increase this value significantly.

8. POLICY OPTIONS

8.1 IMPROVING THE EXISTING NETWORK

Our analysis identifies two broad areas in which the existing public rights of way (PRoW) network might be improved:

1. **Bring recognised routes back into use.** Our analysis identifies several routes in our case study areas that are recorded in local PRoW records but see very low, or no use. This is most notably the case in south-east Wales but applies to varying degrees in all of the case study regions. Furthermore, our analysis suggests some of the obstructed, historic lost paths and paths in disrepair hold good potential for public use. Likely, poor information (eg lack of signage), maintenance (eg overgrown) and accessibility (eg closed gates/fences) are preventing public use. These routes should be brought back into operation, starting with the most valuable routes in those areas most deprived of provision. Doing so will require a combination of works to improve the maintenance, accessibility, and signage of these routes, and will involve engagement with the responsible landowners.

2. **Green existing routes.** Our statistical analysis suggests that at least as much, if not more, of the social value generated by the PRoW network, is generated by its greenness rather than its length. Despite a relatively high average greenness in England of 77%, many local areas, particularly urban areas, have significantly fewer green routes. Table 17 shows that those areas with the least green PRoW are also often areas with a low overall provision of PRoW and higher rates of deprivation. Greening is potentially one of the more accessible policy interventions, with tree planting and other initiatives such as pocket parks and green building viable in densely urbanised areas. This is particularly pertinent in urban areas where PRoW designation may not be possible, or most beneficial to ensuring

TABLE 17: FIFTEEN LOCAL AUTHORITIES WITH THE LOWEST AVERAGE GREENNESS OF THEIR LOCAL PROW

Rank	Local authority	Average length of PRoW within 800m	Average percentage greenness of local PRoW
1	Portsmouth	840	41.7%
2	Leicester	1,824	55.7%
3	Sandwell	1,861	55.9%
4	Coventry	733	57.9%
5	Liverpool	281	60.6%
6	Manchester	972	60.6%
7	North-east Lincolnshire	212	60.7%
8	Birmingham	1,906	61.0%
9	Nottingham	1,680	62.1%
10	South Tyneside	5,757	62.7%
11	Wolverhampton	3,127	62.8%
12	Blackpool	471	65.0%
13	Southampton	357	65.4%
14	Worthing	1,149	65.5%
15	Bristol, City of	2,573	65.8%
	England average	**2,739**	**77%**

TABLE 18: TOP TEN LOCAL AUTHORITIES WITH THE LOWEST PROW PROVISION, THEIR RESPECTIVE GAP WITH THE ENGLISH AVERAGE PROVISION, AND POTENTIAL WELLBEING VALUE CREATED BY CLOSING THAT GAP

	Local authority	Proportion of postcodes within 400m of a 3km continuous PRoW	Average PRoW within an 800m radius	Gap with English average provision	Population	Wellbeing value per person per year	Total wellbeing value created per year
1	Norwich	6.02%	129	2,610	141,137	£13.39	£1,890,000
2	North-East Lincolnshire	47.17%	212	2,527	159,821	£12.95	£2,070,000
3	Liverpool	26.85%	281	2,458	494,814	£12.59	£6,230,000
4	Southampton	35.81%	357	2,382	252,796	£12.19	£3,080,000
5	Blackpool	30.85%	471	2,268	139,305	£11.60	£1,620,000
6	Sefton	41.80%	568	2,171	275,396	£11.09	£3,050,000
7	Corby*	36.59%	680	2,059	70,827	£10.51	£740,000
8	Kingston upon Hull, City of	28.31%	709	2,030	260,645	£10.36	£2,700,000
9	Coventry	47.18%	733	2,006	366,785	£10.23	£3,750,000
10	Plymouth	36.65%	796	1,943	263,100	£9.91	£2,610,000
						Total	**£27,740,000**

* Part of North Northamptonshire unitary authority since 2021

the benefits are reached by people who are underserved by the current walkable network. Having comparable greenness data for Wales would improve the targeting of any such policies.

8.2 EXPANDING THE NETWORK

3. **Connect up existing routes.** Our analysis identifies areas where PRoW routes are highly fragmented, such as in our Devon and West Midlands Combined Authority (CA) case studies. Nationally, access to long continuous PRoW walking routes is once again lowest in those areas that have been held back over recent decades, notably in places like Liverpool, Blackpool, Kingston Upon Hull, Hartlepool, and Bradford. While further research is required to investigate the nuances of this issue, we identify some evidence that suggests that fragmentation reduces the attractiveness of PRoW, and decreases the likelihood of regular use. Work is required to investigate, at very localised scales, the impact of obstacles and fragmentation on the uptake of walking in nature, and to make small improvements and extensions to infrastructure to remove barriers.

4. **Equalise provision.** The provision of PRoW is unequal across England and Wales. Every local authority on the top ten lowest PRoW provision list (Table 18) is also in the top one-third most deprived authorities in the country, and three are among the top ten most deprived (Blackpool, Liverpool, and Kingston Upon Hull). While some of this inequality may be mitigated through the greater provision of non-PRoW designated paths, we have presented strong evidence that in many places this will not be the case and the imbalance will be contributing towards inequity in health and social outcomes.

   Government should prioritise action to equalise access to paths across the country. Not only could this improve wellbeing, but this would also help to universalise the principle of access to nature and the UK's countryside. In making this investment, the government would automatically target funding at some of

the areas of the UK most in need of levelling-up and could potentially generate significant value in the forms of both avoided health costs and subjective wellbeing value. For example, bringing PRoW provision up to the English average in the top ten least-supplied authorities would generate an estimated £28m of wellbeing value every year (Table 18). It is important to note here, however, that designation alone will not improve social outcomes, particularly in an urban context. Ensuring that all path provision holds the preferred features which drive usage, as evidenced by this research, is key.

5. **Create green urban corridors.** Our case study analysis shows that, by some margin, the most valuable PRoW routes are the off-road, green urban corridors connecting the centre of urban areas with the periphery. These often run beside water courses. While such routes can be challenging to develop in already densely populated urban areas, their exceptional value, not only to human health and wellbeing, but also in other domains such as flood protection, biodiversity and landscape connectivity, air quality, and carbon sequestration make them essential policy targets. Where opportunities are identified by local stakeholders to create and maintain such routes, capital funding should be readily available.

6. **Restore or replace lost rights of way.** A very significant length of PRoW has been lost since the turn of the twentieth century, through inadequate record keeping and maintenance, as well as through the new town development process. While in some places these routes have been replaced by alternatives, or are of low value, in others prime opportunities for public access to physical activity in nature are being lost. As shown in Table 19, many of the top ten local authorities that have lost most PRoW also presently have low PRoW provision, and/or are in relatively deprived communities. Authorities should be funded and mandated to restore and/or replace lost rights of way where the current provision is inadequate.

TABLE 19: TOP TEN AUTHORITIES WITH THE GREATEST LENGTH OF LOST PROW, AND THE POTENTIAL WELLBEING VALUE OF THE LOST PROW

	Local authority	Average PRoW within an 800m radius of a postcode	Average PRoW within an 800m radius inclusive of lost rights of way	Metres lost	Benefit per person per year
1	Stevenage	1,524	5,697	4,173	£21.71
2	Torfaen	5,146	8,333	3,187	£16.43
3	Welwyn Hatfield	2,836	5,841	3,005	£15.47
4	St Edmundsbury	3,326	5,984	2,658	£13.64
5	Sandwell	1,861	4,502	2,641	£13.55
6	Milton Keynes	2,865	5,468	2,604	£13.35
7	Eastbourne	1,021	3,284	2,263	£11.57
8	Coventry	733	2,925	2,192	£11.20
9	Harlow	3,999	6,176	2,177	£11.12
10	Stoke-on-Trent	1,332	3,506	2,173	£11.10
	National average	**2,790**	**3,856**	**1,066**	**£5.39**

9. PROPOSAL: A GREEN WALKING FUND

The UK government has made several statements and commitments relating to access to nature. Most recently, in its 2023 Environmental Improvement Plan, the government introduced a new commitment that everyone in the United Kingdom should live within 15 minutes walk of a green or blue space.[40] Paths will be central to this commitment, both as connections to nature and routes through nature, but the policy support for improvement and expansion of the path network is weak and insufficient to deliver on the 15 minute target, and the government's wider access goals.

Government recently cut the two-year budget for walking, wheeling, and cycling infrastructure investment by two-thirds, from £308m to £100m (or £50m per year). By contrast, the government's Roads Investment Strategy 2 (2020–2025) has funding worth over £5bn per year, more than 100 times larger than the active travel budget. Given the demonstrated social benefits, greater investment in path infrastructure is needed.

Restoring, maintaining, and extending a walkable network, such that social and health outcomes are maximised, requires deep local knowledge and engagement, and therefore is not something that can be centrally controlled. To this end, local authorities are required to develop Rights of Way Improvement Plans (RoWIPs), but these plans lack the backing of delivery resources or capital investment power.

We are calling for a funding package, The Green Walking Fund, which is specifically aimed at empowering local areas, in collaboration with diverse local stakeholders, to improve their local walkable network and deliver their RoWIPs. This funding would be allocated with both universal and selective components, including a degree of prioritisation given to PRoW-deprived and socially deprived areas, with funding offered on a non-competitive basis. Specifically:

- Central government funding provided to every local authority in the country sufficient to cover the costs of two Rights of Way officers per local authority, or two Rights of Way officers per 100,000 people, whichever is greater. In addition to helping manage and improve existing routes and identify new path infrastructure opportunities, these officers would help clear the backlog, estimated by the Ramblers to involve approximately 10,000 applications to restore lost paths, that local authorities are holding. This is expected to cost around £150m per year.

- Central government funding, distributed based on need, aimed at equalising access to nature in areas currently underserved by the existing walkable network. We are calling for an investment fund of £400m per year, sufficient to improve (including to green with new nature and biodiversity), expand, and maintain 2km of new routes in 'hard to build' areas in 100 local authorities every year.[iii] The resulting 200km of new safe and green walking routes would benefit an additional 750,000 residents (within five minutes walk of the new path) every year the scheme is in operation, as well as thousands more coming from further afield.

- Central government funding, distributed competitively by application, to local authorities seeking support to bring historic and obstructed lost paths back into use or replace lost paths in strategically valuable locations. We are calling for an investment funding pot of £100m per year, sufficient to construct and maintain 400km of new PRoW or urban green routes in 'easy to build' locations every year. This might include rural locations, and paths on urban wasteland that are cheaper to bring into use and could benefit around 200,000 people living near (5-minute walk) the routes, as well as thousands more living further afield.

Our total call involves funding of £650m provided to local authorities (£12 per person per year) and equivalent, additional, Barnett consequentials for the devolved nations on an annual basis derived from the government's consolidated tax

iii Construction costs will vary significantly between projects. Our costings allow £2m per kilometer of path and were derived from Wiltshire Council's schedule of highway works costs, 2022.

revenue fund. This would represent around a 50% increase in the budget previously promised by the government for active travel infrastructure, before the cuts made in early 2023. Funding at our proposed level should represent the minimum level of policy ambition and not a ceiling on the amount of support the government is willing to provide to expand access to nature. In Wales, total funding would likely equate to around £38m per year and if extended to Wales, the two proposed investment schemes could benefit some 40,000 Welsh residents living in the vicinity of the new walking opportunities each year.

APPENDIX

TABLE A1: MODEL 1 MODEL OUTPUT - LOGISTIC REGRESSION MODEL OF THE PROBABILITY OF A RESPONDENT TO THE NATURAL ENGLAND MONITOR OF ENGAGEMENT WITH THE NATURAL ENVIRONMENT (MENE) SURVEY REPORTING A VISIT TO GREEN SPACE IN THE PAST SEVEN DAYS

Variable	Unit	Reference	Estimate	Std. Error	Z-value	P-value	Significance
(Intercept)	yes/no		-1.745	1.55E-02	-112.476	< 2e-16	***
Ind1	metres of PRoW within 800m of a postcode	0 metres of PRoW	0.0000265	2.31E-06	11.49	< 2e-16	***
Dog Yes	No	No dog	1.067	1.04E-02	102.616	< 2e-16	***
Dog Unknown	Yes	No dog	-1.119	1.43E-02	-78.362	< 2e-16	***
Residence_ IMDrank	deprivation rank out of 32,844 local areas	Rank 1	0.0000184	5.00E-07	36.715	< 2e-16	***
Age 25–34	yes/no	Age16–24	0.0531	1.69E-02	3.138	0.0017	**
Age 35–44	yes/no	Age16–24	-0.02268	1.69E-02	-1.342	0.1797	
Age 45–54	yes/no	Age16–24	-0.1307	1.70E-02	-7.692	1.45E-14	***
Age 55–64	yes/no	Age16–24	-0.1595	1.73E-02	-9.236	< 2e-16	***
Age 65+	yes/no	Age16–24	-0.4741	1.59E-02	-29.79	< 2e-16	***

TABLE A2: MODEL 2 MODEL OUTPUT – LOGISTIC REGRESSION MODEL OF THE PROBABILITY OF A RESPONDENT TO THE NATURAL ENGLAND MONITOR OF ENGAGEMENT WITH THE NATURAL ENVIRONMENT (MENE) SURVEY REPORTING A VISIT TO GREEN SPACE IN THE PAST SEVEN DAYS

Variable	Unit	Reference	Estimate	Std. Error	Z-value	P-value	Significance
(Intercept)	yes/no		-2.0260000	0.046130	-43.93	< 2e-16	***
Ind1	metres of PRoW within 800m of a postcode	0 metres of PRoW	0.0000287	0.000002	11.909	< 2e-16	***
Indc4c1600	percentage greenness of PRoW	0% greenness	0.2095000	0.042490	4.929	8.25E-07	***
Dog Yes	Yes	No dog	1.0820000	0.010500	103.061	< 2e-16	***
Dog Unknown	Unknown	No dog	-1.1230000	0.014290	-78.563	< 2e-16	***
Residence_IMDrank	deprivation rank out of 32,844 local areas	Rank 1	0.0000208	0.000001	37.238	< 2e-16	***
Age 25-34	yes/no	Age16-24	0.0618400	0.016950	3.649	0.000263	***
Age 35-44	yes/no	Age16-24	-0.0083040	0.016950	-0.49	0.624074	
Age 45-54	yes/no	Age16-24	-0.1145000	0.017060	-6.714	1.89E-11	***
Age 55-64	yes/no	Age16-24	-0.1414000	0.017360	-8.148	3.7E-16	***
Age 65+	yes/no	Age16-24	-0.4533000	0.016050	-28.248	< 2e-16	***
Stockage Pre-1900	yes/no	Stockage2000+	0.4726000	0.038180	12.376	< 2e-16	***
Stockage 1900-1918	yes/no	Stockage2000+	0.2748000	0.039250	7	2.55E-12	***
Stockage 1919-1929	yes/no	Stockage2000+	0.0792200	0.040370	1.962	0.049745	*
Stockage 1930-1939	yes/no	Stockage2000+	0.0415400	0.036330	1.144	0.252768	
Stockage 1945-1954	yes/no	Stockage2000+	0.0101700	0.036570	0.278	0.781036	
Stockage 1955-1964	yes/no	Stockage2000+	-0.0042110	0.035250	-0.119	0.904894	
Stockage 1965-1972	yes/no	Stockage2000+	-0.0014950	0.035240	-0.042	0.966153	
Stockage 1973-1982	yes/no	Stockage2000+	0.0456700	0.035780	1.277	0.201753	
Stockage 1983-1992	yes/no	Stockage2000+	-0.0203600	0.037820	-0.538	0.590329	
Stockage 1993-1999	yes/no	Stockage2000+	-0.0625400	0.042270	-1.479	0.139035	

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