

**Barriers and facilitators to
accessing greenspace
environments as sites for health
amongst marginalised groups - A
systematic review**

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Dissertation submitted in partial fulfilment of the requirements for the award of Environmental Health MSc (distance learning/campus), University of the West of England.

I declare that this dissertation is my own unaided work.

Literature sources and any research collaborators have been identified and acknowledged.

I declare that the work has not already been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

SignatureSamantha Nordland

Date 10 December 2022.....

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Abstract

Greenspace access has become a priority area for investigation with implications for environmental and public health practice. Large inequalities in access to greenspace persist in the UK. Yet there is a lack of research centering the perspectives of marginalised communities themselves. This research aims to systematically review the evidence on barriers and facilitators to accessing greenspace environments as sites for health amongst marginalised groups in the UK. The study population is minority-ethnicity, low-income and deprived communities. 11 electronic databases are searched, and 5 studies are included in the review. Due to the heterogeneity of qualitative research, the study uses a narrative synthesis for data analysis with a subgroup analysis. Findings are surprisingly homogenous across subgroups and studies. The main barriers and facilitators identified include safety, physical design, environmental hazards, health benefits, quality, social connection, and community activities. Greenspace is highly valued, with quality being more important than proximity, but type of greenspace does not matter. Weight is given to discussing how greenspace access is relevant to the environmental health discipline with opportunities for research and practice presented. Future research on the topic is needed using high-quality evidence, particularly around low-income groups, and recommendations to prioritise structural and co-designed interventions are made.

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1 Introduction

1.1 Background

There is increasing evidence that greenspace exposure is good for health, with an array of benefits (PHE, 2020; WHO, 2017). This reflects the role of environmental, physical and social factors on health (Marmot *et al.*, 2020). Greenspace is also known as an equity-promoting intervention, with the largest beneficial effects on the most vulnerable groups (Rigolon *et al.*, 2021). The Covid-19 pandemic has shone light on just how valuable nature sites and greenspaces are, increasing the research and attention on this area. Furthermore, recent reports highlight the relevance of greenspace to the field of environmental health (EH), especially in relation to air and noise pollution, healthy neighbourhoods and contaminated land (PHE, 2020; WHO, 2019). This is an under-explored area, which this study hopes to contribute to.

However, there is wide inequality in access to greenspace in the UK. In particular, low-income/deprived groups and minority-ethnic groups suffer from less green neighbourhoods, greater distances to parks and higher barriers to use (CABE, 2010). This results in greenspace deprivation (FOE, 2020) presenting equity issues that urgently need to be addressed (Marmot *et al.*, 2020). Now, with a large clinical evidence base, greenspace interventions have been adopted into policy, and more research is focusing on marginalised groups. However, greenspace access relating to minority groups is largely focused on quantitative studies highlighting distance to greenspace. More qualitative work is needed to understand subjective factors pertaining to use. Moreover, it is interesting to consider these groups' own perspectives on the barriers and facilitators they face when accessing greenspace. There is currently no systematic review considering barriers and facilitators amongst this population in the UK, and globally only one recent study exists, making this a relevant and timely topic to choose. This represents an exciting area, as greenspace is particularly suitable to addressing environmental inequalities at neighbourhood level.

1.2 Aims

The aim of the study is to systematically review the evidence on the barriers and facilitators to accessing greenspace environments as sites for health amongst

marginalised groups in the UK, using all available evidence from the UK. For marginalised groups, the study considers minority-ethnic, low-income/deprived groups. It draws on the evidence to generate findings that can guide future interventions and identify gaps.

1.3 Objectives

The objectives of this dissertation include:

- Carry out a systematic review of all relevant evidence on barriers and facilitators to accessing greenspace amongst minority-ethnic, low-income and deprived populations in the UK
- Summarise current body of knowledge and practice through a literature and policy review
- Critically appraise the included studies to assess their quality and carry out data extraction and data synthesis
- Discuss differences and similarities across studies and their findings, identify areas for intervention and any gaps in the literature
- Make reference and situate in relation to the field of environmental health

1.4 Research Question

The research question has been formed according to the PEO framework (population, exposure, outcome), which is used in place of the PICO framework when research is qualitative. The research question is:

What are the barriers and facilitators to accessing greenspaces environments as sites for health amongst low-income, deprived and minority-ethnic groups?

Table 1 - Research question using the PEO framework

Population	Exposure / Intervention	Outcome
Low-income, deprived and/or minority ethnicity	Greenspace	Barriers and facilitators

1.5 Justification for methodology

The decision to carry out secondary research and a systematic review was based on several factors. There are a lack of systematic reviews with this research question, despite the increasing number of primary studies providing the evidence base to carry out secondary research. A review of this type therefore allows for a scoping type of study to assess the evidence, filling the gap. It will hopefully also contribute to the rationale for further study of this type. Furthermore, carrying out primary research in this area would have been difficult, requiring identifying and accessing the relevant populations. Their position as marginalised groups means that they are hard to reach. Many diverse populations live in the midlands and North of England, creating a geographical challenge. There is also the issue of gaining trust, particularly amongst residents of deprived areas, and there may have been additional language barriers (other researchers have had to use interpreters).

Systematic reviews

Systematic reviews are viewed as the strongest form of evidence sitting at the top of the evidence hierarchy. They are used in public and environmental health sciences to inform practitioners and decision-makers (Higgins *et al.*, 2019; Petticrew and Roberts, 2006). They aim to synthesis all available evidence in a research area by combining, analysing, and interrogating the findings, so they can provide answers on effectiveness to inform decision making (Menon, Struijs and Whaley, 2022; Page *et al.*, 2021). Systematic reviews answer research questions in reliable ways, by aggregating results of numerous studies rather than relying on an individual study. For instance, they can examine the lived experiences of populations affected by various environmental exposures (Macura *et al.*, 2019). Systematic reviews minimise bias and maximise transparency by using a standardised set of steps that ensure the process and method of the review is transparent and reproducible (Higgins *et al.*, 2019). A further strength of a systematic review is the ability to understand large bodies of research and map out areas of uncertainty (Petticrew & Roberts, 2006, p. 2). Systematic reviews are more reliable than literature reviews, where the selection process is undefined, biases remain unknown and they cannot be replicated. A downside to systematic reviews is their narrowly defined research questions that can only provide specific insights to certain questions (Temple University Libraries, n.d.).

Systematic reviews are also only a snapshot of the state of research at one time, meaning that as new studies are published, their results may not be reliable.

Systematic reviews in environmental health

The use of this study design has expanded exponentially in EH research since 2010 (Menon, Struijs and Whaley, 2022). Accordingly, researchers have been developing EH systematic review methodologies to fit quantitative research as well as qualitative data within environmental management (ibid). Most environmental health systematic reviews deal with quantitative data, however. Finally the use of the PEO framework above the PICO framework is recommended in environmental health research, particularly when dealing with risk or adverse health outcomes from an exposure (Munn *et al.*, 2018).

1.6 Ethical issues

Due to this being secondary research, there are minimal to no ethical concerns with this type of research. An ethical approval form is attached in Appendix 1.

2 Literature Review

2.1 Definitions

The term 'greenspace' or 'green space' is used widely across academic and professional literature. 'Greenspace' is used interchangeably with 'nature', 'natural environments', 'parks', 'urban vegetation', and 'open space' (Taylor and Hochuli, 2017). The totality of greenspace in an area is known as 'green infrastructure' (ibid). PHE adopts a broad definition of greenspace as any area of vegetated land, urban or rural, that has either been human-modified to varying degrees or left in a natural state (PHE, 2020, p.6). Table 2 lists greenspace typically included and excluded in the term based on the literature review (this is an original table).

Table 2 – Types of greenspace typically included and excluded in the term 'greenspace'

Included	Excluded
<ul style="list-style-type: none">• Parks• Community gardens• Playing fields and green play areas	<ul style="list-style-type: none">• Golf courses• Private gardens• Derelict land or brownfield sites

<ul style="list-style-type: none"> • Woodlands and forests • Grassed areas such as meadows, scrub, river banks, cliff tops • Allotments • Green corridors/greenbelts • National parks • Nature reserves • Open countryside • Disused railway lines and other rewilded sites • Cemeteries and churchyards 	<ul style="list-style-type: none"> • Parks or sites that charge an entry fee ((Farahani and Maller, 2018)
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Recent work has highlighted the valuable role of informal and non-typical greenspaces, for instance cemeteries as a form of greenspace (McClymont and Sinnott, 2021). In the UK at local authority level, greenspace is formally designated through meeting certain criteria. However arguably this represents a labourious, arbitrary and narrow selection process that leaves much greenspace unclassified and unrepresented. This contrasts to the findings above about the importance of informal greenspace.

2.2 Current policy

In terms of relevant legislation, in the UK the rights of all people to access nature are enshrined in law under the Equality Act 2010 (Natural England, 2015). Greenspace and nature access is also reflected in Goal 3 and 11 of the UN's Sustainable Development Goals (SDGs).

The PHE¹ reports 'Improving Access to Greenspace' reflect the topic evolution into a key area for health (PHE, 2020). The novel policy idea of Green Social Prescribing (GSP) is a direct example of access to greenspace policy (Drayson and Newey, 2014). Social prescribing now forms a component of the NHS Long Term Plan (NHS, 2019), where health practitioners 'prescribe' or refer patients to community-based activities due to their proven clinical benefits. GSP refers to activities and

¹ Now the UK Health Security Agency (UKHSA).

interventions that are nature-based and is also supported by Natural England through the 25 Year Environment Plan.

Greenspace access comes into DEFRA's 25 Year Environment Plan, in the environmental goal 'Enhancing beauty, heritage and engagement with the natural environment'² (HM Government, 2018). However, this year, a large coalition of nature-based organisations petitioned the government over the lack of progress (BMC, n.d.) and the Office for Environmental Protection published a critical report highlighting slow pace and lack of outcomes (OEP, 2022).

Accessible Natural Greenspace Guidance (ANGSt)

Perhaps surprisingly, there are current Standards to guide proximity a person should have to greenspace, although this is not widely known about. This is the Accessible Natural Greenspace Guidance (Natural England, 2010, 2014). Although these are currently under review, no new standard has been published, therefore this standard is still used (FOE, 2020). It is unclear who has responsibility to ensure the standards, however, or if they are even enactable through legislation. The Standards state that:

- everyone should have accessible natural greenspace within a five minutes walk from home (300 metres) of at least 2 hectares in size
- one hectare of statutory nature reserve greenspace per thousand population

Local authority level: Local Sustainable Community Strategies and Planning

Policy on access to greenspace falls under local sustainable community strategy targets. How this is embedded into local strategies differs dramatically. For instance the mid Sussex District Council Strategy (2018) commits to providing better access to green and open spaces, promoting accessible facilities and provision of high quality and diverse types of green environments – however this is difficult to locate, brief and not highlighted within the report. In contrast, Bath and North Somerset Council adopted its own Greenspace Strategy (2016) and Bristol has its own Parks and Greenspace Strategy, allowing for more in-depth work.

² There are a total of six environmental goals in the 25 Year Plan.

Planning policies may also relate to access to greenspace (Natural England, 2010) but this again varies between local authorities. A WHO 'Brief for Action' was published for local authorities across Europe, to deliver on greenspace highlighting the investment opportunities and wide remit, including possible nuisance mitigation (WHO, 2017).

2.3 Greenspace as sites for health

The Ottawa Charter for Health Promotion (World Health Organization, 1986) highlighted that social, environmental and physical factors impact health (Maller *et al.*, 2006). The Marmot Reviews built on this social determinant of health concept to highlight the role inequalities play (Marmot *et al.*, 2010, 2020). Barton and Grant's health map (2006) demonstrates the way that determinants, such as the natural environment, impact on an individual's health (Figure 1).



Figure 1 - Barton and Grant health map (2006)

Research shows significant associations between greenspace and positive health markers (Stigsdotter *et al.*, 2010). For example greenspace exposure is associated with lower risk factors for chronic disease (Beyer *et al.*, 2018) and even with lower

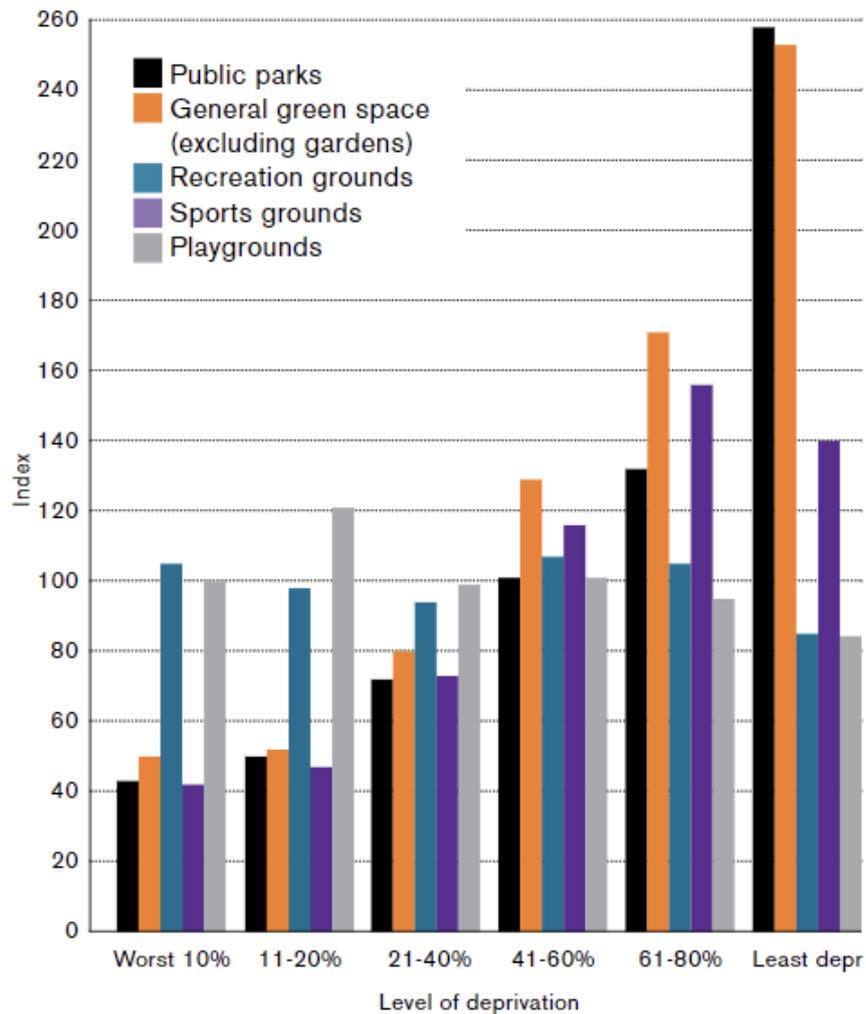
all-cause mortality (Wang *et al.*, 2017) as well as mental health and stress (Bratman *et al.*, 2019; Gidlow *et al.*, 2016; Ward Thompson *et al.*, 2016; Beyer *et al.*, 2014). This may be due to the fact greenspace provides the opportunity for physical activity and exercise therefore promoting healthy behaviours (PHE, 2020; Beyer *et al.*, 2018). Natural environments have been found to promote attention restoration and stress reduction, two major theories on why greenspace contributes to health (Hartig *et al.*, 2014; Ulrich *et al.*, 1991). Moreover, green sites provide opportunity for social contact and connection (Astell-Burt *et al.*, 2022; PHE, 2020; Hartig *et al.*, 2014). Such findings provide a clinical rationale behind greenspace environments as sites that promote health, to the extent that researchers are even looking into screening for park access during healthcare visits (e.g. Razani *et al.*, 2020).

2.4 Unequal access to greenspace

The literature documents large inequalities in access to greenspace, especially amongst low-income and deprived communities and people from ethnic-minority backgrounds (CABE, 2010). Greenspace, such as parks are not evenly distributed between neighbourhoods, and there are further issues of poor-quality spaces, especially around housing estates (O'Brien, 2006). ONS data shows 9.6 million people in England live in neighbourhoods that lack greenspace (FOE, 2020). Moreover, deprived city-centre areas have five times less quality greenspace than non-deprived urban areas (Marmot *et al.*, 2020). Figure 2 demonstrates distribution of types of greenspace by deprivation level (CABE, 2010, p.13).

Despite use of greenspace increasing during the pandemic, the 20 poorest local authorities reported a 28% reduction in use of parks compared to pre-pandemic (Chapman and Phagoora, 2020). The inequality in access is partly explained through the social distribution of barriers to access and structural barriers to participation

Figure 2 - Quantity and type of green space and area deprivation Source: CABI, 2010 p.13



(Cronin-de-Chavez, Islam and McEachan, 2019; Morris *et al.*, 2011). Others have pointed to greenspaces feeling like white landscapes using socio-cultural-political lenses (Byrne, 2012). Further research is therefore warranted to promote health for everyone.

Despite unequal access, greenspace has been found to have the greatest health benefits on the most worst-off (Ward Thompson *et al.*, 2012). Rigolon *et al.*'s systematic review showed that disadvantaged groups from lower-SES show more beneficial health effects from greenspace exposure than affluent people (Rigolon *et al.*, 2021). Likewise, a large observational study showed access to recreational greenspaces decreased health inequality between socio-economic groups and

income-based health inequalities had the least impact on those in the greenest areas (Mitchell and Popham, 2008). For these reasons, greenspace is believed to be an equity-promoting intervention particularly suited to addressing environmental inequalities at neighbourhood level.

2.5 Why is this relevant to environmental health?

There is not much literature on greenspace access and environmental health. Pillay and Pahlad (2014) note the ability of green infrastructure to benefit environmental health at city level, due to the multi-faceted benefits on factors affecting human health. Jennings and Gaither (2015) meanwhile use an ecosystems services framework to look at how greenspaces can help address environmental health disparities in the US. Greenspace relates to the following areas of environmental health: pollution control (noise and air), contaminated land, housing, and public health. Noise and air pollution are most directly relevant to the work of the EHP.

Noise problems are the single largest type of complaint made to local authorities (LAs) in England (CIEH, 2020). Provided that EHPs must investigate noise issues that could be statutory nuisances under the Environmental Protection Act (EPA) (1990), interventions that can mitigate noise effects would be valued by the LA. Greenspace provides noise attenuation via the absorption, dispersal and destructive interference of sound waves through the thick vegetation and space (PHE, 2020, p.28). Greenspace also positively alters peoples' perception of noise, as well as compensating for the adverse health effects through the relaxing and restorative effects of exposure (ibid).

Air pollution control is also of concern to EHPs. Ninety per cent of the global population are exposed to concentrates that exceed WHO safe limits (Fuller, 2018). Greenspace (vegetation and trees) help to filter the air and remove toxins, improving local air quality (PHE, 2020; WHO, 2019; Meerow and Newell, 2017; Kabisch *et al.*, 2016). Green infrastructure and open spaces help control the flow and distribution of the pollution, and vegetation such as trees and greenways provide barriers between the pollution source and receptor (PHE, 2020).

Two other areas that link to access to green space and environmental health include housing and healthy neighbourhoods, and dealing with contaminated land. Healthy neighbourhoods and housing are important determinants of health (Battersby, Ezratty and Ormandy, 2020). In one study, difference in living quality conditions accounted for 29% of health inequalities between groups, with 20% of the gap alone thought to be down to lack of greenspace, unsafe neighbourhoods and pollution (WHO, 2019). The provision of safe greenspace is therefore highly relevant to EHPs working in housing and urban regeneration. The remediation of illegal dump sites and contaminated land into public greenspace (WHO, 2019) represents another area of relevance to the EH profession. For instance, the Port Sunlight River Park in Liverpool transformed an ex-landfill site into accessible greenspace for recreation (World Health Organisation, 2017). Furthermore, remediating and greening poor-quality vacant land can have a significant association with improved mental health in deprived areas (South *et al.*, 2018).

2.6 Literature on greenspace access

In the field on barriers and facilitators of accessing greenspace, literature is clustered around adults (about 70%) as it is still relatively new, but there is growing evidence on children and young people (Waite *et al.*, 2021; e.g. McEachan *et al.*, 2018a). Together, minority-ethnicity, low-income and deprived categories make up the biggest proportion of the research with the remaining looking at age, disability, gender and children. Urban greenspace is more widely researched (Pinto *et al.*, 2022; Rigolon *et al.*, 2021; Farahani and Maller, 2018; Hordyk, Hanley and Richard, 2015; Schipperijn *et al.*, 2010; e.g. Kendall *et al.*, 2008) than rural greenspace (Slater, 2022a; O'Brien and Snowdon, 2012; e.g. Morris *et al.*, 2011).

Covid-19 and greenspace

The pandemic contributed to a shift in thinking on the importance of accessible greenspace, changing our relationship with nature and increasing the use of greenspaces (ONS, 2021b, 2021a). Greenspace provides safe, accessible spaces for members of the public to exercise, relax and socialise. The pandemic accelerated research on greenspace due to the newfound importance of the topic area. Studies demonstrated for instance that greenspace alleviated anxiety and aided the mental

health of those without gardens (Poortinga *et al.*, 2011). EHPs played a vital role during the pandemic in helping to keep communities and businesses safe (Rodrigues *et al.*, 2021). This is due to the disciplines orientation toward health and training in infection control (CIEH, 2021). Enhancing access to greenspace can therefore aid the work of the EHP when managing future outbreaks of infectious diseases.

2.7 Existing Reviews

To check for existing systematic reviews on the research question, the following databases were searched in May 2022: Cochrane Library of Systematic Reviews, Google Scholar and PROSPERO (for prospective reviews). No existing reviews were found. This was repeated during the final search in November 2022, generating one relevant review, “The usage, constraints and preferences of greenspace at disadvantage neighborhood: A review of empirical evidence” (Chenyang, Maruthaveeran and Shahidan, 2022). Chenyang *et al.*’s view is different to this dissertation’s review as it considers global evidence whereas this review considers UK studies.

2.8 Justification and rationale for topic

This is an emerging research area that has not yet been fully explored, exemplified by the lack of studies sharing this research question. Yet, much of the existing primary research is on low-income/deprived and minority-ethnic groups, providing the evidence base to carry out a review on this subject. The experiences from the Covid-19 pandemic have proven how beneficial access to greenspace is, with now a better time than ever to continue research in this area. Information on greenspace usage is beneficial for researchers, policy makers, city planners, and the park sector (Schipperijn *et al.*, 2010). Furthermore, greenspace interventions are extremely cost-effective (PHE, 2020), and utilise free natural resources. This makes interventions easy to roll-out, and realistic and practical for a local authority to adopt a greenspace strategy. As this research area has rapidly grown, there are new studies to include in a review of this type.

2.9 Why is this research question important?

As outlined above, studies highlight how marginalised groups suffer unequal access to greenspace, yet it is interesting to consider these groups' own perspectives on what the barriers and facilitators to accessing greenspace are. The literature advised that effort should be made to include perspectives of low-income minority-ethnic communities to foster environmental justice when researching constraints and barriers, as such people "may face extraordinary obstacles to participating in urban planning" (Groshong *et al.*, 2020, p.642). For this reason, a qualitative, subjective research question was formed to centre the opinions, attitudes and beliefs that these groups hold. The outcome evolved from perceptions, to barriers and facilitators as the latter was a more scientific, measurable and categorizable outcome. It was important to include facilitators, as most research to date has focused on barriers rather than enablers (Slater, 2022a). Next, as marginalised communities often comprise both low-income/deprived and minority-ethnic communities, with a lot of cross-over between these demographics, the decision was taken to focus on both demographics. This also helped to ensure that the evidence base was big enough to carry out a systematic review, as these demographics account for the most research, whilst still enabling a narrow focus on marginalised groups. Initially thought was given on whether to include global studies, due to a concern that there may not be sufficient evidence from within the UK, however this was not the case. Initially it was decided that for an MSc dissertation it was more useful to carry out an in-depth, narrowly focused review.

3 Methods

3.1 Search protocol

The following sub-sections provide more detail about the search strategy development.

Preliminary searches

To create an effective research question and as background research for conducting this review, an extensive search of literature and 14 electronic databases was carried out. Information was entered into tables for reference. The preliminary searches included biomedical focused databases (e.g. AMED, BioMed Central) which were subsequently excluded due to lack of results. A database search tracker was made by the author on a MS Word document to keep track of search development amongst the databases and produce consistency across databases.

Consultation with librarian

Two sessions were undertaken with a UWE librarian to check and discuss this reviews' proposed databases, search terms and search strategy. These sessions helped narrow down search terms and identified the need for more social science focused databases.

Databases

The review included electronic databases that contain published literature in the fields of behaviour, environmental health, environmental sciences, social science, public health and healthcare. Due to the multi-disciplinary nature of the research question, a wide number of databases were searched (total = 11).

Databases used in final search:

PubMed, PsycINFO, Scopus, Sage, Taylor & Francis, MEDLINE, ASSIA, CINAHL Plus, GreenFILE, ProQuest, ScienceDirect.

Grey literature

Grey literature may comprise unpublished journal articles, reports by government, organisations, as well as dissertation and theses. This review decided to include unpublished studies and grey literature, as this can help avoid publication bias (Petticrew and Roberts, 2006). Publication bias occurs when results are more likely to be published if they contain significant (positive) findings. For this review, it was found pertinent to include grey literature due to the volume of research carried out by

non-government organisations, universities and NHS trusts e.g. (Kendall *et al.*, 2008).

Unfortunately, two reliable databases for searching grey literature were recently discontinued (OpenGrey, formerly OpenSIGLE, and ZETOC). For this reason, Google Scholar was used. OpenGrey remains a searchable archive under the name DANS EASY. In total, Google Scholar, DANS EASY and WorldCat were searched and a total of 8 papers included. The TRIP database and Clinicaltrials.gov were searched for medical and clinical research however 0 were found.

Snowballing

Manual searching of references lists (snowballing) of the most relevant studies was conducted after the final database search. This identified 3 records.

Search terms

Before the search query (or search string) was formulated, a table was made to initially gather all possible search terms and synonyms, based on the PEO framework (see Table 3). This helped in the design of the search strategy by capturing the main terms in the literature.

Table 3 - PEO key words and synonyms

Person/Population	Exposure	Outcome	Study design
Low-income	Greenspace	Barriers	All study types
Low socio-economic status	Greenspace	Facilitators	
Unemployed	Urban greenspace	Obstacles	
Poverty	Parks	Enablers	
Deprived	Woods	Motivators	
Minority ethnicity	Forests	Factors	
Minority	Greenway	Preferences	
Marginalised	Naturalness	Perceptions	
Black	Public greenspace	Attitudes	
	Countryside	Beliefs	

Asian (Low-income) Communities (Low-income) Neighbourhoods	Environment Nature Natural environment Nearby nature Urban nature	Accessibility Usability Experiences In/equities Benefits Usability	
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Search strategy

The search was made as effective as possible with help from the extensive preliminary searches, and where possible using only the search field Title (when this did not detract from search result efficacy). This is in line with the finding that screening via Titles-first can be more efficient than screening Titles and Abstracts together (Mateen *et al.*, 2013). This successfully generated a manageable number of results allowing for inclusion of more databases as the results were sufficiently focused. Accounts on the databases were made to save search history to ensure transparency.

Search terms below for population, exposure and outcome were combined with Boolean operators ('AND'/'OR') forming a search query. Truncations (*) were used to identify papers using varying suffixes at the end of words. Quote marks were used for phrase searches. Where databases used controlled vocabulary, search terms were adapted, for instance when using PubMed, MeSH terms were used. The search query below was used uniformly across all databases (except where MeSH terms were used) and in some databases less terms were used where these generated more successful results.

Search query:

Population

Minority groups OR minority health OR "Ethnic Racial Minorities" OR Asian OR Black OR minorit* OR marginal* OR "low-income" OR "low socio*" OR unemployed OR depriv* OR Poverty OR prejudice OR psychosocial deprivation OR "low-income neighbourhood*" OR "low-income communit*" OR muslim OR discriminat* OR equit* OR inequit* OR "unequal access" OR communit*

Greenspace

“Greenspace*” OR “greenspace*” OR “Urban greenspace*” OR Park OR Parks OR Wood* OR Forest* OR “access to greenspace” OR greenway OR "nature-based" OR naturalness OR "nearby nature"

Outcome

Barrier* OR Facilitat* OR Obstacle* OR Enabl* OR Motivat* OR Factor* OR Preference* OR Perception* OR Attitude* OR Belief* OR Access* OR Experienc* OR Inequit* OR Usab* OR use* OR Equit* OR Assess* OR Why OR “recreational participation” OR limit* OR “uneven access” OR determinants

The date of the final search was saved (25 November 2022). Most searches were undertaken in April/May 2022 and repeated in a final search in November 2022. This was important as it resulted in the inclusion of a newly published article which was included in this review.

Reference management

Initially Mendeley reference manager was used for the literature review, however this review switched to using Zotero to manage references as the latter is compatible with UWE style Harvard referencing.

Screening

All records retrieved during the final database searches were exported to Zotero reference manager. A new collection in Zotero was made for each database as well as collections for Snowballing and Grey Literature. Duplicated records were deleted. Records were screened by applying the inclusion/exclusion criteria. First records were screening using the Title and all those that were included were inserted into a new collection, INCLUDED 1 while those that were excluded were inserted into a collection EXCLUDED 1. This process was repeated based on the abstract and full-text screening. The final screening was done after retrieving and reading the full texts of all records in INCLUDED 2. INCLUDED 3 therefore contains the records to be included in this review. A table was made with reasons for exclusion at full-text screening (Table 6). Full texts were retrieved via the UWE online library, with no additional requests required.

Inclusion/exclusion criteria

The inclusion/exclusion criteria, in Table 4, have been determined with help from the PICO framework. The criteria were decided and set early on, before the completion of the preliminary and final database search, to minimise bias.

Table 4 - Inclusion and exclusion criteria

Inclusion	<p>Studies...</p> <ul style="list-style-type: none">• Whose population group is ethnic minority and/or low-income adults• Intervention/exposure relates to greenspace (including urban greenspace, man-made greenspace, semi/natural or rural greenspace)• With outcomes indicative of barriers and facilitators to using greenspace• With qualitative, quantitative, and mixed study designs• In English language• Since 2010• Carried out in the UK
Exclusion	<p>Studies...</p> <ul style="list-style-type: none">• With no findings relating to ethnic minority and/or low-income adults• Only looking at children, young people, or teenagers• Exposure/intervention is stimulated or pictured green-space environments• Outcomes not relevant for understanding barriers and facilitators of using greenspace• Looking at physical activity, exercise, or sports• That look at Covid-19 and greenspace• Not in English language• From before 2010• Of low quality• Not carried out in the UK

Justification for the criteria

The criteria help to ensure the review is transparent and reproducible. The time frame of after 2010 has been decided to ensure that the review is based on the most recently available evidence, yet it is still manageable. Next, an area of literature focuses on physical exercise and greenspace and so this needed to be reflected in the inclusion/exclusion criteria. The review only looks at adults rather than including

children and teenagers. This makes the study more focused and precise, to generate more exact findings. Adults and children are also two very different population groups and combining them would have questionable use. This review has excluded studies which look at Covid-19 and greenspace, as this represents specific, unique circumstances which may affect the results. Finally, low-quality studies graded C are excluded to ensure a level of certainty over result credibility.

Type of studies included

This review includes qualitative, quantitative studies and mixed methods studies. This is in line with other secondary research in the field (Chenyang, Maruthaveeran and Shahidan, 2022; Kendall *et al.*, 2008).

3.2 Critical appraisal

The methods and results of studies must be checked to assess the quality of the study and the reliability of the results (Petticrew and Roberts, 2006). The 'Critical Appraisal Skills Programme' (CASP) (2018) was designed to support the researcher in considering research issues systematically by proposing a checklist of questions to aid appraisal. The appraisal checklist used in this systematic review was adapted from the CASP tool for qualitative research and is included in Appendix 2. The checklist was piloted first using two sample studies picked randomly from the literature.

Scoring system

Each study was evaluated and the questions from the CASP checklist criteria were answered. For each question in the checklist, where the answer was Yes, it was marked green. If the study did not meet the criteria and the answer was No, the answer was marked red. Where the author was unsure or unable to make a judgement, it was marked yellow. A traffic light system was used to grade studies according to Table 5. No studies were graded C and excluded from this review.

Table 5 - Scoring system and grading process

Traffic light scoring system	Grade	Grading explanation
1 to 2 areas of red and/or yellow	Grade A	Study is well conducted and reported and there are minor or insignificant concerns
3 to 4 areas of red and/or yellow	Grade B	Author has some concerns regarding the way the study was conducted or reported; these are unlikely to reduce validity of overall findings
5 to 6 areas of red and/or yellow	Grade C	Significant concerns regarding the design, conduct and/or reporting of the study. Concern this will make study findings invalid.

3.2 Data extraction

Data extraction is the process of extracting information from each study included in the review (Petticrew and Roberts, 2006). The extraction must be systematic and consistent. The use of a form helps to ensure this by giving equal weighting to the type of information taken from each study. Data extraction bias can occur if this process is not complete correctly, resulting in the review author(s) altering the original reporting of a study (ibid). For this reason, where possible data extraction is carried out by at least two investigators (Higgins *et al.*, 2019), however it is not possible at this level of study. The data extraction form used in this review has been created by the author and is included in Appendix 3. To create the form, the following resources were found helpful: 'Systematic Reviews in the Social Sciences: A Practical Guide' (Petticrew and Roberts, 2006); Table 7.3.a. in the 'Cochrane Handbook for Systematic Reviews' (Higgins *et al.*, 2019).

3.3 Narrative synthesis

According to the 'Cochrane Handbook for Systematic Reviews', a narrative synthesis can be used where meta-analysis is not feasible or sensible (Higgins *et al.*, 2019). Meta-analysis should be carried out where possible in systematic reviews, but these require homogeneity between study designs and findings. Particularly with qualitative research, heterogeneity means it is not possible to conduct a statistical summary (Petticrew and Roberts, 2006). This review uses a narrative synthesis for data analysis. However, it is recommended that narrative synthesis methods should be

pre-specified in order to avoid bias (Higgins *et al.*, 2019). The methods used in this dissertation will follow the two stages proposed in 'UWE Guidance on systematic reviews for Public and Environmental Health dissertations' (UWE, 2017). Stage 1 will involve a narrative reporting for each study (study summary and study strengths and limitations), and Stage 2 will involve between-study reporting. Furthermore, data reflecting differential effects of an exposure should be extracted by the reviewer as it enables an investigation of heterogeneity (Higgins *et al.*, 2019). To achieve this, a subgroup analysis will be attempted for low-income/deprived sub-population, minority-ethnic sub-population and migrant, refugees and asylum seeker sub-population.

4 Results

This chapter presents the results of the search and the data extraction, quality appraisal and analysis of the included studies via narrative synthesis.

4.1 Search results

Presented below is a flow chart of the data search (Figure Three). The reasons for exclusion at full text screening are presented in Table 6.

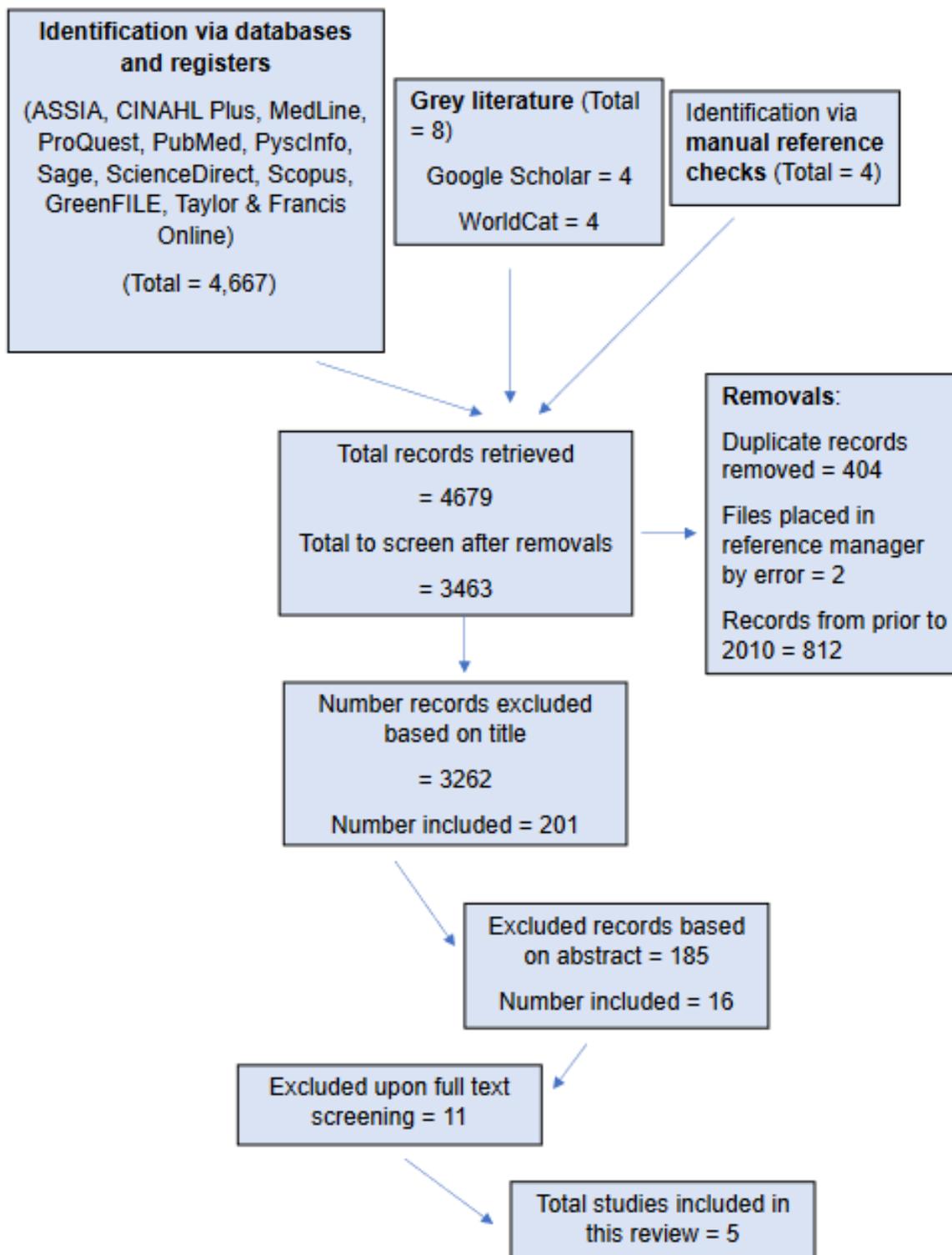


Figure 3 - Flow chart of data search

Records excluded upon full text screening

Table 6 - Table of excluded studies and reasons for exclusion

Record (study)	Reason(s) for exclusion
(Kendall <i>et al.</i> , 2008)	Study published prior to 2010
(Morris and O'Brien, 2011)	Study specifically looks at exercise and physical activity, through a review of projects funded by Sports England
(Thompson, Roe and Aspinall, 2013)	The aim of the study is to assess the effectiveness of a woodlands-based intervention compared with a control without the intervention
(Sotoudehnia, 2014)	Study does not address the population in this systematic review
(Edwards, Larson and Church, 2022)	Study is focused on cultural ecosystem benefits (CEBs) and whether or not minority-ethnicity greenspace users derived similar or different CEBs to white users. This is not the same outcome
(Jones A <i>et al.</i> , 2009)	Study published prior to 2010. Study also looks at physical activity
(Doick <i>et al.</i> , 2013)	Study aim does not generate findings relevant for this review as it considers greenspace facility design and provision. In addition, population of their study does not meet this review's inclusion.
(Boyd <i>et al.</i> , 2018)	This study is focused on predictors of infrequent contact with nature using statistical analysis to determine associations. This therefore generates findings (predictors) about who is more likely to have a certain reason for non-visits. This differs from this systematic review, and it also includes all types of demographics rather than this reviews' population. While their study may help to make decisions about where to focus future interventions, it is speculative as it is based on associations rather than causal effect. This differs subtly but importantly from the aims of this systematic review, which, through attempting to uncover the specific barriers and facilitators to greenspace access and use by the target population, is concerned with causation.
(Colley, Irvine and Currie, 2022)	This study focuses on gender differences in contact with nature. Socio-economic status was not. Moreover, the study sample was made up of less than 4% black, Asian or other non-white minority ethnicity.
(Roberts <i>et al.</i> , 2019)	Similar to Boyd <i>et al.</i> & Doick <i>et al.</i> above, this study looks for associations between park features, use and satisfaction. It assesses users for their satisfaction levels relating to park features.
(Seaman, Jones and Ellaway, 2010)	The study was initially thought to be relevant, however does not sufficiently include target population. Findings for areas are also not differentiated.

4.2 Critical appraisal

For the next section, each included study has been issued with a letter of the alphabet to aid reference (Table 7). The appraisal scoring system is outlined in the Methods chapter.

Table 7 - Study alphabetising

Study A	(Chenyang, Maruthaveeran and Shahidan, 2022)
Study B	(Cronin-de-Chavez, Islam and McEachan, 2019)
Study C	(Gidlow and Ellis, 2011)
Study D	(Morris <i>et al.</i> , 2011)
Study E	(Slater, 2022a)

The results of the critical appraisal for each study and traffic light colours for scoring are displayed on Table 8. Table 9 shows study grading outcome and author's notes. Study A was at the boundary between a Grade B and Grade C. If the critical appraisal of the studies had been completed at an earlier date, this review author would have approached their dissertation supervisor to discuss Study A further. However, as it was still within grade B it was included. The full appraisals are included in Appendix 4.

Table 8- Critical appraisal summary results

Critical appraisal grading table (traffic light system)	Study A	Study B	Study C	Study D	Study E
1. Did the study address a clearly focused question or was there a clear statement of aims of the research?	Y	Y	Y	Y	Y
2. Were the methodology and research design appropriate to answer the research question?	Y	Y	Y	Y	U
3. Was the exposure defined by the authors?	N	Y	Y	Y	Y
4. Were the study participants recruited in an acceptable way?	Y	U	Y	Y	Y
5. Was the data collected in a suitable way that addressed the research question?	Y	Y	U	Y	Y
6. Have ethical issues been taken into consideration?	Y	Y	Y	Y	Y
7. Was the data analysis sufficiently rigorous?	Y	Y	Y	Y	Y
8. Is there a clear statement of findings?	N	Y	Y	U	Y
9. Has the author(s) considered bias or the strengths and limitations of their study?	N	Y	Y	N	N
10. Are results precise and/or believable?	Y	Y	Y	Y	Y
11. Can the results be applied to other low-income and/or minority ethnicity populations?	Y	Y	U	Y	N
12. Is the research valuable?	N	Y	Y	Y	Y

Table 9 - Study grading results

Study	Number of red/yellow squares	Grade	Author's Notes
Study A	4	B	This was a recently published systematic review however it is a weak study with four areas of concern and if the critical appraisal process had been completed earlier, the author of this dissertation would have sought the supervisor's advice on whether or not to include this study. As it still was within a Grade B scoring, the study was included.
Study B	1	A	This was a strong primary study conducted thoroughly and ethically producing good-quality evidence in an under-studied area. The only concern was potential selection bias in recruitment due to the over-representation of female respondents.
Study C	2	A	This was a well-carried out study using baseline data from a small-scale deprived urban area. Data collection could have been improved by using interviews as well as focus groups. The population was white British meaning it is unclear how generalisable findings are given that deprived urban populations are often diverse ethnically.
Study D	2	A	This was a strong study with a novel methodology using baseline data from population-wide studies from England, Wales and Scotland. It employed strong data analysis methods using both systematic review methods and meta-analysis. The study produces findings at a population level.
Study E	3	B	The concerns with this study were to do with its chosen methodology and the fact this makes findings not very generalisable or applicable to other minority-ethnic populations. However, the study was carried out well regardless, producing valuable findings in an under-studied population.

4.3 Data extraction

The main characteristics of the included studies are summarised in Table 10, whilst Table 11 shows findings on barriers and facilitators across subgroups. Tabulating study findings is a key step before evidence synthesis and improves transparency in the review process (Petticrew and Roberts, 2006). The full data extraction forms are in Appendix 5.

Table 10 - Characteristics of included studies

Characteristics of included studies									
Year	Author(s)	Methodology & study design	Location	Population	Exposure	Outcome	Methods	Key Findings	Study grade
2022	Slater, H.	Qualitative primary research – multiple case study	UK (Scotland and England)	Minority ethnic communities	Rural greenspace	Motivations for visiting, perceptions and identities	Interviews and surveys generated from three case studies	Social connection and sense of escape are primary motivators. Community-base initiatives help to overcome barriers. Rural greenspace not seen as very different to urban greenspace.	B
2022	Chenyang, Maruthaveeran and Shahidan	Systematic review of literature	Includes studies globally	Disadvantaged neighbourhoods	Greenspace (both rural and urban greenspace)	Uses, constraints and preferences of accessing greenspace	Systematic review– search of 4 databases	Affected by personal, social, physical and other attributes. Social attributes and accessibility are primary.	B
2011	Morris, O'Brien, Ambrose-Oji, Lawrence, Carter and Peace	Secondary research (systematic review and meta-analysis)	Britain (all)	Under-represented social groups	Woodlands and forests	Barriers to access	Analysis of quantitative and qualitative research	Deep-seated psychological, emotional and socio-cultural barriers	A

2011	Gidlow and Ellis	Primary research qualitative with cross sectional design	North Staffordshire, UK	Deprived urban community	Neighbourhood park (urban greenspace)	Perceptions of local greenspace, issues and barriers to use	Focus groups with adults and young people, part of a mixed-methods study	Adults reported antisocial behaviour and lack of facilities as main barriers	A
2019	Cronin-de-Chavez, Islam and McEachan	Qualitative primary study – cross-sectional study design	Large city in the North of England	Low-income multi-ethnic adults (with children)	Urban greenspace (4 parks, playing fields, sports facilities, play areas and allotments.)	Determinants (barriers and enablers) of use	In-depth interviews & focus group conducted with adults of range of ethnic groups in three electoral wards of the most deprived quintiles	Social interaction and emotion (fear) primary. Barriers and enablers common across diverse ethnic groups. Community activities are key, and quality is important.	A

Table 11 - Table of barriers & facilitators among subgroups

Ethnic minorities		Low-income/deprived		Migrants, asylum seekers and refugees	
Barriers	Facilitators	Barriers	Facilitators	Barriers	Facilitators
<ul style="list-style-type: none"> • Language barriers • Low awareness of local geography • Cost (transport) • Safety & crime • Poor physical designs • Not owning car or knowing bus routes • Winter weather • Attitudes and beliefs 	<ul style="list-style-type: none"> • Proximity and locality of greenspace • Social connection • Provision of low-cost/free transport • Fair, warm weather • Perceived health benefits • Sense of escape from everyday life • Facilitated access through community activities and organisations 	<ul style="list-style-type: none"> • Anti-social behaviour • 'Unwelcoming' places • Safety and crime • Poor-quality areas • Low motivation to go out • Norms around which types of spaces are used • Cost • Lack of car • Poor design (locked gates) 	<ul style="list-style-type: none"> • Social connection • Awareness of health benefits • Relaxing and calming environment • Proximity and doorstep access • Sense of escape 	<ul style="list-style-type: none"> • Social isolation – no friends/family • Poor mental health and trauma preventing access • Lack of information and awareness • Information not in other languages 	<ul style="list-style-type: none"> • Opportunity for social connection & relationships • Accessing practical peer support via park connections • Health benefits – calming, relaxing, good for children • Escaping mundanity of life

4.4 Narrative synthesis

As the research question of this systematic review is qualitative in nature, as predicted the results are too heterogenous to be combined through a meta-analysis. The observed results will be analysed via a narrative synthesis using the stages outlined in the Methods.

Stage One: Narrative reporting for each study

Study A (Chenyang et al., 2022)

Study summary

This study is a systematic review of the global evidence relating to the use, constraints and preferences of greenspace amongst disadvantaged neighbourhood residents. The author searched four databases and followed the PRISMA guidelines for screening and selection of their studies. They performed data analysis using a socio-ecological framework by lumping results into themed categories of personal, physical, social and other. The authors found a range of personal, physical, social and other factors affecting use, constraints and preferences and these factors interrelated with each other (Table 12). The need for good quality greenspace with positive aesthetics to promote the use of greenspace in disadvantaged neighbourhoods was highlighted. No clear statement of overall findings was provided.

Strengths and limitations

The study is relevant as it is the first review to systematically consider the global evidence on disadvantaged neighbourhoods' use of greenspace. It brings together a lot of evidence. The study met its aim and goals, except it did not provide clear results of where the research gaps lie. The study has a number of limitations making it a weak overall. The authors' search strategy involves few databases and keywords. A discussion about types of greenspace included in the studies is missing. There is an absence of critical appraisal in included studies meaning the validity of results is unknown. Furthermore, the results are heterogenous meaning their

contribution is questionable, for instance combining all countries, cultures, age groups, etc. No subgroup analysis is performed so there is not an indication of homogeneity of findings in relation to specific groups. The authors succeed in providing an in-depth summarisation of existing research. A main study finding is that well-designed and attractive greenspaces facilitate access in disadvantaged neighbourhoods.

Table 12 - Study A findings

Study A – Summary of findings
<p>Barriers</p> <ul style="list-style-type: none"> • Gendered family responsibilities • Low leisure time for both subgroups of the population • Insecurity for both (crime, sexual assault) • Cost for low-income population • Facilities, maintenance for ethnic-minority population • Transport in general • Safety including traffic, lighting, crime for both • Poor facilities low-income population • Poor maintenance (hygiene, air quality, sewage, noise, infrastructure repairs) • Physical obstacles (fences, gates, rubbish, vegetation)
<p>Facilitators</p> <ul style="list-style-type: none"> • Personal motivation for low-income population • Group visits for both populations • Social interaction across the board • Organised activities • Proximity to greenspace in general • Good weather, summer months
<p>Other</p> <ul style="list-style-type: none"> • Those who use active transport know neighbourhood greenspace better

Study B (Cronin-de-Chavez et al., 2019)

Study summary

This was a strong qualitative primary study with a cross-sectional (observational) design. The aim of the study was to consider barriers and enablers (determinants) of greenspace use by low-income and multi-ethnic adults with children within a deprived urban area. The authors used interviews and a focus group for data

collection. The sample comprised 30 respondents of a range of ethnic backgrounds. Thematic analysis was used for the data analysis and a-priori conceptual frameworks facilitated discussion. Nine core themes emerged as determinants of usage, with fear (emotion) and social and community factors being key (Table 13). Interestingly, results were homogenous across and between multi-ethnic groups, meaning that results have a larger applicability and can likely be generalised. The authors stress the need for greenspace interventions that are co-produced with residents (Roberts et al. 2018 in Cronin-de-Chavez, Islam and McEachan, 2019).

Table 13- Study B findings

Study B – Summary of findings
<p>Barriers</p> <ul style="list-style-type: none"> • Safety and crime, experiences of violence (fear, emotion)– especially multi-ethnic population • Lack of free time • Beliefs about capabilities • Cold weather during winter months • Physical accessibility such as gates • Mental health illness amongst asylum-seekers • Lack of knowledge of local greenspaces, especially for new residents such as migrants and refugees. Maps required • Distance/proximity, unfamiliarity, bus routes • Health and safety – polluted water, broken glass, hygiene issues • Social isolation – migrants • Cost of transport, use of car
<p>Facilitators</p> <ul style="list-style-type: none"> • Opportunity for social interaction • Practical support for migrant families • Benefits of greenspace – knowing that greenspace access is healthy was an enabler • Relaxation opportunities in greenspace • High-quality spaces (aesthetics, cleanliness) • Facility range
<p>Other</p> <ul style="list-style-type: none"> • The barriers faced by low income multi-cultural areas can be so great that greenspace is not used • Greenspace is valued regardless of usage

Study strengths and limitations

This study contributes valuable, high-quality evidence on barriers and enablers by an under-studied group. The authors used purposive stratified sampling to ensure representation of a range of races/ethnicities in their sample, the only study to do so. The authors gave a lot of weight to ethical considerations. The use of a-priori conceptual frameworks gave the findings greater utility as they share common terminology and language to existing bodies of knowledge. A chance of selection bias and/or participation bias was noted (due to most respondents being female and 8 potential participants leaving citing lack of time), however this was acknowledged by the authors. However this does not affect accuracy, as this is an observational study it just means the findings have a narrower application. Furthermore the use of triangulation helped to reduce overall risk of bias in the study and improve result validity, such as by having a second investigator check coding and by using multiple theoretical frameworks (Noble and Heale, 2019). Finally, the study area was a deprived urban centre with a demographic typical of large urban centres in the UK, meaning results are very generalisable.

Study C (Gidlow and Ellis, 2011)

Study summary

This was a strong qualitative primary study using baseline data from focus groups, from before the start of a community greenspace intervention. The study aimed to understand experiences, perceptions, issues and barriers to local greenspace use amongst residents, to shed light on potential interventions within a very deprived area. The study population was predominantly white. There were separate focus groups for adults and young people with separated results through subgroup analysis. Data analysis was thoroughly described and rigorous, and themes independently verified by a second investigator, providing triangulation to improve validity. Greenspace was found to be valued by adults despite poor quality (Table 14). This is despite the fact the study showed that poor-quality greenspace can actually be detrimental to health and well-being. Greenspace usage is hindered by antisocial behaviour, misuse and quality issues, meaning that even greenspace in close proximity to residents ('doorstep greenspace') can remain under-used due to area neglect.

Table 14 - Study C findings

Study C – Summary of findings
<p>Barriers</p> <ul style="list-style-type: none"> • Low hope for change • Anti-social behaviour (drug use, crime, vandalism, arson) • Poor quality (litter) • Health and safety issues such as broken glass, drug rubbish • Inadequate facilities and maintenance • Adult perceptions of the dominance of teenagers • Tensions between social groups (feeling that it's not their space) • Lack of lighting and dense vegetated areas
<p>Facilitators</p> <ul style="list-style-type: none"> • Seating areas that are sheltered • 'The cage' courts/football pitch area that is multi-functional • Socialising and social benefits • Proximity to the space, providing convenience
<p>Other</p> <ul style="list-style-type: none"> • Proximity to greenspace does not matter if issues persist • Need for community-engagement activities • Existence of parks was valued regardless • Demand for facilities such as sports facilities, communal equipment, graffiti walls • Respondents struggled to identify facilitators

Study Strengths and limitations

The study underlines the importance of designing interventions on a case-by-case basis, as these findings demonstrate, proximity and distance to greenspace are not always primary facilitators of usage. The authors were able to access a hard-to-reach group generating valuable insights in line with the wider literature. The financial incentive and including parents in recruitment strategy helped to overcome the challenges in recruiting participants from this deprived area. Like other studies, respondents were majority female, potentially raising participation bias or at least narrowing down the applicability of the results. However, the authors considered limitations to their study, as well as acknowledging that having further subgroups would have provided more targeted findings. The study could have been improved by using interviews in addition to focus groups. The generalisability of the findings are limited by the fact the area is white British ethnically.

Study D (Morris et al., 2011)

Study summary

This was a secondary research paper that examined existing data sets carried out by the Forestry Commission or Forest Research on barriers to use of woodlands and forests in Britain. The data came from 20 research studies between 2000-2009, involving 22,863 respondents. Studies either directly or indirectly looked at barriers to visiting woodlands and forests. Qualitative data was systematically reviewed while quantitative data was analysed statistically, generating themes. The authors proposed their own typology of barriers within two categories (physical and structural barriers, and socio-cultural, economic and personal barriers). Findings were differentiated according to demographic sub-status. Low-income groups faced a more even spread of barriers, while BME groups faced barriers mostly related to off-site physical barriers and attitudes and beliefs (Table 15). The authors recommend facilitated access in order to promote access for disadvantaged groups.

Table 15 - Study D findings

Study D
Barriers <ul style="list-style-type: none"> • Distance and proximity to site (most deprived access urban nature) • Safety – found by BME communities • BME groups: off-site physical barriers (lack of transport and information), attitudes and experiences personal & social • Lack of information & language barriers – not available in own language • Cultural norms BME populations– women in groups vs alone; woodland-based recreation is done less • Cost – deprived communities & BME • Low-income: barriers evenly distributed across themes • Low-income: restricted horizons, cars and transport issues, unreliable public transport, anti-social behaviour, cost
Facilitators [This study only considers barriers]
Other <ul style="list-style-type: none"> • One-size-fits-all approach does not work for hard-to-reach groups • Facilitated access required using targeted, promoted and accompanied visits to woodlands and forests

Study strengths and limitations

This research was novel in its scope and approach, making use of existing data to generate new insights, using a data body that is not widely known about. The study had a strong design and methodology, which benefited from the strengths of both qualitative and quantitative analysis. The study is based on a large sample, involving nearly 23,000 respondents across Great Britain. The downside to this is that it produces broad, rather than narrow and focused findings and the populations, although broken into subgroups for analysis, are less homogenous. However, by linking the barriers to the demographic groups, the authors were able to compare the distribution of barriers between groups.

Study E (Slater, 2022)

Study summary

This was a qualitative primary study that used multiple case studies to explore the motivators of accessing rural greenspace amongst minority-ethnic individuals. It also looked at the populations' perceptions, identities and the role of community organisations. Data was collected via walking interviews, semi-structured interviews and a survey. Thematic analysis was carried out to generate themes emerging from the research. Relevant findings included the prominence of social connection, sense of escape, and perceived benefits of nature as individual motivations (Table 16). The study also found that rural greenspace was not perceived as separate to urban greenspace. Community initiatives are key facilitators to accessing rural greenspace, especially in relation to cost, transport and organisation.

Table 16 - Study E findings

Study E
Barriers [Study focused on facilitators]
<ul style="list-style-type: none">• Cost• Not owning car

<p>Facilitators/enablers</p> <ul style="list-style-type: none"> • Community-based organisations • Subsidised/free transport • Social connection • Dissemination of information about rural greenspaces • Memories or experiences of nature as children, especially amongst refugees • Quality and perceived benefits, over proximity • Perceived benefits (air quality, relaxation, beauty, calming, fresh air, health, mental health) • Sense of escape (esp. for refugees) • Social connection
<p>Other</p> <ul style="list-style-type: none"> • Minority-ethnic respondents reported rural/nature-based identity as part of their identity

Study strengths and limitations

The study is valuable as it focuses specifically on motivators for use; this differs from most research up to now, which has mainly looked at barriers to use. This is the only study to outline a systematic approach to selection of case study/site area. The study succeeds in reaching a hard-to-reach population, making the findings valuable. A drawback of this study was the design involving data collection from individuals who are already frequent users of rural greenspace. This could possibly bring up issues of bias in the results as those who are frequent visitors and members of outdoors' organisations are more likely to report positive perceptions. To improve the study, it could include infrequent visitors to gain a larger cross-section. This study considered multiple outcomes and arguably it may have had deeper results with a more narrow focus. The author gives weight to ethical considerations including her own positionality as a white researcher.

Stage Two: Between-study reporting

This section will discuss similarities and differences between studies based on the publication date and location, study design and the PEO framework.

Date and location

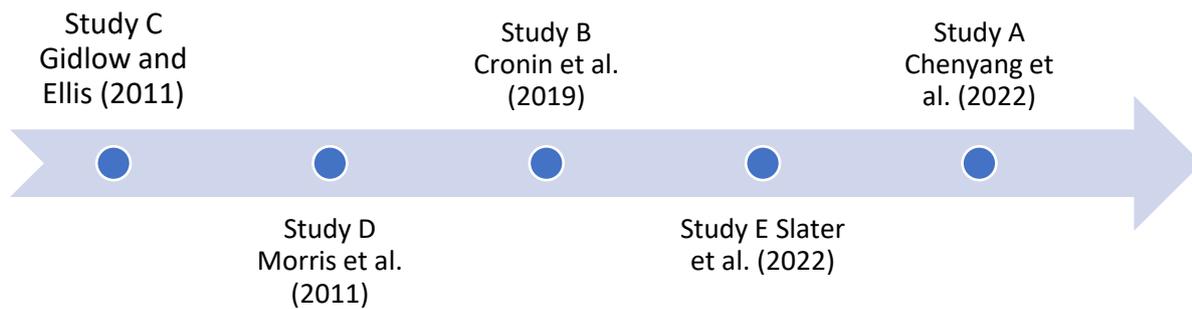


Figure 4- Timeline of studies by publication date

Three of the five included studies were published within the last four years as demonstrated in the timeline. Despite a small sample size, this is in line with the very recent growth of the research area and corroborated by Chenyang et al.'s review (2022). Four studies were based in the UK with the fifth including findings from UK-based studies. Much of the data collection from primary studies originates from Scotland, the Midlands or the North of England, very much in line with wider literature (Colley, Irvine and Currie, 2022; Roberts, Irvine and McVittie, 2021; Ward Thompson *et al.*, 2019; Sotoudehnia, 2014; Thompson, Roe and Aspinall, 2013; see also Seaman, Jones and Ellaway, 2010). This may be due to the fact that there are higher levels of deprivation and more ethnic-minority communities living in the Midlands and North of England.

Study design

Of the included studies, the majority (=3) were primary studies with two secondary research articles. This is predictable given that most of the field is made up of primary studies. This is common when a research area is still a young body of knowledge, as secondary research tends to be conducted when the primary evidence base is large. In their review Chenyang et al. found 79% of their included studies were primary research (2022). The primary studies were all observational and all utilised the same data collection methods (surveys, interviews, focus groups) typical for this kind of research. Furthermore, all used thematic analysis for data analysis. This follows the trend in the wider literature, making cross-comparison particularly possible (Doick *et al.*, 2013; Seaman, Jones and Ellaway, 2010; Kendall *et al.*, 2008). Both secondary reviews included qualitative and quantitative studies,

reflecting the diversity of types of research and the need to employ methods to analyse all types of data.

Population

There is much cross-over in the studies in terms of population looked at. Four of the included studies look at minority-ethnicity populations, and four also consider low-income/deprived populations. One study only considers minority-ethnicity, and one other only considers deprived population. Both of the secondary research studies look at 'disadvantaged neighbourhoods' and 'under-represented social groups'. All focus on adults although Gidlow and Ellis (2011) include young people in their study.

Exposure



Figure 5 - Types of greenspace in studies

Greenspace or natural environments make up the exposures in all studies. The author decided to include all types of greenspace in this systematic review to gather all available evidence and enable gaps to be spotted in the literature. As Figure 5 shows, of the included studies, two specifically look at urban greenspace, one looks

at rural greenspace (exact types of rural greenspace are not defined) and the other two combine rural and urban greenspace. One study looks at forests and woodlands in particular, whereas another looks only at one urban park. Two studies (Cronin-de-Chavez, Islam and McEachan, 2019; Gidlow and Ellis, 2011) include mention of a formal classification of greenspace of their exposure. Despite the type of greenspace varying between studies, findings from the studies actually indicate that the specific type of greenspace is not that important. For instance, a main finding from Slater’s study on rural greenspace was that the type of greenspace did not matter to study respondents, and they viewed urban and rural greenspace as part of a totality, or network of greenspace with similar benefits. All studies found that quality of the exposure was a much more important determinant of use than the category of greenspace itself. This helps to synthesise findings across studies.

Outcome

The outcomes across included studies were of all qualitative and subjective nature. Table 17 summarises study outcomes. Three studies considered barriers and facilitators, one looking only at barriers and the last looking just at enablers. Alongside considering barriers and facilitators to use, two studies also considered the population’s wider perceptions relating to greenspace.

Table 17 - Summary of study outcomes

List of keywords relating to outcomes	Study A (Chenyang, Maruthaveeran and Shahidan, 2022)	<ul style="list-style-type: none"> • Uses of greenspace • Constraints • Preferences
	Study B (Cronin-de-Chavez, Islam and McEachan, 2019)	<ul style="list-style-type: none"> • Barriers of use • Enablers • Determinants
	Study C (Gidlow and Ellis, 2011)	<ul style="list-style-type: none"> • Perceptions of greenspace • Issues • Barriers
	Study D (Morris <i>et al.</i> , 2011)	<ul style="list-style-type: none"> • Barriers to access

	Study E (Slater, 2022b)	<ul style="list-style-type: none"> • Motivators for visiting green • space • Perceptions • Identities • Community-based organisations role as facilitators
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5 Discussion

The discussion in this chapter is generated from the results in the previous chapter, drawing also on themes raised in the Table of barriers and facilitators across subgroups (Table 11).

5.1 Themes emerging from results and findings

Migrants, refugees and asylum-seekers

Within minority-ethnic residents, findings relating to migrants, refugees and asylum-seekers were distinct enough to warrant inclusion as a subgroup for analysis. This was unexpected, but it has drawn attention to how little research exists on this subgroup, with little to compare findings to. The main barrier faced by this group appears to be lack of information and awareness of the local geography, accessible greenspaces, bus routes, and which parks are safe (Cronin-de-Chavez, Islam and McEachan, 2019). Language barriers were cited, with information in other languages not available. This type of barrier is easy to address, as information provision is low-cost and easy for a local authority to remedy through a simple solution of providing leaflets with maps of safe local greenspace, translated into the main languages found in the area. The importance of social connection is also highlighted, with the potential of new relationships able to overcome the barrier of social isolation. This was also found in research on refugees in Sheffield (Slater, 2022a). Social connection can improve mental health, another barrier in this group. As greenspace

innately benefits mental health easing anxiety and depression symptoms (Bratman *et al.*, 2019; McEachan *et al.*, 2018b), greenspace access can provide an upward spiral of benefits. Finally, a facilitator of greenspace access is the availability of practical peer support at the local park. For example, Cronin *et al.* report parks as sites that new residents gain information on children's activities, information about the local area, and benefits and housing advice through meeting and chatting with other users.

Minority-ethnic groups

Some of the findings on barriers and facilitators faced by minority-ethnic groups cross-over with the previous group, in terms of language barriers and lack of information/awareness, hindering social connection or decreasing confidence (Chenyang, Maruthaveeran and Shahidan, 2022; Cronin-de-Chavez, Islam and McEachan, 2019; Morris *et al.*, 2011). However this only applies to those who do not speak English, perhaps older residents who may not have had learning opportunities. Morris *et al.* (2011) find the largest barriers in this group to be attitudes and beliefs and physical barriers. For instance, they reported that Pakistani women in particular felt uncomfortable going alone to the park (*ibid*). However concern about safety was reported as a barrier across studies and ethnic groups, meaning this factor is not unique to ethnicity. Amongst the minority-ethnic subgroup, social connection was a key facilitator to access, with respondents reporting accessing greenspace with friends, family and children (Slater, 2022a; Cronin-de-Chavez, Islam and McEachan, 2019). Community events and informal community activities in parks were further key facilitators of access. This was an unexpected finding, representing an area for further research. Barriers and facilitators were found to be homogenous across ethnic-groups with the same themes arising in relation to Asian, Black, Eastern European and other minority-ethnic groups. This was also noted by Cronin *et al.* (2019).

Low-income and/or deprived

Unlike the previous subgroups, Morris *et al.* (2011) found that the low-income subgroup faced a more balanced distribution of barriers. This can be partly explained by the fact this group will not all face language barriers. There were a number of determinants that stood out, related to anti-social behaviour, inadequate facilities and

misuse (Gidlow and Ellis, 2011). Three studies mentioned the issue of drug paraphernalia being left around, as well as other hazards such as waste and broken infrastructure (Chenyang, Maruthaveeran and Shahidan, 2022; Cronin-de-Chavez, Islam and McEachan, 2019; Gidlow and Ellis, 2011). Furthermore, this group was found to suffer from low personal motivation to go outside (Gidlow and Ellis, 2011). Morris et al. found that such groups suffered from what they named 'restricted horizons' (Morris *et al.*, 2011, p.387). There was a sense of not belonging in greenspaces amongst deprived neighbourhood residents. This is in line with other literature on deprived communities, summed up by the publication title, 'It's Not for People Like Them' (Waite *et al.*, 2021; Ward Thompson *et al.*, 2007). This may be due to missing place attachments between residents and their area, found by Haase et al. as an explanation for the finding in their study (2021). It could also be a general rejection altogether of the area that manifested through non-use of green (ibid). The negative attitudes and lack of identified facilitators of access to these poorly maintained greenspaces shows a clear need for urgent intervention. Addressing these is a priority for health (Marmot *et al.*, 2020; PHE, 2020).

Other barriers and facilitators

Safety

Safety issues in relation to crime and anti-social behaviour was a widely reported barrier, for all types of greenspace except rural sites. This was reported as a sense of fear (emotion) by Cronin et al. (2019), which effectively reflects the fact that much of the time this is a perception rather than representing a real risk of harm. However, having said this, the same authors found that many respondents had been victims of violent crime in greenspaces, reflecting that high crime rates are found disproportionately in poorer areas (Marmot *et al.*, 2020). However, safety in the literature also related to other barriers, for instance high volumes of traffic and busy roads. Improved lighting as well as removing dense brush and vegetation were highlighted as facilitators to access (Gidlow and Ellis, 2011). Safety and crime is also one of the most reported findings across the rest of the literature (e.g. Stodolska *et al.*, 2011).

Physical design

Locked gates, fences, narrow entrances and poor infrastructure were all cited as physical barriers representing poor physical design of greenspaces (Chenyang, Maruthaveeran and Shahidan, 2022; Cronin-de-Chavez, Islam and McEachan, 2019; Gidlow and Ellis, 2011). Parents of children reported not being able to get push chairs through entrances designed to keep quad bikes and motorcycles out of parks (Chenyang, Maruthaveeran and Shahidan, 2022; Cronin-de-Chavez, Islam and McEachan, 2019; Morris *et al.*, 2011). In attempting to control anti-social behaviour, park designers are inadvertently creating barriers to access for families.

Nature aesthetics and health

Having attractive, aesthetic greenspaces were found to motivate and encourage access. In addition, the perceived health benefits of spending time in nature were also reported as a facilitator to use. Respondents reported being drawn to the relaxing, calming, peaceful elements of greenspace and enjoyed the fresh air, clean air, less noisy spaces that provide opportunities for health (Chenyang, Maruthaveeran and Shahidan, 2022; Slater, 2022a; Cronin-de-Chavez, Islam and McEachan, 2019). Such facilitators may be considered even more important since the Covid-19 pandemic.

Quality

Quality of greenspace was found to be one of the most important barriers/facilitators of accessing greenspace environments. Respondents were willing to travel further to access better quality sites (Slater, 2022b; Cronin-de-Chavez, Islam and McEachan, 2019; Gidlow and Ellis, 2011). Although proximity and closeness to greenspace was found to facilitate access generally, where sites were particularly poor-quality this acted as a deterrent. Gidlow and Ellis's findings (2011) here are important, as they suggest that doorstep greenspace is not always beneficial for health when the sites themselves are detrimental to health.

Environmental hazards

The reasons greenspace sites may be detrimental to health are multifaceted and occur when there are multiple barriers to access relating to poor-quality, inadequate facilities that are poorly maintained or subject to vandalism. The studies on urban greenspace found a high occurrence of rubbish, litter, drug paraphernalia, broken

glass and broken infrastructure such as lights and walls (Chenyang, Maruthaveeran and Shahidan, 2022; Cronin-de-Chavez, Islam and McEachan, 2019; Gidlow and Ellis, 2011). These may present trip hazards or could harbour pests and disease. Other reported issues included polluted water sources in parks, build-up of dog mess, and frequent arson attacks (Cronin-de-Chavez, Islam and McEachan, 2019; Gidlow and Ellis, 2011). Chenyang et al. note the addition of sewage, however their study was world-wide and it is unlikely that sewage or waste would be a problem in UK greenspaces.

Such issues were widely reported by respondents and represented an unforeseen category of barriers not regularly cited in the literature. This may be within the remit of EH and could represent an area where the profession could contribute toward greenspace accessibility. For instance, an EHP's skills relating to conducting risk assessments could be used. Responses were mixed and not all positive toward Gidlow and Ellis's proposal of police presence to increase safety. Instead, the utilisation of EHPs could provide a suitable, and more popular alternative focused on prevention of harm.

Social connection

Social connection emerged as a key facilitator of access across studies and subgroups, regardless of type of greenspace. The opportunity for socialising, fostering new relationships, and spending time with friends and family were highlighted as motivators to access, and in some cases as enabling access through tackling social isolation (Chenyang, Maruthaveeran and Shahidan, 2022; Slater, 2022a; Cronin-de-Chavez, Islam and McEachan, 2019; Gidlow and Ellis, 2011; Morris *et al.*, 2011).

Community activities as key

Closely linked to social connection, community activities in greenspaces were strong facilitators of use, to the extent that four of the five study authors made recommendations to increase community activities. The type of activity did not matter. Even just the presence of community groups regularly using the greenspace, or information campaigns on greenspace via community noticeboards and networks are likely to facilitate access (Slater, 2022a; Cronin-de-Chavez, Islam and

McEachan, 2019). Walking groups, litter-picking, children's activities and gardening were provided as examples of future informal community activities in greenspace. Other literature on the population has also noted the importance of social activities (Lee, Gu and An, 2017).

It is useful to consider why community activities emerge as so key. Slater found that community-based organisations help to provide reliable sources of information about local greenspaces (2022). This tackles the barrier discussed above relating to lack of information. Community-based organisations also emerged as facilitators to accessing rural greenspace, as they organised outings, trips, offered subsidised transport, and provided the level of organisation required to access sites further away (ibid). Indeed, cost of public transport and not owning a car were mentioned as barriers to access (Chenyang, Maruthaveeran and Shahidan, 2022; Slater, 2022a; Cronin-de-Chavez, Islam and McEachan, 2019). Furthermore, community activities foster social connection, another main motivator of use of greenspace in the findings. The suggestion of litter picking could help to improve attractiveness of poor-quality spaces, provide opportunity for social connection and contribute toward reclaiming the space away from anti-social behaviour.

Hard-to-reach communities

All primary studies have managed to access typically hard-to-reach communities, making research findings particularly valuable. It is interesting to consider how this has been achieved. The role of trust appears central, it is notable that authors mention in their methodology the requirement of investing time to get to know community leaders and members (e.g. Cronin-de-Chavez, Islam and McEachan, 2019). In one study in a highly deprived area, researchers use the local school in order to overcome the challenges of recruitment that they faced (Gidlow and Ellis, 2011). In addition, small financial incentives helped in the form of £10 or £20 vouchers. In both cases the study participants were busy, typically with families and young children, without much free time or economic resources and the offering of a financial incentive helped to acknowledge the difficulties that they faced in participating in the research.

Summary

Across studies, barriers and facilitators focused on safety, physical design, environmental hazards, health benefits, quality of space, social connection and community activities. Most determinants are structural/physical rather than individual/behavioural. Low-income/deprived areas face severe barriers, including a sense of not belonging in greenspaces. Across studies, respondents expressed that quality matters more than proximity. This is surprising given that in the deprived population of this study, cost of public transport, lack of free time around work, and not owning a car were all barriers to access. It demonstrates that there is a universal value of good-quality space. When this is not the case, the park can even represented a source of dissatisfaction of the neighbourhood adversely impacting health (Gidlow and Ellis, 2011). Haase et al. also found as well that people were willing to travel greater distances and spend more money reaching higher-quality greenspaces (2021).

Moreover, the findings show that regardless of use patterns, residents value the existence of greenspace highly, even amongst those who are non-users (Cronin-de-Chavez, Islam and McEachan, 2019; Gidlow and Ellis, 2011). It is widely thought that the pandemic increased people's appreciation for nature and greenspace. These results suggest the valuing of greenspace pre-dated the pandemic but perhaps it has just been more reported on. Finally, the type of greenspace was found to be not important. Respondents did not typically prefer one type over the other, instead highlighting benefits, barriers and facilitators to both (Slater, 2022b). Rural, urban, woodland or forest greenspace were seen as part of a totality or network of local greenspace, with respondents choosing which space to access based on quality and facilities rather than type (Slater, 2022b; Cronin-de-Chavez, Islam and McEachan, 2019).

5.2 Heterogeneity

There was a surprising level of homogeneity between studies, ethnic groups, subgroups, and authors looking at urban greenspace, woodlands, forests and rural greenspace. Very similar barriers and facilitators were identified across subgroups and studies. This makes overall findings on barriers and facilitators homogenous.

This was found by Morris et al. too, who noted that similarities across studies in the way that barriers were characterised aided with synthesis (2011). Although this review carried out a subgroup analysis to review differentiated results and improve finding precision, no major differences were found beyond language barriers. The homogeneity could partly be since minority-ethnic groups are more likely to live in low-income and deprived areas (CABE, 2010; Marmot *et al.*, 2010). There is likely much overlap between low-income and minority-ethnic groups, which suggests it may not be worthwhile separating populations in studies where the effort would outweigh the benefit.

5.3 Strengths and weaknesses of this review

A main strength of this review was the inclusion of a high number of databases (11). For comparison, Chenyang et al. include four databases in their review (2022). This makes for a large scoping review meaning the findings are more reliable. Carrying out an extensive literature search before conducting the study also facilitated the research process and made the inclusion of many databases manageable. Another strength is the combining of evidence from hard-to-reach populations (from the three primary studies). This makes this review particularly valuable as it generates insights that may otherwise be difficult to access. On the other hand, the review is based on a small sample size, and this reduces the validity of findings. This is reflective, however, of the relatively young field of the topic area. Despite the small number of studies included, its narrow focus arguably allows for a more in-depth exploration of where greenspace issues are relevant to the EH field in England.

A limitation of this study was the lack of time to discuss grading of studies with the author's dissertation supervisor, a process that is difficult to carry out at dissertation level. Therefore, the inclusion of Chenyang et al.'s study (2022) remains a potential weakness of this review. This represents an area for improvement. Additionally, to strengthen the review next time, the author would contact authors of key studies to ask for other findings or unpublished studies. Furthermore, the author did not have the opportunity to discuss definitions of the study populations due to the word limit (such as meaning of 'low-income' or 'deprived').

To address the small sample size, it may be sensible to include a longer date-range in future studies. For instance there were studies from 2006-8 that would likely have been relevant (Kendall *et al.*, 2008; e.g. O'Brien, 2006). This represents a weakness if relevant findings were excluded from this study. Another limitation is the positioning of the three primary studies as low down on the evidence hierarchy, meaning such a review should be repeated following the publication of more robust studies. However, this does not make this review obsolete, as scoping studies such as this are important early on in a field to provide rationale for further investigation.

Next time, the review would attempt to categorise barriers and facilitators into distinct themes and categories. Additionally, it would look to include studies with a broader focus and remit, as Chenyang *et al.* (2022) do in their study. For instance, studies on physical activity, crime, or health and greenspace could be included. Although these studies do not meet this review's inclusion criteria, the criteria could be broadened as it is likely such studies contain useful insights.

5.4 Generalisability of findings

As Gidlow and Ellis (2011) note, there is always going to be a limit on the generalisability of qualitative-based or subjective research due to the fact the findings are going to be area-specific to some degree. However, this review's findings are homogenous, meaning they are likely to apply to other low-income and minority-ethnic populations. This is especially true given that this review's population is representative of many urban centres in the UK. Furthermore, the review combining evidence from the UK improves generalisability (although it is worth noting that most data comes from Scotland and England). This contrasts to Chenyang *et al.*'s study (2022), which by considering global evidence of many demographics, with no subgroup analysis, does not have as wide applicability.

The results are less generalisable outside of the UK due to the differing socio-economic contexts. They are arguably most applicable to other cities who also have large minority-ethnic populations and wide public transport use. The findings are less relevant to North America, due to their reliance on cars, lack of walkable neighbourhoods and layout of suburban sprawl. For instance, in included primary

studies, all greenspace was accessible via foot, public transport or free transport. Having said this, car ownership was mentioned as a barrier to accessing more remote greenspace.

5.5 Comparisons with the wider literature

As noted during the themed discussion, many findings on the key barriers and facilitators are in line with the wider literature, including reports conducted specifically on deprived and minority-ethnic populations (FOE, 2020; CABE, 2010; Kendall *et al.*, 2008). When compared to the only other existing systematic review with the same research question (Chenyang *et al.*), this review overlaps with their main finding that attractiveness and quality are hugely important. However, barriers relating to the environmental hazards stood out as a unique finding.

One important difference is the lack of importance of individual determinants of use in this review. Although individual factors are discussed, most barriers/facilitators emerging from this review relate to a structural, physical or environmental level. In comparison, the wider literature highlights the primacy of individual, personal and behavioural barriers/facilitators (Ryan *et al.*, 2020) This may relate to the fact that the neighbourhoods in this review are low-income/deprived, making structural barriers stand out more than individual barriers due to the levels of deprivation and physical degeneration.

The finding that low-income subgroups suffer from perceived barriers relating to feelings of not belonging stands out. Initially, this review expected to encounter this issue in relation to minority-ethnic subgroups. This was due to the vast literature on racial exclusion in Britain's green landscapes (e.g. (Byrne, 2012; Agyeman, 1978), and minority-ethnic populations on the whole have the least access to greenspace (CABE, 2010). However, racialised barriers did not come up once in the study, and the results actually showed that contrary to the existing evidence base, people of Black, Asian or other minority-ethnic background identify strongly with nature, outdoors and rural spaces (Slater, 2022a).

5.6 Relevance to Environmental Health

The fact that clean air and quiet spaces emerged as facilitators of access to greenspace demonstrates the relevance of this topic to environmental health. Greenspaces provide refuge from the harmful health effects of excess noise in residential settings and combat the negative experience of polluted air, especially in inner-city environments. Such findings were shared by the latest PHE report on greenspace (PHE, 2020). If more funding was provided to improve greenspace quality and enhance access to greenspace, this would mitigate some of the issues that EHPs work on.

Initiatives such as traffic reduction and pedestrianisation are part of the Clean Air Zones LA's and some EHPs are working on ('Clean air zones', n.d.). However, increasing greenspace infrastructure locally could also represent alternative methods for achieving Clean Air Zones; this requires further investigation. Furthermore, investing in greenspaces may help to decrease likelihood of residential noise complaints due to increasing the number of peaceful, quiet spaces that counteract the detrimental impacts and providing refuge from noisier environments. It may also reduce general number of complaints and investigations that the EH department has to deal with regarding poor hygiene and health and safety concerns. In Sheffield, for every £1 spent on park maintenance, there is £34 saved in health costs and primary beneficiaries are locals (PHE, 2020). It would be interesting to calculate potential cost savings for EH departments relating to improved greenspace infrastructure. Positive findings would bolster a rationale for EH departments to look into working with greenspace provisioners. Finally, there may be a role for EHPs to work within a multi-disciplinary team in the roll-out of Natural England's 2022-3 Action Plan which involves tying health planning with nature recovery and green infrastructure at LA level.

5.7 Gaps in the research

First-hand (primary) research on marginalised communities' perspectives, beliefs and attitudes relating to greenspace is scarce and although this review combined the existing UK-based studies, the small sample size (5) is reflective of this. This review contributes to filling that gap. More specifically, there is a lack of research on

greenspace access for migrants, refugees and asylum-seekers. This makes carrying out a subgroup analysis on this population more valuable. It was also difficult to gather evidence on greenspace and environmental health, for instance there are no studies that categorise the environmental hazards identified in this review as barriers to greenspace access in the UK that this author is aware of. This suggests that this review may be amongst the first to do so. This review combines a range of types of greenspace, made possible due to the homogeneity of findings, however most studies look at urban greenspace leaving a gap of research on mixed types, rural, woodlands and forests. Research from Wales is also missing, with most studies looking at England or Scotland.

5.8 Recommendations

This review recommends further research is carried out on environmental health and greenspace. Practically, an EH task-force could be created to investigate in-depth the relevance of greenspace access to EH, potential cost savings of improved infrastructure, and how interventions might be added to the EHP's toolbox. Next, the review recommends prioritising neighbourhood-level or structural interventions above behaviour-based interventions to reflect the findings of this study. For instance, interventions may include supporting community organisations to run greenspace-based social activities, or improving physical design by inserting lighting, removing dense vegetation, creating accessible entrances and replacing sub-standard and broken infrastructure. Although this type of intervention may be costly up-front, it would represent efficiency in the long run, especially through avoided health costs. Finally, this review recommends that future interventions are co-produced with local communities. This allows those who are most affected to proactively take part, as well as reconciling the gap between facilities and appropriateness for use (Doick *et al.*, 2013; Thompson, Roe and Aspinall, 2013).

5.9 What questions are raised and how could they be investigated?

This research raises several other questions. It would be valuable to know if the research findings in this review persist post-Covid-19, or if such findings are no longer up-to-date. It would be interesting to consider if EH complaints decrease as quantity and quality of greenspace increases, or what cost savings could be

achieved through greenspace interventions. Comparing findings between higher and lower-SES areas would additionally help to shed light on whether greenspace access helps to promote equity in exposure to environmental health hazards.

6 Conclusion

To conduct the review, data was gathered through searching 11 electronic databases and grey literature, and 5 studies were identified for inclusion. Data was extracted and studies were critically appraised, followed by analysis using a narrative synthesis which involved individual and between-study reporting and a subgroup analysis. The study has met its aim to systematically review the evidence from the UK on barriers and facilitators to accessing greenspace environments as sites for health. Furthermore, objectives set out in 1.3 have hopefully been met. Reflections were shared on how green space access related to the EH field and the role of the EHP in the Introduction, Results and Discussions chapters and Sections 2.5 and 5.6 specifically. Bodies of knowledge were summarised in the literature review, and the Discussion allowed for exploration of differences between studies, identified gaps in the research and areas for future intervention.

Summary of findings

The main barriers and facilitators identified in the study include safety, physical design, health benefits, environmental hazards, community activities, social connection, and greenspace quality. Similar findings were reported across subgroups with minor differences. Findings also persisted between studies, ethnic-groups and those looking at urban greenspace and rural greenspace. Barriers and facilitators overwhelmingly related to structural determinants over individual/personal determinants. This is likely to be reflective of the degenerated areas that the population resides in where structural, physical and environmental factors are more obvious or acute. The only group to face issues relating to a sense of not belonging in greenspace was the low-income/deprived group, representing an area for further research. Quality of greenspace mattered more than proximity to greenspace, with poor-quality and misused parks representing health hazards. This is contrary to the widespread assumption that more is always better. Across studies, respondents

were willing to overcome cost and transport barriers to travel to better quality, safer parks. The type of greenspace (rural, urban, woodland, forest, park) was not important to respondents, with rural greenspace viewed as part of a totality of greenspace in an area not separate to local urban greenspace (Slater, 2022a). Furthermore, greenspace is valued highly regardless of individual usage patterns, widely acknowledged as an asset to a neighbourhood.

Summary of validity of findings

Heterogeneity was assessed to be relatively low between studies and findings, making the overall findings largely homogenous, bolstered by the fact all evidence relates to the UK. This together with the large number of databases in the search increases the precision of findings. The fact the findings fit with the wider literature also provides additional certainty to the results, improving validity likelihood. However as this is qualitative research there will always be more heterogeneity compared with quantitative research, and there were two types of study design included in the studies. Additionally, the review is based on a small sample size of five studies, which does affect validity. However, there were no major limitations or sources of bias identified in this review that would introduce uncertainty. There is however some concern over the inclusion of Chenyang et al.'s study (2022) in this review, as it was a weak study. This could make findings less valid. In addition, the primary studies were all observational (cross-sectional). As these sit low down on the evidence hierarchy, this arguably makes the findings of this review less strong and rigorous. Overall, there is no reason to doubt the credibility of findings in this qualitative review, although the small sample size is worth highlighting.

Summary of recommendations

As this field is still relatively new, there are many exciting opportunities for future research. There is still a need for more high-quality evidence on barriers and facilitators of greenspace access amongst marginalised groups, particularly involving studies higher up in the evidence hierarchy. The review has highlighted the opportunity for increased mitigation of harm, of the kind the EHP addresses in their professional practice, via the extension of green infrastructure locally.

Recommendations include a task-force to examine this further, and secondary research to look at associations between greenspace access and number of EH

complaints in a locality. Further recommendations include research on, and interventions aimed at, deprived urban populations as a priority, focusing on structural/physical interventions at neighbourhood level. These could address multiple barriers at once and contribute simultaneously to health equity. Interventions would be most effective if co-produced and co-designed with the local community, thus preventing unintended design consequences, and creating a sense of empowerment that may act as an additional facilitator to use.

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(Word Count Limit: 15,000, 10% margin 13500-16500)

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Appendices

Appendix 1 – Ethical Approval



**Faculty of Health & Applied Sciences
Department of Health and Social Sciences
Frenchay Campus
Coldharbour Lane
Bristol BS16 0QY**

Date 04/02/2022

Dear Sam

RE: MSc Environmental Health

Title of Project: A systematic review of the evidence on barriers and facilitators to accessing green space environments as sites for health amongst marginalised groups, drawing on all relevant international evidence to generate insights that can guide future interventions.

Thank you for submitting your ethics application. As your project was considered to be low risk, your application has been reviewed, by myself, as your supervisor and has been granted ethical approval to proceed.

Please note that any information sheets and consent forms must include the UWE logo. Further guidance is available on the UWE website at:
<http://www1.uwe.ac.uk/aboutus/departmentsandservices/professionalservices/marketingandcommunications/resources.aspx>

The following conditions apply to all research given ethical approval by UWE:

1. You must notify your supervisor if you wish to make significant amendments to the original application: these include changes to the study protocol which have an ethical dimension.
2. You must notify your supervisor if there are any serious events or developments in the research that have an ethical dimension.

The University is required to monitor and audit the ethical conduct of research conducted by academic staff, students and researchers. Your project may therefore be selected for audit by the University Research Ethics Committee.

Best wishes

Sharon Humphries
Supervisor
Dissertation Module (UZVRTM-45-M)

Appendix 2 – Critical Appraisal checklist

Table 1 - Critical appraisal form used in this review (adapted by author from the CASP Qualitative Checklist (Critical Appraisal Skills Programme, 2018).)

Critical appraisal checklist	
<i>Where necessary, notes are included in italic to show considerations by author during appraisal.</i>	
1. Did the study address a clearly focused question or was there a clear statement of aims* of the research? <i>*Including any objectives.</i>	
2. Were the methodology and research design appropriate to answer the research question?	
3. Was an exposure defined by the author(s)?	
4. Were the study participants recruited in an appropriate way? / Were the studies selected in an appropriate way? <i>Note: Has the researcher explained recruitment method and why the participants selected were the most appropriate, and did they include discussions around participation?</i>	
5. Was the data collected in a way that addressed the research question? <i>Note: Is the setting justified; is it clear how data was collected; are methods explicit; is form of data stated?</i>	
6. Have ethical issues been taken into consideration? <i>Note: This may include a consideration of the relationship between researcher and participants, and whether the researcher critically examined their role, potential bias and how they managed event changes.</i>	
7. Was the data analysis sufficiently rigorous? <i>Note: Is the data analysis method described; if thematic analysis is used, is category/theme generation explained; how was data selected from original sample; does sufficient data support findings.</i>	

<p>8. Is there a clear statement of findings?</p> <p><i>Note: Are findings explicit; are findings discussed in relation to original aims and objectives? Have any aims and objectives been met?</i></p>	
<p>9. Has the author(s) considered bias or the strengths and limitations of their study?</p> <p><i>Note: Has validity and credibility of findings been discussed?</i></p>	
<p>10. Are results precise and/or believable?</p>	
<p>11. Can the results be applied to other low-income and/or minority ethnicity populations?</p>	
<p>12. Is the research valuable?</p> <p><i>Note: Do results fit with available evidence? Has the researcher(s) considered the contribution of the findings to existing knowledge, practice or policy? Have they identified new gaps or discussed the generalisability of findings?</i></p>	

Appendix 3 - Data extraction form

Table 18 - Data extraction form made by author

Author(s) and Year of Publication	
Journal and Database extracted from	
Title of study	
Location of study* *If secondary research, any geographical exclusions	
Methodology / Study Design	
Study population	
Aims and objectives	
Methods	
Number of participants if primary research /Number of reviews if secondary research (Sample size)	
How participants/studies were recruited	
Method of data collection and analysis	
Exposure details	
Outcomes	
Bias considerations	
Results and key recommendations	
Author's notes	

Appendix 4 – Critical appraisal of studies

Critical appraisal checklist – Appraisal of Study A (Chenyang, Maruthaveeran and Shahidan, 2022)

Adapted by author from the CASP qualitative checklist (Critical Appraisal Skills Programme, 2018)

Study appraised: Chenyang, D., Maruthaveeran, S. and Shahidan, M.F. (2022) 'The usage, constraints and preferences of green space at disadvantage neighborhood: A review of empirical evidence', *Urban Forestry & Urban Greening*, 75, p. 127696. Available at: <https://doi.org/10.1016/j.ufug.2022.127696>

<p>13. Did the study address a clearly focused question or was there a clear statement of aims* of the research?</p> <p><i>*Including any objectives.</i></p>	<p>Yes</p> <p>A clear and concise aim was provided with further goals identified.</p>
<p>14. Were the methodology and research design appropriate to answer the research question?</p>	<p>Yes.</p> <p>The methodology of a systematic review was appropriate to summarise and analyse the current research status of greenspace usage in disadvantaged neighbourhoods. The research design purported to follow the PRISMA guidelines. However it is of note that the adherence to the PRISMA guidelines or prescribed steps of a systematic review was questionable. Search strategy: It did not include enough relevant databases and few key words were used, therefore potentially missing relevant studies. Data synthesis was not described. There is no evidence that authors completed appraisals of the included studies. There is no critical discussion of strengths and weaknesses of the studies or of the review.</p>
<p>15. Was the exposure defined by the authors?</p>	<p>Yes.</p> <p>Authors define the exposure as green space. They do not specify explicitly whether exposure is urban green space or rural green space (or both). However, as it is a systematic review they are gathering all available evidence in relation to green space, so the answer is yes.</p>

<p>16. Were the study participants recruited in an acceptable way? / Were the studies selected in an appropriate way?</p> <p><i>Note: Has the researcher explained recruitment method and why the participants selected were the most appropriate, and did they include discussions around recruitment?</i></p>	<p>Yes.</p> <p>Studies were selected according to PRISMA guidelines in that criteria were set for inclusion beforehand, databases were searched and screened and results exported. This process was clearly explained and discussed.</p> <p>However, there were deficiencies. Only 4 databases were used. Only a few key terms were used for the search strategy. This means that potential relevant studies are likely to have been left out. In addition, snowballing (manually checking reference lists) identified 18 papers, suggesting that the authors' search strategy was not effective.</p>
<p>17. Was the data collected in a suitable way that addressed the research question?</p> <p><i>Note: Is setting justified; is it clear how data was collected; are methods explicit; is form of data stated?</i></p>	<p>Yes.</p> <p>Data was exported from database searches and into an Excel spreadsheet where the data was then analysed. This exporting follows the normal procedures in a systematic review.</p>
<p>18. Have ethical issues been taken into consideration?</p> <p><i>Note: this may include a consideration of the relationship between researcher and participants, and whether the researcher critically examined their role, potential bias and how they managed event changes.</i></p>	<p>Yes.</p> <p>There is little to no ethical considerations required for a systematic review as it is secondary research and unlikely to be able to cause risk or harm.</p>
<p>19. Was the data analysis sufficiently rigorous?</p> <p><i>Note: Is the data analysis method described; if thematic analysis is used, is category/theme generation explained; how was data selected from original sample; does sufficient data support findings.</i></p>	<p>Yes.</p> <p>The data analysis method was not defined by the authors. The first part of the data analysis was fine. Authors extracted data and analysed it via an Excel spreadsheet in order to summarise the literature in the field. This was rigorous and provided a good summary of the objective details of the included studies (location of the study, characteristics summary, data methods, sampling, findings). In addition, the authors provided an in-depth analysis</p>

	<p>of personal, social, physical and other attributes stemming from the findings.</p> <p>However, important elements were left out of the data analysis: the exposures in the studies and type of green space the study talked about. Also, there was no analysis of the strengths and limitation of the studies. There was little evidence of any critical analysis of the included studies or appraisal. No grading of the studies was provided.</p>
<p>20. Is there a clear statement of findings?</p> <p><i>Note: are findings explicit; are findings discussed in relation to original aims and objectives?</i></p>	<p>No.</p> <p>There is no clear statement of findings and results are not explicit. There is no discussion of validity and/or credibility of findings. Study findings are not discussed in relation to stated aims and objectives, nor in relation to existing bodies of knowledge.</p>
<p>21. Has the author(s) considered bias or the strengths and limitations of their study?</p> <p><i>Note: Has validity and credibility of findings been discussed?</i></p>	<p>No.</p> <p>There has been no discussion of the strengths and limitations of the study by authors. Bias has not been considered. Neither in this review nor in any of the included studies.</p>
<p>22. Are results precise and/or believable?</p>	<p>No</p> <p>Results are not believable due to the use of a small number of databases and keywords. In addition the results lump together children and adults, who may have very different use, constraints and preferences of green space. Results from different countries have been combined despite the studies having been undertaken in dramatically different situations, cultures/religions, physical environments, social behaviours (e.g. car use, women not going out alone etc.). Subgroup analysis has not been utilised as a method for overcoming this, or for combining results of similar subgroups. This makes the results imprecise.</p>
<p>23. Can the results be applied to other low-income and/or minority ethnicity populations?</p>	<p>Yes.</p> <p>Due to the fact they include large cross sections of the demographics under review, they could be</p>

	<p>compared or applied with populations of other disadvantaged areas.</p>
<p>24. Is the research valuable?</p> <p><i>Note: Do results fit with available evidence? Has the researcher(s) considered the contribution of the findings to existing knowledge, practice or policy? Have they identified new gaps or discussed the generalisability of findings?</i></p>	<p>No.</p> <p>The research is not very valuable as it is unclear what unique findings it contributes to the body of research, or that any specific gaps have been identified by the authors. The findings are not generalisable as they combine all possible ages, ethnic backgrounds, countries, cultures etc. meaning that the results are extremely heterogeneous and would not be applicable to other low-income and multi-ethnic populations in any one place.</p>

Critical appraisal checklist – Appraisal of Study B (Cronin-de-Chavez, Islam and McEachan, 2019)

Adapted by author from the CASP qualitative checklist (Critical Appraisal Skills Programme, 2018)

Study appraised: Cronin-de-Chavez, A., Islam, S. and McEachan, R.R.C. (2019) Not a level playing field: A qualitative study exploring structural, community and individual determinants of green-space use amongst low-income multi-ethnic families. *Health & Place*. [online]. 56, New York, New York, Elsevier B.V., pp.118–126.

<p>1. Did the study address a clearly focused question or was there a clear statement of aims* of the research?</p> <p><i>*Including any objectives.</i></p>	<p>Yes</p> <p>Aim is clearly stated representing a clear and focused research question. No further objectives given.</p>
<p>2. Were the methodology and research design appropriate to answer the research question?</p>	<p>Yes</p> <p>This study explores qualitative (subjective) outcomes therefore a cross-sectional qualitative methodology is appropriate. Research design utilising interviews and focus groups is appropriate.</p>
<p>3. Was an exposure defined by the author(s)?</p>	<p>Yes</p> <p>Defined early on in the study and described.</p>
<p>4. Were the study participants recruited in an appropriate way? / Were the studies selected in an appropriate way?</p> <p><i>Note: Has the researcher explained recruitment method and why the participants selected were the most appropriate, and did they include discussions around participation?</i></p>	<p>Unsure.</p> <p>The participants were appropriated via suitable networks in the community, in a clearly defined and appropriate study area. Purposive stratified sampling used to ensure representation of a range of ethnic groups. However the networks for recruitment ended up with an over-representation of women as samples which may have been avoided if additional/other means for recruitment were included. In addition, the details of who was selected from the pool is unclear.</p>
<p>5. Was the data collected in a way that addressed the research question?</p>	<p>Yes.</p> <p>The setting is highly appropriate for the research question (three most deprived wards in urban centre with high representation of minority ethnic groups) and the authors</p>

<p><i>Note: Is the setting justified; is it clear how data was collected; are methods explicit; is form of data stated?</i></p>	<p>clearly stated the data collection methods (interviews and focus group). The form of data collection is made clear (fieldnotes and audio recordings where consent was given) and details were given about the interviews. The authors did not justify their methods chosen, however interviews and focus groups are typical and appropriate for qualitative cross sectional study designs.</p>
<p>6. Have ethical issues been taken into consideration?</p> <p><i>Note: This may include a consideration of the relationship between researcher and participants, and whether the researcher critically examined their role, potential bias and how they managed event changes.</i></p>	<p>Yes.</p> <p>The primary author considers her relationship with the interviewees. She justifies her involvement due to length of experience working with minority ethnicities and speaking a minority ethnic language. Interpreters are offered and used in the study. The authors ensure that participants understand the research process fully. Participants can choose whether they want to be recorded, and if they wish to have an individual interview or form part of a focus group. Children are allowed to accompany parents. Last minute changes to interviews are accepted and worked around.</p>
<p>7. Was the data analysis sufficiently rigorous?</p> <p><i>Note: Is the data analysis method described; if thematic analysis is used, is category/theme generation explained; how was data selected from original sample; does sufficient data support findings.</i></p>	<p>Yes.</p> <p>In-depth explanation of data analysis method provided and an explanation how thematic analysis is undertaken. This was checked by a second author meaning validity was checked by investigator triangulation. Sufficient data supported findings and the use of multiple theoretical frameworks additionally provided theory triangulation. However how data was selected from original sample was not made clear, but the assumption is that all data was used.</p>
<p>8. Is there a clear statement of findings?</p> <p><i>Note: Are findings explicit; are findings discussed in relation to original aims and objectives? Have any aims and objectives been met?</i></p>	<p>Yes.</p> <p>Findings are made explicit, and a clear concise summary is provided. Authors relate findings to original aim.</p>
<p>9. Has the author(s) considered bias or the strengths and limitations of their study?</p>	<p>Yes.</p> <p>Validity and credibility of findings are considered in the Discussion as authors provide consideration regarding</p>

<p><i>Note: Has validity and credibility of findings been discussed?</i></p>	<p>strengths and limitations of their study. Potential weaknesses of study are outlined meaning that authors have considered bias and implicitly make reference to selection and participation bias. However, authors did not refer to any specific bias and could have given more thought to the different types of bias.</p>
<p>10. Are results precise and/or believable?</p>	<p>Yes</p> <p>Authors use sub-group analysis, research question and methodology is suitably focused that results are precise, and findings were homogenous across sub-groups as well. This makes results precise.</p>
<p>11. Can the results be applied to other low-income and/or minority ethnicity populations?</p>	<p>Yes.</p> <p>The results can be applied effectively to other similar populations in different urban areas and even across minority ethnic groups due to homogeneity in subgroup analysis.</p>
<p>12. Is the research valuable?</p> <p><i>Note: Do results fit with available evidence? Has the researcher(s) considered the contribution of the findings to existing knowledge, practice or policy? Have they identified new gaps or discussed the generalisability of findings?</i></p>	<p>Yes.</p> <p>Results fit with evidence in the field and the authors have related their findings to existing knowledge and policies. New gaps or needs are highlighted. Generalisability of findings are discussed.</p>

Critical appraisal checklist – Appraisal of Study C (Gidlow and Ellis, 2011)

Where necessary, notes are included in italic to show considerations by author during appraisal.

Study appraised: Gidlow, C.J. and Ellis, N.J. (2011) 'Neighbourhood green space in deprived urban communities: Issues and barriers to use', *Local Environment*, 16(10), pp. 989–1002. Available at: <https://doi.org/10.1080/13549839.2011.582861>.

<p>1. Did the study address a clearly focused question or was there a clear statement of aims* of the research?</p> <p><i>*Including any objectives.</i></p>	<p>Yes</p> <p>Clearly focused aim and goals of the research. This was inevitably aided by the fact that the data was collected before an intervention.</p>
<p>2. Were the methodology and research design appropriate to answer the research question?</p>	<p>Yes.</p> <p>Focus groups are common in observational studies of a qualitative nature. Study could have included interviews as well.</p>
<p>3. Was an exposure defined by the author(s)?</p>	<p>Yes.</p> <p>Exposure was very well defined, with the park chosen also formally classified as green space by the local authority.</p>
<p>4. Were the study participants recruited in an appropriate way? / Were the studies selected in an appropriate way?</p> <p><i>Note: Has the researcher explained recruitment method and why the participants selected were the most appropriate, and did they include discussions around participation?</i></p>	<p>Yes.</p> <p>Participants were recruited via doorsteps and high streets, and via the adjacent school. There was a clear study setting. There was an in-depth discussion around participation, including good justification for using £20 vouchers for participation.</p>
<p>5. Was the data collected in a way that addressed the research question?</p> <p><i>Note: Is the setting justified; is it clear how data was collected; are methods explicit; is form of data stated?</i></p>	<p>Yes.</p> <p>Data was collected via focus groups, using semi-structured discussions. They were recorded and audio transcripts were created.</p>
<p>6. Have ethical issues been taken into consideration?</p> <p><i>Note: This may include a consideration of the relationship between researcher and</i></p>	<p>Yes.</p> <p>Authors gained ethical approval from their university committee. Participants provided with information sheets about the study.</p>

<p><i>participants, and whether the researcher critically examined their role, potential bias and how they managed event changes.</i></p>	
<p>7. Was the data analysis sufficiently rigorous?</p> <p><i>Note: Is the data analysis method described; if thematic analysis is used, is category/theme generation explained; how was data selected from original sample; does sufficient data support findings.</i></p>	<p>Yes.</p> <p>Thematic analysis was very rigorous and explained in-depth. A second investigator checked all themes and codes that emerged.</p>
<p>8. Is there a clear statement of findings?</p> <p><i>Note: Are findings explicit; are findings discussed in relation to original aims and objectives? Have any aims and objectives been met?</i></p>	<p>Yes.</p> <p>Authors provide succinct summary of findings and link them to current debates and the literature.</p>
<p>9. Has the author(s) considered bias or the strengths and limitations of their study?</p> <p><i>Note: Has validity and credibility of findings been discussed?</i></p>	<p>Yes.</p> <p>Authors discuss sources of potential bias and how these may affect the validity and generalisability of results. They include considerations of their study's strengths and weaknesses.</p>
<p>10. Are results precise and/or believable?</p>	<p>Yes.</p> <p>Results are believable due to the rigorous standards adhered to by the researchers especially in the data collection and analysis. Findings are quite homogenous and in line with literature suggesting they are precise.</p>
<p>11. Can the results be applied to other low-income and/or minority ethnicity populations?</p>	<p>Unsure.</p> <p>The results are likely to be relevant when applied to deprived area of the same demographic (white British). However, many low-income urban centres have multi-ethnic populations, therefore it is unclear how generalisable the results are.</p>
<p>12. Is the research valuable?</p>	<p>Yes.</p>

	Research fits with available evidence and findings are useful for decision-makers when designing interventions. Generalisability of findings have been discussed.
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Critical appraisal checklist - Appraisal of Study D (Morris *et al.*, 2011)

Where necessary, notes are included in italic to show considerations by author during appraisal.

Study appraised: Morris, J. *et al.* (2011) 'Access for all? Barriers to accessing woodlands and forests in Britain', *Local Environment*, 16(4), pp. 375–396. Available at: <https://doi.org/10.1080/13549839.2011.576662>

<p>1. Did the study address a clearly focused question or was there a clear statement of aims* of the research?</p> <p><i>*Including any objectives.</i></p>	<p>Yes.</p> <p>A clear statement of aims was provided regarding use and barriers to visiting woodlands and forests and understanding the social determinants of usage between demographic groups.</p>
<p>2. Were the methodology and research design appropriate to answer the research question?</p>	<p>Yes.</p> <p>Secondary research allowed the authors to review a wide data set to derive insights from existing Forest research. The research design was appropriate to answer the question under review, as it combined the strengths of qualitative and quantitative approaches, analyses and results.</p>
<p>3. Was an exposure defined by the author(s)?</p>	<p>Yes.</p> <p>Exposure was defined as woodlands and forests.</p>
<p>4. Were the study participants recruited in an appropriate way? /</p>	<p>Yes.</p>

<p>Were the studies selected in an appropriate way?</p>	<p>All research studies relating to the research question in the time frame given was included and the rationale for the study inclusion was explained.</p>
<p>5. Was the data collected in a way that addressed the research question?</p> <p><i>Note: Is the setting justified; is it clear how data was collected; are methods explicit; is form of data stated?</i></p>	<p>Yes.</p> <p>The qualitative data analysis was based on data collected from the results and conclusions of the individual studies included. For quantitative data, results from original studies were treated in two stages, first using data from results of original studies and then by new analysis of primary data sets. The data included in this was made up of the last three POF surveys with a sample of 13,284 people included.</p>
<p>6. Have ethical issues been taken into consideration?</p> <p><i>Note: This may include a consideration of the relationship between researcher and participants, and whether the researcher critically examined their role, potential bias and how they managed event changes.</i></p>	<p>Yes.</p> <p>There are generally no significant ethical concerns in the carrying out of secondary research and none were identified.</p>
<p>7. Was the data analysis sufficiently rigorous?</p> <p><i>Note: Is the data analysis method described; if thematic analysis is used, is category/theme generation explained; how was data selected from original sample; does sufficient data support findings.</i></p>	<p>Yes.</p> <p>Meta-data from included studies is tabulated. Results were homogenous enough for cross-comparison and meta-analysis. Qualitative study results and conclusions were analysed using systematic review techniques. Quantitative primary data sets were statistically analysed (using descriptive statistics, chi-squared test and cluster analysis)</p>
<p>8. Is there a clear statement of findings?</p> <p><i>Note: Are findings explicit; are findings discussed in relation to original aims and objectives? Have any aims and objectives been met?</i></p>	<p>Unsure.</p> <p>The authors discuss findings in relation to their original aims and meet their aims, and they make their findings explicit. However there is not a succinct summary of findings except in the abstract.</p>

<p>9. Has the author(s) considered bias or the strengths and limitations of their study?</p> <p><i>Note: Has validity and credibility of findings been discussed?</i></p>	<p>No.</p> <p>The authors did not discuss study strengths and limitations or the potential role of bias in their research. This means validity and credibility of findings was not discussed, except where authors pointed out that results were in line with the literature. However, no significant potential for error was found in the study.</p>
<p>10. Are results precise and/or believable?</p>	<p>Yes.</p> <p>Results from the meta-analyses are significant and precise. Results in general stemmed from a robust data collection and analysis procedure ensuring credibility.</p>
<p>11. Can the results be applied to other low-income and/or minority ethnicity populations?</p>	<p>Yes.</p> <p>The results are generalisable given that they stem from population-wide surveys and data collection. This is a strength of the research.</p>
<p>12. Is the research valuable?</p> <p><i>Note: Do results fit with available evidence? Has the researcher(s) considered the contribution of the findings to existing knowledge, practice or policy? Have they identified new gaps or discussed the generalisability of findings?</i></p>	<p>Yes.</p> <p>The results fit with the wider evidence in the field, as well as contributing new insights based on previously unassimilated data and findings.</p>

Critical appraisal checklist – Appraisal of Study E (Slater, 2022a)

Notes are included in italic to show further considerations when answering the questions.

Study appraised: Slater, H. (2022) 'Exploring minority ethnic communities' access to rural green spaces: The role of agency, identity, and community-based initiatives', *Journal of Rural Studies*, 92, pp. 56–67. Available at: <https://doi.org/10.1016/j.jrurstud.2022.03.007>.

<p>1. Did the study address a clearly focused question or was there a clear statement of aims of the research?</p> <p><i>Note: including any objectives.</i></p>	<p>Yes.</p> <p>A concise aim is provided with a further breakdown into three goals.</p>
<p>2. Were the methodology and research design appropriate to answer the research question?</p>	<p>Unsure.</p> <p>Cross-sectional qualitative study is appropriate for this type of qualitative primary research, and interviews and surveys are commonly used and appropriate. However, it is unclear why the researcher chose to design her study around ethnic-minority communities who are already frequent accessors of rural green space alone, rather than combining the study sample with the population who are not members of outdoors walking groups. This would have given a broader cross-section of the population and perhaps have been more appropriate for a fuller answer to the research question.</p>
<p>3. Was an exposure defined by the author(s)?</p>	<p>Yes.</p> <p>The exposure defined was rural green space.</p>
<p>4. Were the study participants recruited in an appropriate way? / Were the studies selected in an appropriate way?</p> <p><i>Note: Has the researcher explained recruitment method and why the participants selected were the most appropriate, and did they include discussions around participation?</i></p>	<p>Yes.</p> <p>Participants were recruited through the case studies (outdoors organisations for ethnic-minority and people of colour communities). Surveys were distributed online through appropriate social media channels with focus on relevant potential participants. However the author did not include discussion around whether all candidates participated or issues they faced during participation.</p>
<p>5. Was the data collected in a way that addressed the research question?</p> <p><i>Note: Is the setting justified; is it clear how data was collected; are methods explicit; is form of data stated?</i></p>	<p>Yes.</p> <p>The research setting was well explained and appropriate for the research question. The author clearly outlines the data collection method of interviews and a survey. The survey used open ended questions thus gaining qualitative data. Author explains and justifies the</p>

	<p>reasons behind the walking interviews and outline how interviews were conducted (informally but with pre-determined questions). Surveys were online and on-paper promoting accessibility. Data was recorded where possible, transcribed and written up using software.</p>
<p>6. Have ethical issues been taken into consideration?</p> <p><i>Note: this may include a consideration of the relationship between researcher and participants, and whether the researcher critically examined their role, potential bias and how they managed event changes.</i></p>	<p>Yes.</p> <p>Author included reflections on her role as researcher and her ethnicity, and her status as an outsider. Details were provided on gaining consent where necessary.</p>
<p>7. Was the data analysis sufficiently rigorous?</p> <p><i>Note: Is the data analysis method described; if thematic analysis is used, is category/theme generation explained; how was data selected from original sample; does sufficient data support findings.</i></p>	<p>Yes.</p> <p>Methods are described and thematic analysis is used, with category, theme and coding generation explained. The findings are based on all the data. However, there is only one investigator, meaning that analyses are not checked which is a downside.</p>
<p>8. Is there a clear statement of findings?</p> <p><i>Note: are findings explicit; are findings discussed in relation to original aims and objectives? Have any aims and objectives been met?</i></p>	<p>Yes.</p> <p>Findings are made explicit and are discussed through the lens of the original aims and goals, which were met through the research data and results analysis.</p>
<p>9. Has the author(s) considered bias or the strengths and limitations of their study?</p> <p><i>Note: has validity and credibility of findings been discussed?</i></p>	<p>No.</p> <p>The author did not include a discussion of the study strength and limitations, nor was there reflection on potential bias affecting result validity. However the author did reflect on her role as a white researcher and an outsider potentially impacting interviews.</p>
<p>10. Are results precise and/or believable?</p>	<p>Yes.</p> <p>The data collection and analysis were clearly outlined and rigorous therefore making results believable.</p>

<p>11. Can the results be applied to other low-income and/or minority ethnicity populations?</p>	<p>No.</p> <p>The population under study were ethnic minority people already engaged in and frequent users of rural green space. As minority-ethnic populations are known to be the least frequent and under-represented rural green space visitors, these results cannot easily be applied to general minority ethnic populations.</p>
<p>12. Is the research valuable?</p> <p><i>Note: Do results fit with available evidence? Has the researcher(s) considered the contribution of the findings to existing knowledge, practice or policy? Have they identified new gaps or discussed the generalisability of findings?</i></p>	<p>Yes.</p> <p>Despite the shortcomings, the study produces original research on an under-studied topic area focusing on the motivators of green space use, contrasting to the majority of research on barriers or constraints. New gaps and areas for future research were identified and these were in line with those identified by other contemporary papers.</p>

Appendix 5 – Data extraction of studies

Study A (Chenyang et al., 2022)

Author(s) and Year of Publication	Chenyang, D., Maruthaveeran, S., Shahidan, M. F. 2022 ScienceDirect
Journal and Database extracted from	Urban Forestry & Urban Greening ScienceDirect
Title of study	“Usage, constraints and preferences of green space at disadvantage neighborhood: A review of empirical evidence.”
Location of study* *If secondary research, any geographical exclusions	Secondary research and no geographical constraints for included studies
Study population	Residents of disadvantaged neighbourhoods (low-income, low-resource, poverty, minority, and disadvantaged communities)
Aims and objectives	The aim of the study was to systematically sort out factors and relationships affecting utilisation, constraints and preferences of greenspace in disadvantaged communities globally, using a socio-ecological approach. The aim listed in the Discussion chapter was to explore reasons behind each factor and identify deficiencies in research. The aims were met, apart from identifying deficiencies in research.
Study Design	Systematic literature review of published research
Methods	Using PRISMA guidelines, a search was conducted in 2021 using four electronic databases: Science Direct, Scopus, Web of Science, CNKI. Authors used a conceptual framework to analyse results.
Number of reviews if secondary research (Sample size)	42 studies
How studies were selected	Electronic database searches and screening using two criteria (1) If the article was based on residents’ usage patterns, constraints, and preferences (2) If the article was a study about residents in disadvantaged neighborhood green spaces

Method of data collection and analysis	Data collection and analysis was carried out by exporting results into an Excel. Authors created a conceptual framework from the analysis and summarisation of the results. No details were provided on how the conceptual framework was created or what results it is based on.
Exposure details	Green space in disadvantaged neighbourhoods. Little to no information is provided on the actual types of green space of combined studies.
Outcomes	The use, constraints and preferences of green space use by residents of disadvantaged neighbourhoods.
Bias considerations	There is no discussion of bias in the study, nor discussion of the study's strengths and limitations.
Results and key recommendations	There is no clear statement of findings or concise summary of findings. The authors found that attributes interact with each other to influence residents' use of green space, and that well-designed attractive communities foster disadvantaged groups to participate in green space.
Author's notes	Weak study design. Due to the issues from the critical appraisal, results are unlikely to be precise and are not differentiated between sub-groups.

Study B (Cronin-de-Chavez et al., 2019)

Author(s) and Year of Publication	Cronin-de-Chavez, A., Islam, S., McEachan, R. 2019
Journal and Database extracted from	Health & Place MedLine, ASSIA, CINAHL, ProQuest, ScienceDirect
Title of study	"Not a level playing field: A qualitative study exploring structural, community and individual determinants of greenspace use amongst low-income multi-ethnic families"
Location of study	City > 500,000 inhabitants in the North of England, UK (not specified)
Study population	Low-income and multi-ethnic parents living in a deprived urban area Following ethnicities included: Pakistani origin, other South Asian, Middle Eastern, Western European, Eastern European, Roma, African origin, white British origin.
Aims and objectives	Aim of the study was to explore barriers and enablers (determinants) of urban green space (UGS) amongst

	low-income, multi-ethnic parents in an area of high deprivation. No further objectives. Aim was met.
Study Design	Primary research. Qualitative cross-sectional study (observational study)
Methods	In-depth interviews and focus groups.
Number of participants if primary research (Sample size)	=30 23 interviewees and one focus group of 7
How participants/studies were recruited	Relationships were built with local community leaders to gain trust. Recruited via community networks such as children centres, parenting projects, refugee drop-ins, community centres. Participants were given £10 supermarket vouchers.
Method of data collection and analysis	Interview notes were anonymised. Interpreters were available and interviewer spoke at least one minority language. Interviews were recorded, and if not fieldnotes were written up directly after interview. Data analysis methods comprised a thematic analysis using a coding system generated and tested by two authors. The second author checked the analysis carried out by the first author.
Exposure details	Green space totalling 13% of the land within the study area, including 4 parks, playing fields, sports facilities, play areas and allotments.
Outcomes	Barriers and enablers of use of urban green space (determinants).
Results and key recommendations	Nine core themes emerged, with fear (emotion) and social and community factors being key. Neither one theoretical framework alone could explain the determinants of use showing the need for a holistic models of health behaviour.. Importantly they found barriers and enablers to be similar across multi-ethnic sub groups, meaning results were homogenous.
Bias	There is a low risk of response bias as the researchers provided interpreters and included steps to ensure the interviewees fully understood what was asked of them at different stages. There is a chance of selection bias due to over-representation of women in sample. Chance of participation bias, 8 potential interviewees cancelled citing lack of time. However triangulation (theoretical and investigator) helps improve overall validity and accuracy, decreasing

	risk of bias.
Author's notes	The study utilised a priori conceptual frameworks which was very useful as they made sure the authors' findings shared common terminology and language with existing bodies of research. The study also raised several environmental health considerations at park-use level that an EHP could review.

Study C (Gidlow and Ellis, 2011)

Author(s) and Year of Publication	Gidlow, C.J and Ellis, N. J. 2011
Journal and Database extracted from	Local Environment ProQuest and Scopus
Title of study	"Neighbourhood green space in deprived urban communities: Issues and barriers to use"
Location of study* *If secondary research, any geographical exclusions	North Staffordshire, UK
Methodology / Study Design	Qualitative primary study (observational)
Study population	Deprived urban community (white British background)
Aims and objectives	To explore perceptions of local green space (issues and barriers to use), implications for use and potential interventions. Aims met.
Methods	Focus groups with adults and young people from baseline data before a project that promoted the use of a small neighbourhood park in a deprived urban area.
Number of participants if primary research (Sample size)	Adults = 35 (formed into four focus groups) Young people* = 23 *This systematic review will only focus on results and findings relating to adults.
How participants/studies were recruited	Recruitment for adult participants took place via doorsteps and high streets, invitations to parents at adjacent school (with a financial £20 incentive) and responses to concurrent postal survey. Selection was based on catchments (within 300m to exposure) or having children at adjacent school.
Method of data collection and analysis	Four focus groups to collect data using semi-structured discussions. They were digitally recorded and

	transcribed. Thematic analysis was used for data analysis.
Exposure details	Urban park in deprived area that met formal classification as a green space
Outcomes	Experiences and perceptions of local green space, to understand issues and barriers to use, as well as potential interventions that could help
Bias considerations	Opportunistic sampling introduced a risk of selection bias from recruiting the most motivated and proactive residents; this was discussed by authors. Second investigator checked thematic coding to improve accuracy.
Results and key recommendations	The results indicated that despite doorstep green space, antisocial behaviour and lack of facilities were main barriers to use. The results were contrary to the way green space is presented in the literature as positive resources that promote well-being, showing the need for case-by-case basis.
Author's notes	This is a valuable study with findings that illuminate deterrents on usage.

Study D (Morris et al., 2011)

Author(s) and Year of Publication	Morris, J., O'Brien, E., Ambrose-Oji, B., Lawrence, A., Carter, C., Peace, A. 2011
Journal and Database extracted from	Local Environment Taylor and Francis Online
Title of study	"Access for all? Barriers to accessing woodlands and forests in Britain"
Location of study* *If secondary research, any geographical exclusions	Secondary research within Britain
Methodology / Study Design	Secondary research (systematic literature review)
Study population	Morris et al. present data relating to social deprivation, race or ethnicity, gender, disability and age.* *The results relating to social deprivation and race or ethnicity are relevant in this review.
Aims and objectives	To explore the reasons for existing woodlands not reflecting diversity of society by analysing forest users, forest access, barriers and ways to address barriers.
Methods	Secondary research from Forestry Commission and/or Forest Research from from 20 research projects between 2000-2009. The study design involves both systematically reviewing qualitative research and

	statistical analyses on the quantitative data.
Number of reviews if secondary research (Sample size)	20 research projects and studies involving 22,863 research respondents
How participants/studies were recruited	All research conducted by the Forestry Commission and/or Forest Research between 2000 -2009 that was relevant to understanding the barriers to visiting woodlands and forests was collated for the study.
Method of data collection and analysis	Meta-data from studies was tabulated. Quantitative (meta-analysis) and qualitative analyses (thematic synthesis) were performed on the data.
Exposure details	Forests and woodlands in Britain
Outcomes	Barriers to forest access and use
Bias considerations	Authors provide a quality assurance column in table of summary of study characteristics.
Results and key recommendations	Woodland access and barriers to use are strongly related to social demographics including low-income and minority ethnicity status. The authors recommend facilitated access to overcome the barriers.
Author's notes	Although mostly in Scotland and England, it comprises data from all three countries in the UK, although ethnicity data was not collected in Wales.

Study E (Slater, 2022)

Author(s) and Year of Publication	Slater, H. 2022
Journal Database	Journal of Rural Studies Scopus
Title of study	"Exploring minority ethnic communities' access to rural green spaces: The role of agency, identity, and community-based initiatives"
Location of study* *If secondary research, any geographical exclusions	UK (Scotland and England)
Methodology / Study Design	Qualitative primary research using multiple case study analysis (observational study).
Study population	Minority-ethnicity green space users. Respondent demographics: <ul style="list-style-type: none"> • 46% African, Caribbean or Black ethnic background • 54% Asian, Asian Scottish or Asian British (Pakistani, Indian or Bangladeshi) ethnic

	background
Aims and objectives	To explore motivations for using and accessing rural green space amongst minority ethnicities and uncover the role of community organisations and identity.
Methods	Walking interviews, semi-structured interviews, and a survey forming multiple case study analysis. Three case studies systematically.
Number of participants if primary research (Sample size)	Interviews = 25 Interviews with leaders = 5 Survey responses = 26
How participants were recruited?	Participants were invited through case studies. Surveys respondents were gathered online and hard copies were distributed events. Case studies chosen systematically.
Method of data collection and analysis	Data collected through walking interviews and a survey. Data results were audio recorded (where consent was given) before being transcribed and analysed using NVivo software. The analysis method was thematic analysis using concepts and coding. Survey results analysed through descriptive statistics and thematic coding.
Exposure details	Rural green space
Outcomes	Motivators for accessing rural green space and the role of community-based initiatives in facilitating access to green space. Further outcomes studied were perceptions of rural green space and identity.
Bias considerations	Chance of participation bias due to majority of female respondents. Author discusses role as white researcher possibly affecting interviews.
Results and key recommendations	Community-based organisations and activities facilitate minority ethnic communities' access to rural green space and help to overcome practical and social barriers. Social connection was key across case studies. Recommendation for participatory and creative methods for this qualitative research.
Author's notes	This was a novel study design using multiple case study analysis combining data from very relevant and similar organisations and respondents, producing precise results.