Access to Natural Green Spaces and their Associations with Psychological Wellbeing for South Asian People in the UK: A Systematic Literature Review

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Access to natural green spaces and their associations with psychological wellbeing for South Asian people in the UK: A systematic literature review

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ABSTRACT

Use of natural green spaces (NGS) is associated with improved psychological well-being (PWB). Ethnic minorities, particularly South Asian (SA) communities in the UK, face unequal access to NGS and experience a greater prevalence of health challenges than the general population. Improving access to green space can contribute to addressing current health inequalities. Following PRISMA guidelines, this systematic literature review aimed to synthesise existing research on NGS access barriers experienced by SAs and associations between NGS use and PWB. A comprehensive search was conducted through SAGE, Science Direct, and SCOPUS in August 2022; we included qualitative, quantitative and mixed-methods studies with findings on NGS access and/or associations between NGS use and PWB for SAs in the UK. We employed deductive thematic analysis to explore inhibitors and enablers of access which were then conceptualised through a multidimensional framework. Associations between NGS and PWB were coded inductively and mapped separately. This review is registered on PROSPERO: CRD42022353711. Twenty-six studies were included in the review which varied substantially in their aims, methods, context, and participants. Included studies on NGS grouped SAs within broader demographic categories such as minority ethnic communities or Muslims. Our findings indicate that SAs are disadvantaged in their access to NGS due to numerous intersecting factors including unequal distribution, inadequate transport, racialisation of NGS, and safety concerns. Whilst these findings generally aligned with broader literature on NGS access, certain access barriers and enablers are particularly significant to SA communities. We also identified several dimensions of PWB that are enhanced for SAs through interacting with NGS including overall mental health outcomes, physical wellbeing, and social relatedness. This review highlights opportunities to improve access to NGS and thereby enhance PWB outcomes for SA people. It also identifies the lack of primary research exploring NGS access and PWB associations for SA communities, specifically in rural contexts.

1. Introduction

Natural green spaces (NGS) – green open spaces in and around towns and cities, the wider countryside, and coastline encompassed by natural features (e.g., grass, trees, crops) (Natural England, 2017) – are associated with a wide range of physical and mental health benefits (De la Barrera et al., 2016; Keniger et al., 2013; Tzoulas et al., 2007). Early research in this area has demonstrated the significance of NGS in restoring attention (Kaplan and Kaplan, 1989) and affective states (Hartig et al., 1991) by comparing participants' experiences before and after exposure to NGS. More recently, Birch et al. (2020) found exposure to natural features such as the swaying of trees and grass, and escaping urban life, helps to mitigate stress and the research of Lyshol and Johansen (2024) indicates that those with greater access to NGS experience better self-perceived health. The many positive associations between access to NGS and health and wellbeing outcomes have been well summarised within several systematic reviews (e.g., Van den Berg et al., 2015). Use of NGS can also enhance other indicators of mental wellbeing including spiritual wellbeing (Edwards et al., 2022) and social cohesion (Charles Rodriguez et al., 2022). Considering their benefits, NGS are identified by the World Health Organization (2016, 2017) as a vital component of urban planning and public health strategies.

Fresh air, natural features, and open space can also encourage people to engage in physical activity (Douglas et al., 2017), in turn reducing

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sedentary time (Richardson et al., 2013). For example, a meta-analysis by Twohig-Bennett and Jones (2018) found NGS exposure to be associated with significant reductions in a wide range of physical-health related issues including blood pressure, incident of diabetes, and premature death. There are also links between the physical and mental health benefits of NGS. For example, NGS-facilitated goal-oriented engagement can foster a sense of accomplishment, leading to a more positive self-perception (Grahn and Stigsdotter, 2010). As such, these many physical health benefits associated with NGS are linked to one's overall psychological wellbeing (PWB).

Unfortunately, a large body of research shows how ethnic minority communities lack equitable access to NGS in Western countries (Friends of Earth, 2020; Natural England, 2019a; Pinault et al., 2021), perpetuating health inequalities (Rogerson et al., 2019). In England, approximately 40% of individuals from ethnic minority communities reside in areas with the least access to green space, in stark contrast to the 14% of White individuals experiencing such conditions (Friends of Earth, 2020). Research by Natural England (2014) similarly found that the majority (69%) of participants from White backgrounds were regular visitors of NGS, compared to only 42% of those from ethnic minority backgrounds. These results point to a clear disparity in both availability and usage of NGS.

In recognition of such ethnic disparities in access to NGS, a growing body of research has explored underlying barriers and opportunities. For example, White, middle class individuals often have better proximate access to NGS than minority ethnic communities (Natural England, 2019a) and a lack of visible diversity can detract from minority users' sense of belonging (Kloek et al., 2017). Minority ethnic access to NGS is further constrained by transport unavailability, lack of knowledge of routes, safety concerns, and family related responsibilities (Boyd et al., 2018; Hordyk et al., 2015). Considering these challenges, there have been political efforts to facilitate access to NGS for ethnic minorities in the UK. For example, Natural England (2015) and Sport England (2015) made efforts to improve use of NGS by promoting awareness of the diversity of spaces available and highlighting community groups who make use of them. The UK government has prioritised further enhancing access to NGS through providing more walking and cycling pathways, planting more woodland, and aiming to ensure that everyone lives within a walkable distance to NGS (Department for Environment Food & Rural Affairs, 2019).

Despite these efforts, use of NGS among minority ethnic communities remains disproportionately low in the UK (Natural England, 2019a). Compounding this issue is the lack of research on NGS access and PWB benefits experienced by distinct minority ethnic communities. Instead, minority communities are often homogenised under a single category (e.g., Black, Asian and Minority Ethnic – BAME) which obscures their diverse and unique challenges and lived experiences (Kloek et al., 2017). For example, South Asians (SA) may encounter cultural stigmas specific to their communities that disapprove of mixed-gender interactions, as well as racial stereotypes specific to SA culture, which hinder their access to certain leisure contexts (Daniel et al., 2018).

Research is particularly needed on NGS access and PWB associations in the context of SA communities for whom the prevalence of a variety of health conditions is disproportionally high. For example, the literature suggests that SA individuals, particularly those from Pakistani, Bangladeshi, and Indian backgrounds, have an increased risk of heart attacks, coronary heart disease, and strokes than the general population (Daniel et al., 2018; Laar et al., 2019). Indeed, within representative samples of SA adults, studies have found 30% to present symptoms of hypertension, 21% high cholesterol, and 17% diabetes (Mahmood et al., 2019; Shah and Kanaya, 2014). SA communities also face concerning mental health challenges (Karasz et al., 2019) disproportionately to those from White British backgrounds (Proto and Quintana-Domeque, 2021). Exacerbating these issues is the fact that SA individuals experience prolonged waiting times and less favourable outcomes in comparison to White communities when referred to UK mental health services (Thomas, 2023). These health inequalities are particularly disconcerting considering that SA communities represent 9.6% of the England population, with the majority being of Indian, Pakistani and Bangladeshi backgrounds (Office for National Statistics, 2023).

Enhancing access to NGS could be a valuable preventative measure for ill-health, thereby combatting current health disparities. For example, Mitchell and Popham (2008) found that increased exposure to NGS was associated with lower income deprivation related health inequality in England. Unfortunately, individuals of SA descent constitute less than 1% of visitors of NGS (Natural England, 2019b). Similarly, a survey of 523 England-based participants found that those from SA backgrounds were the least likely to engage with local NGS among various ethnic minority communities, and additionally presented with poorer mental health (Roe et al., 2016). Due to SA communities' particularly low engagement with NGS, and their pressing health concerns, enhancing our understanding of NGS access and PWB associations within these communities is paramount. Through a systematic review of literature in the UK, our research addresses this gap, seeking to provide valuable insights into the specific factors influencing access to NGS among SA communities and the PWB benefits associated with their use of these spaces.

2. Materials and methods

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (see Supplementary Material) (Page et al., 2021). The review protocol was pre-registered on PROSPERO (ID: CRD42022353711).

2.1. Structuring the research question

The research questions were structured using the Population (SA people; those who's ethnicity or ancestry originates from Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka), Interest (NGS), and Content (access and PWB associations) (PICo) framework (Lockwood et al., 2015). The research was guided by the following questions:

a) What are the inhibitors and enablers underlying SA people's access to NGS within the UK?
b) How are NGS associated with PWB for SA people in the UK?

2.2. Search strategy

The first author (MH) identified appropriate search terms and databases in consultation with library services staff in July 2022 which were subsequently trialed. An array of keywords associated with specific NGS such as "parks", "seaside", "forestry", "dales", and "mountains" were input into various databases, including the Psychology and Behavioural Sciences Collection, JSTOR, PubMed, Medline, and Taylor & Francis Online. The databases and keywords were then refined based on the relevance of the results. The finalised electronic literature search was conducted in August 2022 using SAGE, Science Direct, and SCOPUS. The Boolean search string consisted of the following terms: (("South Asian" OR "ethnic minority" OR race* OR bme OR Muslim OR Pakistani OR Bangladeshi OR Indian OR Bengal) AND ("green space*" OR nature* OR rural* OR countryside OR adventure* OR outdoors OR mountain* OR hike*)). The search was adapted according to the requirements of each individual database. Google Scholar was additionally searched to identify any relevant missing studies; approximately 1.6 million records were identified. Relevant articles were primarily observed over the first five pages, but to enhance the study rigor, records were extracted from the first 20 pages. Each database search was filtered to display results published in the UK, from years 2005–2022.

2.3. Eligibility criteria

We adopted a sample size, phenomenon of interest, study design,

Table 1
SPIDER tool listing the study inclusion criteria.

	Criteria
S	Studies conducted with participants predominantly from SA backgrounds (>50% of study participants) and are based in the UK.
P of I	Studies that draw conclusions about access to, or PWB outcomes associated with NGS.
D	Published and grey literature incorporating any research design which includes primary data.
E	Studies that report data on access to NGS (including underlying barriers and opportunities) and/or associations between NGS and PWB. NGS as defined as green open spaces in and around towns and cities, the wider countryside, and coastline encompassed by natural features such as grass, trees, crops.
R	Peer reviewed qualitative, quantitative, mixed methods studies and grey literature.

evaluation, research type (SPIDER) tool to set inclusion criteria for this review (Methley et al., 2014) (Table 1).

2.4. Selection process

Titles and abstracts were screened independently by two authors (MH, JDB) in September 2022. To ensure consistency in the application of inclusion/exclusion criteria, interrater agreement was calculated (McHugh, 2012). Relative agreement was 97% with a Cohen's Kappa score of .45 (moderate). A full consensus was reached through discussion, which resulted in the inclusion of most studies that were initially excluded by either reviewer. Another author (LDP) reviewed 10% of excluded articles which were selected using a random number generator and reflected an agreement rate of 100%.

The remaining articles were then reviewed at full text by one author (MH) against the study criteria in November 2022. A randomly selected sample of 30% were reviewed by a second author (RCE). Interrater agreement reflected a 96.3% consensus with a Cohen's Kappa score of .62 (substantial). Full agreement was reached upon discussion. A randomly selected 10% sample of the excluded papers were reviewed by a third author (JDB) and reflected an agreement rate of 100%.

2.5. Critical appraisal

Each included paper underwent critical appraisal independently by at least two authors (MH, RCE, JDB) using a standardised Critical Appraisal Skills Programme (CASP) tool as appropriate for the study design (CASP, 2018a, 2018b; Hong et al., 2018). CASP appraisals were scored by awarding one point for each fulfilled item across the checklist for each study. The overall score was totaled for each study and divided by the number of items in the CASP checklist, resulting in a standardised score that allowed comparison across studies regardless of design. Each study was then rated 'excellent' (=1), 'good' (≥.8 to <1), 'moderate' (≥.5 to <.8), or 'poor' (<.5) according to their score. These ratings were determined by the distribution of scores across all studies and thresholds that reflected the overall quality of the research (Hong and Pluye, 2019). Interrater reliability was calculated to gauge the consistency of scoring between the authors; interrater agreement was 93% and a Cohen's Kappa score of .72 (substantial). Full consensus was reached through discussion.

2.6. Data extraction and analysis

Data were independently extracted, coded, and thematically analysed by two authors (MH, RCE) who followed a transparent and systematic approach that included cross examination and discussions between each step. Nvivo software was used as a repository to manually

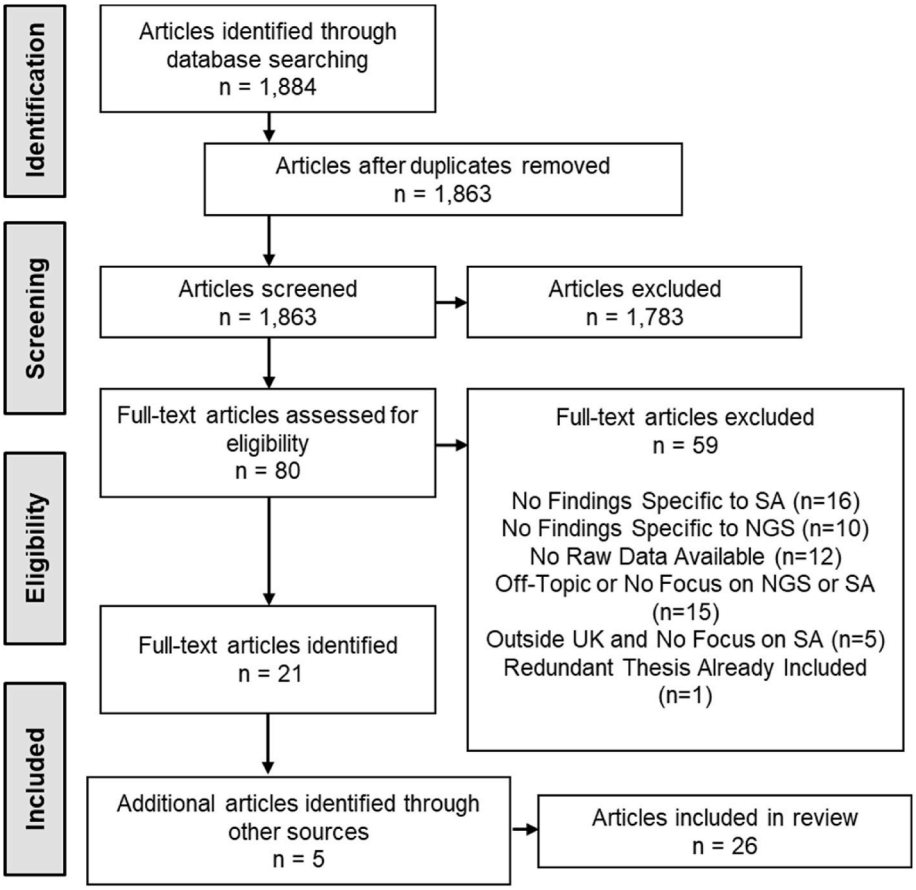

Fig. 1. PRISMA chart depicting the flow of literature into the review.

analyse and compare findings.

First, author name(s), publication year, study aim(s), study design, and sample characteristics were extracted (Table 2; Supplementary Material). Second, findings relating to SA people's access to NGS and PWB associations were extracted. This step included coding the author's interpretations of findings from the manuscripts, supported by the results of raw data, and assigning them to the corresponding research question. Coding the authors' interpretations alongside the raw data was crucial for gaining deeper insights into the implications of the data, as contextualised by the authors themselves. This approach ensured that the findings were situated within the frameworks established by the researchers, preventing reduction or inaccurate representation of the data.

Quantitative and qualitative data relating to each research question were pooled and thematically analysed. For data on access to NGS, we applied Wang et al. (2015) framework, which characterises access to parks through several dimensions: *physical* (tangible and spatial aspects), *social* (communal and societal factors), *personal* (aspects related to individual preferences and motivations), *transport* (cost and availability of transportation), and *knowledge* (awareness and familiarity factors). We applied a deductive coding approach based on these thematic categories, with new categories added where necessary. Data on PWB were coded inductively. All coding decisions were compared between two authors (MH, RCE), with differences being resolved through discussion and in consultation with AT. These comparisons were also supported through the authors interpretations of the data which were documented alongside codes.

2.7. Author positionality

The biases, histories, and interests of researchers shape their research processes (Bourke, 2014). Acknowledging the positionality of each author is crucial for transparency, as it helps to contextualise how research processes and conclusions have emerged from individual perspectives. The first author (MH) specialises in the field and is of SA heritage, giving him a nuanced professional and personal understanding of experiences and challenges faced by SA people as an academic and ethnic insider. MH related with many of the access barriers/opportunities and PWB associations highlighted in the review, allowing him to convey these insights amongst the research team during analysis. The other authors were White with expertise in the subject matter or methodological aspects of this research. As such, they offered academically informed outsider perspectives, supporting a more objective analysis. Overall, each author's positionality brings a distinct set of perspectives, skills, and potential sensitivities to the research.

3. Results

3.1. Article selection

To determine the inhibitors and enablers underlying SA people's access to NGS and their PWB associations within the UK, we conducted a search that yielded 1884 records (Fig. 1), of which 1863 were excluded through screening. Five additional papers were found through searching the reference lists of the remaining 21 papers. A total of 26 papers were included in the review.

3.2. Overview of studies

The 26 included studies varied substantially in their aims, methods, context, and participants (Table 2). In the UK, SA people's experiences and interactions with NGS have predominantly been explored in urban regions and disadvantaged neighbourhoods. Only three studies focused on rural areas (Garland and Chakraborti, 2006; Morris and O'Brien, 2011; Nayak, 2017), reflective of the concentration of SA individuals in cities. A variety of research methodologies were applied including quantitative surveys (n = 6), satellite-based data analysis (n = 5), individual interviews (n = 18), focus group interviews (n = 5), and

Table 2
Study characteristics.

ID	First author and year	Aims	Study design & Methods	Context	Quality score (CASP)
1	Cronin-de-Chavez et al. (2019)	To explore structural and individual determinants of green space use amongst parents of young children in an urban, deprived, multi-cultural area situated in the North of England, UK.	Qualitative- Semi structured interviews	Three multi-ethnic electoral wards in a large city (>500,000 inhabitants) in the North of England	Good: .91
2	Comber et al. (2008)	To determine green space access in an English city using a network analysis in a geographical information system	Quantitative- network analysis	Leicester is in the English midlands and has a large and diverse ethnic minority population.	Moderate: .6
3	Dadvand et al. (2014)	To investigate the association between contact with green spaces and fetal growth and to explore how this association might be modified by ethnicity and indicators of individual and neighbourhood SES.	Quantitative- satellite based greenness, NGS satisfaction audit (by participants) and baby weight measure	Based on 10,780 singleton live-births from the Born in Bradford cohort, UK (2007–2010).	Excellent: 1
4	Edwards et al. (2022)	To understand the facilitators and barriers for Muslim communities accessing protected areas	Qualitative- semi structured interviews	The London boroughs surrounding Walthamstow Wetlands contain some of the highest levels of ethnic diversity in the UK.	Good: .9
5	Eyre et al. (2015a)	To explore environmental influences on physical activity from a child's perspective	Qualitative- focus groups	Two schools in deprived wards of Coventry, England.	Good: .91
6	Eyre et al. (2015b)	To understand how children from a low socioeconomic area within the UK use their surrounding built environments for physical activity	Quantitative- GPS monitoring	Two most deprived wards in Coventry with similar socio-economic status, UK.	Good: .91
7	Ferguson et al. (2018)	To assess the distribution and quality of green spaces in the diverse city of Bradford	Quantitative- Neighbourhood Green Space Tool and Census data	The multi-ethnic and socioeconomically diverse city of Bradford, UK,	Excellent: 1
8	Garland and Chakraborti (2006)	To examine issues of racist victimisation in the rural arena	Qualitative- conclusions drawn from pre-existing interview and questionnaire data	Three rural counties of England - specifically Suffolk, east Northamptonshire, and north and south Warwickshire.	Moderate: .5

(*continued on next page*)

Table 2 (*continued*)

ID	First author and year	Aims	Study design & Methods	Context	Quality score (CASP)
9	McEachan et al. (2018)	To explore the associations between availability of, satisfaction with, and use of urban green space and mental wellbeing among children aged 4 years.	Quantitative- questionnaire, Normalised Difference Vegetation Index, and NGS satisfaction audit (by participants)	Born in Bradford longitudinal cohort.	Excellent: 1
10	McEachan et al. (2016)	To explore whether residential 'greenness' and access to green space were associated with depressive symptoms among pregnant women.	Quantitative- questionnaire and Normalised Difference Vegetation Index	Born in Bradford longitudinal cohort.	Good: .91
11	Morris and O'Brien (2011)	To evaluate projects aiming to encourage under-represented groups to use green space	Mixed methods- surveys and interviews	Five woodland projects: Greenwood CF, Great Western CF, Bedgebury, Haldon, Rosliston.	Good: .93
12	Morris et al. (2019)	To explore how walking groups find a place in women's lives.	Qualitative- Interviews and ethnographic field work	Walking groups in north-east England from mixed socioeconomical backgrounds.	Good: .9
13	Nayak (2017)	To offer richly embodied account of racism and belonging based on the biographical testimonies of British Bangladeshi Muslim young women.	Qualitative- semi structured interviews	Within Sunderland, the British Bangladeshi population is predominantly concentrated in three main wards, two of which are in Sunderland East, the other in Sunderland West.	Good: .9
14	Neal et al. (2015)	To examine the relationships between park spaces and ethnically diverse local populations.	Qualitative- individual and group interviews	The London Borough of Hackney which is in the Northeast of the city; Milton Keynes in South East England; and Oadby, a suburb of the city of Leicester in the English Midlands.	Good: .8
15	Ratna (2017)	To explore first generation Gujarati Indian men and women's experiences of walking.	Qualitative- mental mapping, photo-elicitation, participant observations and semi-structured interviews	Harrow in Northwest London has been twinned with Bhuj, a city in Gujarat.	Good: .8
16	Rishbeth and Birch (2021)	To explore the extent to which urban nature reflects and informs transnational dynamics within the everyday lives of first generation migrants living in one city in the north of England.	Qualitative- interviews	One city in the north of England.	Good: .9
17	Rishbeth and Rogaly (2018)	What does sitting outside mean for people experiencing marginalisation and exclusion in the city? In what ways is this meaning changed by corporate-led regeneration of urban public spaces, and shaped by urban design?	Qualitative- interviews	Case study of central square in Woolwich, south-east London.	Moderate: .5
18	Roberts et al. (2019)	To examine the associations between park features, park satisfaction and park use in a deprived and ethnically diverse sample in Bradford, UK.	Quantitative- park auditing (researcher and participant) and surveying	Bradford, located in an ethnically diverse and deprived city in the north of England, of which 50.1% of participants are South Asian.	Excellent: 1
19	Roe et al. (2016)	To explore the relationship between general health and a range of individual, social and physical environmental predictors in deprived White British and BME groups living in ethnically diverse cities in England.	Quantitative- questionnaire's	Six ethnic groups living in the three of England's most ethnically mixed conurbations (i.e., London, Manchester and the Wolverhampton and Coventry area)	Good: .91
20	Scraton and Holland (2006)	To explore the meanings and values attached to grandfatherhood for a range of older men who have recently retired from paid employment.	Qualitative- semi structured interviews	A large city in the North of England.	Good: .8
21	Slater (2022)	To investigate members of minority ethnic communities' motivations for visiting rural green spaces, perceptions of rural green spaces and the role of community-based initiatives	Qualitative- walking and semi structured interviews	Voluntary organisations of SADACCA, Boots and Beards, Sheffield Environmental Movement and SCOREscotland.	Good: .9
22	Stride (2016)	To explore the physical education and physical activity experiences of a group of South Asian, Muslim girls.	Qualitative- participatory methods, observations, focus groups and interviews	The study is based in a large, urban, co-educational, secondary school in Yorkshire, England that is diverse and in the top 10% of most deprived neighbourhoods in the UK.	Good: .9
23	Stride et al. (2018)	To explore the physical education and physical activity experiences of a group of South Asian, Muslim girls.	Qualitative- participatory methods, observations, focus groups and interviews	The study is based in a large, urban, co-educational, secondary school in Yorkshire, England that is diverse and in the top 10% of most deprived neighbourhoods in the UK.	Good: .8
24	Sutcliffe (2018)	To explore how people construe their relationship with nature.	Qualitative- in depth interviews	England based.	Excellent: 1
25	Warren (2017)	To investigate the ways in which walking practices intersect with social difference, particularly in relation to faith, ethnicity and gender.	Qualitative- walking interviews and classroom exercise	The neighbourhood of Balsall Heath, an inner-city suburb located within the ward of Sparkbrook.	Good: .9
26	Wood et al. (2018)	To test the relationship between green space quality and restorative benefit in an inner city urban population in Bradford, United Kingdom.	Quantitative- face to face surveys and Natural Environment Scoring Tool (by researchers)	The three most deprived wards of Bradford (Little Horton, Bowling and Barkerend).	Excellent: 1

environment auditing (conducted by researcher n = 1, conducted by participants = 2, conducted by researcher and participant = 1) (Table 2). Most of the qualitative studies focused on identifying the diverse barriers and opportunities underlying NGS access whilst quantitative studies concentrated more on proximal access to NGS and associations with PWB. After critically appraising each paper, five studies were deemed excellent, 18 good, and three as moderate (Table 2). Notably, five of the 15 qualitative studies lacked reporting on positionality, while seven did not detail their methods for data analysis (see Supplementary Material Table S3a).

3.3. Sample characteristics within studies

Participants displayed significant demographic diversity across studies within the label 'South Asian', but several focused on SAs from socioeconomically disadvantaged backgrounds (see Supplementary Materials Table S2). Demographic characteristics reported include age (88%), ethnicity (100%), religion (38%), sex or gender (96%), and socioeconomic background (73%). Studies also discussed a variety of wider characteristics (e.g., parenthood). The exclusive focus on individuals from SA backgrounds was only evident in studies that specifically examined physical activity (PA). No study focused exclusively on SA's access to NGS and PWB associations. Rather, most studies included participants from a variety of backgrounds, often collectively categorising them as 'ethnic minorities', but discussing data relating specifically to SAs in their findings.

3.4. Access to NGS

Included studies discussed a wide variety of interlinked access barriers and opportunities influencing SA people's access to NGS including proximal availability, quality and satisfaction, general safety concerns, opportunities to socialise, commitments, roles and expectations, and knowledge of NGS and their connections to PWB (see Supplementary Materials Table S4). These barriers and opportunities aligned well with the dimensions of greenspace access in Wang et al. (2015)'s thematic framework (Fig. 2). A few studies (n = 4) focused on NGS visitation, all of which reported lower NGS access among SA people in comparison to those from White backgrounds (Eyre et al., 2015b; McEachan et al., 2018; Morris and O'Brien, 2011; Roberts et al., 2019).

3.4.1. Physical dimensions

Proximity was identified as a significant factor shaping access to NGS for SA communities (n = 11) (Comber et al., 2008; Cronin-de-Chavez et al., 2019; Dadvand et al., 2014; Eyre et al., 2015a; Ferguson et al., 2018; McEachan et al., 2016; McEachan et al., 2018; Ratna, 2017; Roberts et al., 2019; Roe et al., 2016; Stride et al., 2018). SA people were found to experience poorer access to NGS than individuals from White backgrounds through geographical analysis (n = 7) (Comber et al., 2008; Dadvand et al., 2014; Eyre et al., 2015b; Ferguson et al., 2018; McEachan et al., 2016, 2018; Roe et al., 2016). For example, Ferguson et al. (2018) found that neighbourhoods with large SA communities in Bradford exhibited a higher density of street trees, but experienced poorer access to NGS compared to neighborhoods with a high proportion of White households: "*Neighbourhoods with a high proportion of Asian/Asian British residents and deprived households have less access to neighbourhood greenspaces*." Similarly, in Leicester, where 43.4% of the population are SA (UK Government, 2020), regions with a higher proportion of SA residents were found to have reduced access to nearby green features (McEachan et al., 2018). Studies also suggested that SAs can experience poorer proximal access to NGS than other ethnic minority groups (n = 3) (Comber et al., 2008; McEachan et al., 2018; Roe et al., 2016) and further studies (n = 3) (Cronin-de-Chavez et al., 2019; Ratna, 2017; Stride, 2016) discussed proximity challenges through qualitative methods.

Beyond geographic accessibility, higher levels of perceived quality and satisfaction with NGS were associated with increased accessibility and usability (n = 7) (Cronin-de-Chavez et al., 2019; Ferguson et al., 2018; McEachan et al., 2018; Rishbeth and Birch, 2021; Roberts et al., 2019; Roe et al., 2016; Wood et al., 2018). For example, two comparative quantitative papers (Ferguson et al., 2018; Roberts et al., 2019) found SAs experienced poorer park satisfaction than those from White backgrounds,

> "*White British respondents (M = 2.26, SD = .83) reported significantly higher (p = 0.01) park satisfaction than Pakistani respondents (M = 2.06, SD = .85)". "In the fully adjusted model, amenities and usability were positively related to park satisfaction.*" (Roberts et al., 2019)

Natural features and larger open spaces were associated with greater NGS access and usability for SAs (n = 4) (Cronin-de-Chavez et al., 2019; Roberts et al., 2019; Warren, 2017; Wood et al., 2018). For example, Warren (2017) noted that larger spaces were particularly significant for Muslim women and Roberts et al. (2019) found associations between size and usability, although ethnicity did not mediate this relationship. The presence of infrastructure/amenities was also found to facilitate access (n = 4) (Cronin-de-Chavez et al., 2019; Edwards et al., 2022; Morris and O'Brien, 2011; Stride, 2016). This included social infrastructure (e.g., picnic tables), provision of prayer space, and access to halal food. Most papers explored physical dimensions of access qualitatively, but a quantitative analysis by Roberts et al. (2019) found the presence of amenities to be positively associated with usability through a survey on park satisfaction and use.

General safety concerns related to unfamiliarity with NGS, poor aesthetics, slippery surfaces, and litter were identified as inhibiting people's access to NGS (n = 6) (Cronin-de-Chavez et al., 2019; Eyre et al., 2015a; Eyre et al., 2015b; Morris et al., 2019; Rishbeth and Birch, 2021; Roe et al., 2016). For example, Cronin-de-Chavez et al. (2019) report that: "*Issues raised included safety of play equipment, water features, traffic, broken walls, litter; slippery surfaces and muddy area.*" Parents were deterred from accessing NGS due to concerns that their children might fall on slippery surfaces or become ill from the cold weather (n = 3) (Cronin-de-Chavez et al., 2019; Eyre, 2015a,b; Rishbeth and Birch, 2021); typical wet and cold weather conditions in the UK also detracted from visitor' experiences of NGS (n = 4) (Cronin-de-Chavez et al., 2019; Eyre et al., 2015a; Rishbeth and Rogaly, 2018; Roe et al., 2016).

3.4.2. Transport dimensions

Use of NGS was also influenced by cost and transport availability (n = 5) (Cronin-de-Chavez et al., 2019; Edwards et al., 2022; Morris and O'Brien, 2011; Slater, 2022; Stride, 2016). Key barriers in this access dimension included difficulties transporting children (Cronin-de-Chavez et al., 2019; Morris and O'Brien, 2011), the cost of travel (Cronin-de-Chavez et al., 2019; Morris and O'Brien, 2011; Slater, 2022), lack of car ownership (Cronin-de-Chavez et al., 2019; Morris and O'Brien, 2011; Slater, 2022), and the burden of sharing travel with others (Morris and O'Brien, 2011). For example, Cronin-de-Chavez et al. (2019) reported that:

> "*Impromptu, everyday trips to local greenspaces were of a different nature, when part of the family would make shorter visits to a local green space (often of poorer quality) that could be accessed on foot between school pick-ups or after school. This was partly because even where the household possessed a car, the mothers in the study mostly couldn't drive, making the time and cost of traveling to a further away green space too prohibitive:*"

3.4.3. Knowledge dimensions

A lack of knowledge relating to how to access NGS was highlighted as a barrier (n = 4) (Cronin-de-Chavez et al., 2019; Edwards et al., 2022; Morris and O'Brien, 2011; Slater, 2022). Two of these studies (Morris and O'Brien, 2011; Slater, 2022) found that information shared through social networks facilitated access. Edwards et al. (2022) also identified

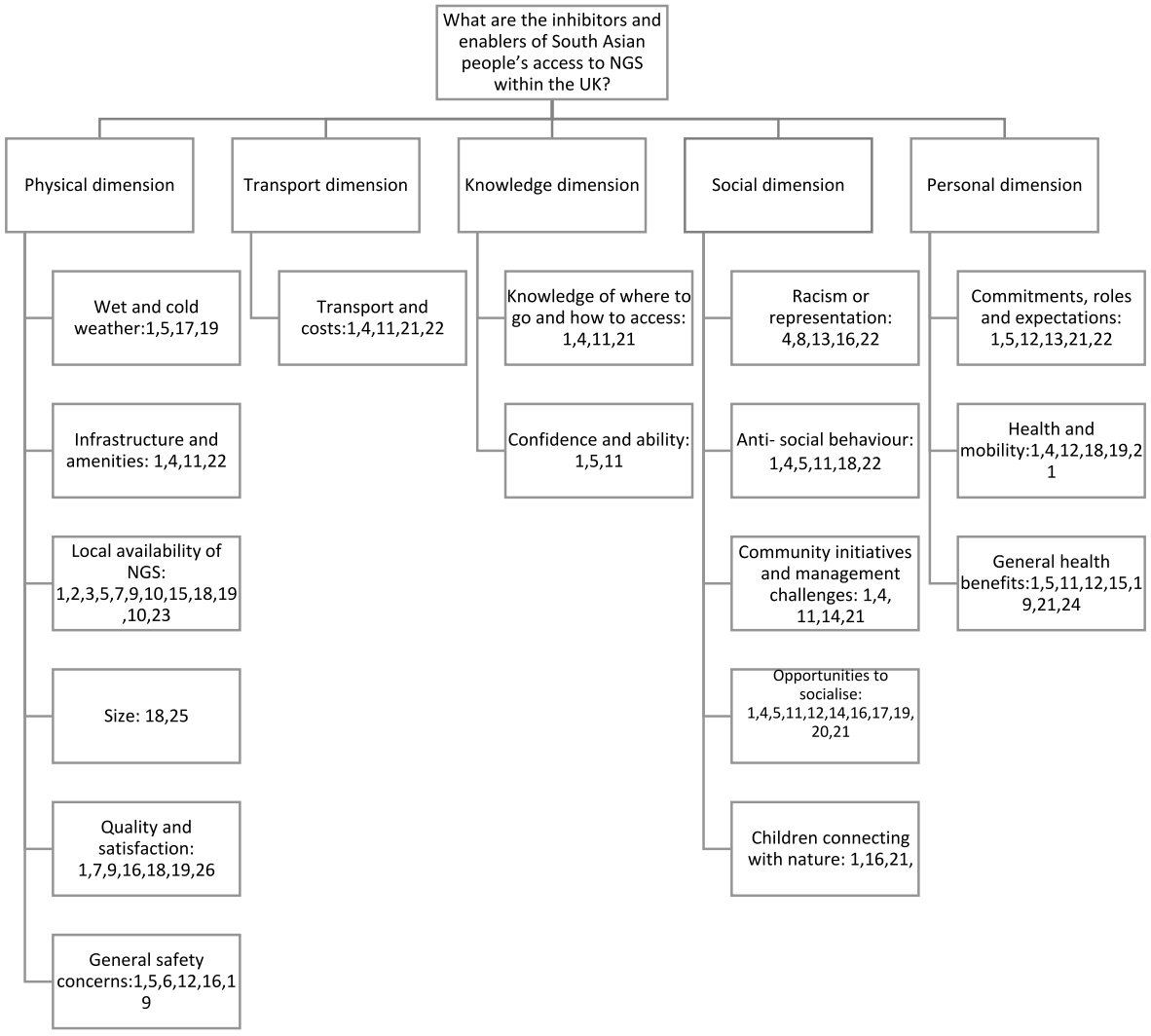

Fig. 2. Inhibitors and enablers of SA people's access to natural green space (NGS) in the UK, mapped onto Wang et al. (2015)'s framework conceptualising dimensions of greenspace accessibility.

language barriers and inadequate provision of appropriate signage as obstacles. Lacking the ability to perform certain skills in NGS and a lack of confidence was also found to inhibit the usability of NGS (n = 3) (Cronin-de-Chavez et al., 2019; Eyre et al., 2015a; Morris and O'Brien, 2011). For example, Cronin-de-Chavez et al. (2019) notes that: "*Individual determinants preventing use included lack of knowledge about where to go, or how to get there and confidence in managing young children whilst outdoors*."

3.4.4. Social dimension

Fears of antisocial behaviour and crime were identified as inhibiting SA access to NGS (n = 6) (Cronin-de-Chavez et al., 2019; Eyre et al., 2015a; Morris and O'Brien, 2011; Roberts et al., 2019; Stride, 2016). The racialisation of NGS was particularly problematic, identified in several qualitative papers (n = 5) (Edwards et al., 2022; Garland and Chakraborti, 2006; Nayak, 2017; Rishbeth and Birch, 2021; Stride, 2016). Two of these papers (Garland and Chakraborti, 2006; Nayak, 2017) found that direct experiences of racial discrimination hindered access to NGS, and three papers (Edwards et al., 2022; Rishbeth and Rogaly, 2018; Stride et al., 2018) suggested people avoid visiting NGS when they were not represented within the space. For example, Rishbeth and Birch (2021) found that:

> "*One of our participants, a young woman who wears a hijab, recounted an experience of feeling avoided in a park setting on account of her clothes—her experience of being judged while outdoors which quite differs from the 'not any rules in nature' perception held by Rojwan.*"

Fears were also associated with witnessing inappropriate language (Cronin-de-Chavez et al., 2019), drugs (Eyre et al., 2015a), and off-leash dogs (Morris and O'Brien, 2011).

Out of the papers that focused on social dimensions of access (n = 11), organised community visits to NGS were found to facilitate access (n = 5) (Cronin-de-Chavez et al., 2019; Edwards et al., 2022; Morris and O'Brien, 2011; Neal et al., 2015; Slater, 2022), but group management and costs associated with such visits were also identified as challenges for management bodies (n = 4) (Cronin-de-Chavez et al., 2019; Morris and O'Brien, 2011; Neal et al., 2015; Slater, 2022). Social companionship was identified as facilitating NGS access (n = 11) (Cronin-de-Chavez et al., 2019; Edwards et al., 2022; Eyre et al., 2015a; Morris and O'Brien, 2011; Morris et al., 2019; Neal et al., 2015; Rishbeth and Birch, 2021; Rishbeth and Rogaly, 2018; Roe et al., 2016; Scraton and Holland, 2006; Slater, 2022). Amongst these papers, the majority (n = 9) (Cronin-de-Chavez et al., 2019; Edwards et al., 2022; Eyre et al., 2015a; Morris et al., 2019; Neal et al., 2015; Rishbeth and Rogaly, 2018; Roe et al., 2016; Scraton and Holland, 2006; Slater, 2022) described how those from SA backgrounds often visit NGS to socialise with family,

friends and the community. One paper (Morris and O'Brien, 2011) found that SA women drew confidence through visiting NGS with groups, another (Morris et al., 2019) identified how group walking could mitigate safety concerns, and two (Edwards et al., 2022; Neal et al., 2015) described how cultural/religious gatherings could facilitate access. For example, one study employing walking interviews indicated that, "*Several participants mentioned how their relationships with family and friends drove their visits to rural green spaces*" (Slater, 2022). Another study that surveyed diverse ethnic groups highlighted, "*People of Indian origin are most likely to visit their local urban green space with someone.*" (Roe et al., 2016).

Finally, parental motivations for children to develop relationships with nature was identified as an enabler of NGS use (n = 3) (Cronin-de-Chavez et al., 2019; Rishbeth and Birch, 2021; Slater, 2022). All of these papers concluded that the benefits and enjoyment associated with these spaces were amongst the reasons driving parents to visit with their children.

3.4.5. Personal dimensions

Family ties and home responsibilities were identified as shaping access to NGS in different ways (n = 6) (Cronin-de-Chavez et al., 2019; Eyre et al., 2015a; Morris et al., 2019; Nayak, 2017; Slater, 2022; Stride, 2016). For instance, family commitments were found to limit participants' visitation (n = 3) (Cronin-de-Chavez et al., 2019; Eyre et al., 2015a; Morris et al., 2019). Moreover, females were constrained due to cultural assumptions regarding gender roles (n = 2) (Stride, 2016; Warren, 2017). Additionally, changes in life circumstances, through retirement and having children, were also found to shape how users engaged with NGS (n = 2) (Ratna, 2017; Slater, 2022). For example, Slater (2022) writes: "*It was their children growing up and moving away that created new opportunities and motives to visit rural green spaces.*" In other cases, participants leveraged their family connections to visit NGS: "*It is noticeable that for many respondents the immediate family and extended kinship network are the most frequent resource girls and young women draw on when it comes to who they spend their leisure time with*" Nayak (2017).

Mobility and health constraints or the use of pushchairs, and difficulties in navigating unpaved areas, were identified as inhibiting access to NGS (n = 6) (Cronin-de-Chavez et al., 2019; Edwards et al., 2022; Morris et al., 2019; Roberts et al., 2019; Roe et al., 2016; Slater, 2022). For example, through quantitative methods, Roberts et al. (2019) found unpathed areas to be significantly associated with a lack of NGS usability, whilst Cronin-de-Chavez et al. (2019) derived similar conclusions through qualitative methods. Similarly, Roe et al. (2016) found NGS access to be significantly positively associated with overall health. Lastly, a desire to attain the health benefits associated with NGS drove engagement (n = 8), reflecting how knowledge of these benefits can enable access (Cronin-de-Chavez et al., 2019; Eyre et al., 2015a; Morris and O'Brien, 2011; Morris et al., 2019; Ratna, 2017; Roe et al., 2016; Slater, 2022; Sutcliffe, 2018).

3.5. Psychological wellbeing associations of natural green spaces for South Asian people

Associations between NGS and enhanced PWB for SAs in the UK (Fig. 3) was evident across most papers (n = 18) (see Supplementary Material Table S4). In the quantitative studies reflecting this relationship, access to NGS was generally measured by geographical proximity. While most of the reviewed studies focused on aspects of mental health, a variety of additional factors associated with PWB were also identified as being positively associated with NGS access and use.

Access to NGS was explicitly linked with positive PWB (n = 10) (Cronin-de-Chavez et al., 2019; Eyre et al., 2015a; McEachan et al., 2016; McEachan et al., 2018; Morris et al., 2019; Rishbeth and Birch, 2021; Roe et al., 2016; Slater, 2022; Sutcliffe, 2018; Wood et al., 2018). A few of these studies described how engagement with NGS led to positive mental health outcomes through health promoting behaviours, whereas other studies linked proximal access to NGS to certain mental health indicators such as stress reduction, and emotional regulation. One paper (Roe et al., 2016) identified a significant positive correlation between general health indicators and access to NGS, one paper (McEachan et al., 2016) identified a significant negative correlation between access to NGS and depressive symptoms, two papers (Rishbeth and Rogaly, 2018; Wood et al., 2018) found that participants experienced better mental health after engaging with NGS, three papers (Cronin-de-Chavez et al., 2019; Rishbeth and Birch, 2021; Slater, 2022) found individuals to experience a sense of healing and restoration from stress when visiting NGS, two papers (Morris et al., 2019; Wood et al., 2018) concluded that reduced access to NGS contributes to the poorer PWB experienced by SAs in comparison to those from white backgrounds, and six papers (Cronin-de-Chavez et al., 2019; McEachan et al., 2018; Morris et al., 2019; Rishbeth and Birch, 2021; Slater, 2022; Sutcliffe, 2018) identified associations between access to NGS and positive mood. For example, McEachan et al. (2018) found that: "*The level of green space within a neighbourhood can have beneficial effects on mental well-being, independent of health behaviours, and therefore can benefit populations without requiring active behavioural change.*"

Mental health outcomes related to access to NGS were also explored between ethnic groups. Three studies (Eyre et al., 2015b; McEachan et al., 2016; Wood et al., 2018) found no statistical difference between ethnicity and instead found socioeconomic factors to be influential. However, in these studies SA's experienced poorer PWB outcomes from NGS than those from White backgrounds due to the heightened accessibility challenges (Eyre et al., 2015b; McEachan et al., 2016; Wood et al., 2018). Three additional studies focusing on behavioural engagement with NGS highlighted the restorative role of NGS for SA users' mental health (Cronin-de-Chavez et al., 2019; Rishbeth and Birch, 2021; Slater, 2022). For example, Rishbeth and Birch (2021) found that: "*Farida, a young female, spent time observing nature through a bedroom window as a way to build confidence during a period of ill health.*"

Access to NGS was also positively associated with good physical wellbeing, with participants feeling fitter and healthier after engaging with these environments (n = 8) (Cronin-de-Chavez et al., 2019; Dadvand et al., 2014; Eyre et al., 2015a; Morris et al., 2019; Neal et al.,

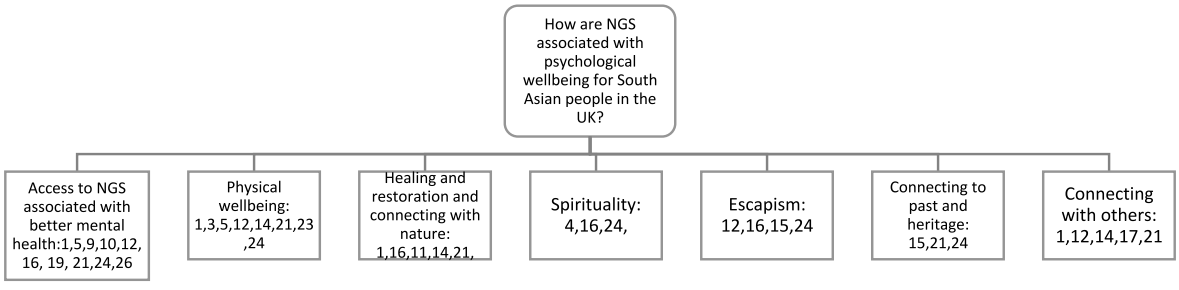

Fig. 3. Associations between Natural Green Space (NGS) access and use and the psychological wellbeing (PWB) of South Asian people in the UK.

2015; Slater, 2022; Stride et al., 2018; Sutcliffe, 2018). Increasing fitness, losing weight, breathing in fresher air, and developing immunity were among the physical health-related associations individuals had experienced when engaging with NGS. One paper (Eyre et al., 2015b) found SA children to engage in higher rates of PA in NGS when compared to indoor environments, and thus experience enhanced physical health outcomes including healthier Body Max Index scores. This relationship is important to recognise as physical health is strongly related to one's PWB (Charles Rodriguez et al., 2022). For example, Morris et al. (2019) writes:

> "*She said that she was glad to come out, and noted when it was raining on one walk that she even came out in the rain. She said this was because she wanted to socialise and also wanted to 'lose weight.*'"

One paper including data on NGS (McEachan et al., 2016) found SA participants were less likely to engage in PA compared to their White counterparts, leading to poorer physical wellbeing outcomes.

Studies identified several other dimensions of PWB that were associated with the use of NGS. Four papers described how visits to NGS helped users to escape from mundane schedules or urban life (n = 4) (Morris et al., 2019; Ratna, 2017; Rishbeth and Birch, 2021; Slater, 2022) and of these, two papers (Morris et al., 2019; Slater, 2022) described how individuals enjoyed visiting rural green spaces to escape from the hustle and bustle of the city. Other findings indicate how users were able to connect better with nature through their visits (n = 5) (Cronin-de-Chavez et al., 2019; Morris and O'Brien, 2011; Neal et al., 2015; Rishbeth and Birch, 2021; Slater, 2022). Moreover, users felt an increased sense of connectedness with other people through social interactions that took place in NGS (n = 5) (Cronin-de-Chavez et al., 2019; Morris and O'Brien, 2011; Neal et al., 2015; Rishbeth and Rogaly, 2018; Slater, 2022). All five papers described how relationships or community bonds were fostered through connecting with others in NGS. For example, Slater (2022) discussed:

> "*For some, accessing rural green spaces provided time for building family bonds:*
>
> *'Doing something like this together is quality family time' (BF8). For others, visiting rural spaces allowed them to connect with new people and build social relationships*."

Participants' Islamic beliefs motivated their visits to NGS, with the natural environment helping them to foster a deeper sense of spirituality whilst in those environments (n = 3) (Edwards et al., 2022; Rishbeth and Birch, 2021; Sutcliffe, 2018). For instance, two papers (Rishbeth and Birch, 2021; Slater, 2022) recognised that visits to NGS offered opportunities for prayer for Muslims, and one paper (Sutcliffe, 2018) identified NGS as a source of spiritual perspective and reflection, thus enhancing spiritual experiences. Finally, three studies highlighted how SA participants became reminiscent of their childhood (in India, Pakistan, or the UK) when engaging with NGS (Ratna, 2017; Slater, 2022; Sutcliffe, 2018).

4. Discussion

4.1. South Asian access to NGS in the UK and associated psychological benefits

This review describes significant inequities experienced by SAs in the UK associated with access to NGS. These inequalities are consistent with wider research highlighting racial and ethnic disparities in access to green spaces (Boulton et al., 2018; Jay et al., 2012). This review also highlighted the many associated barriers and opportunities underlying these disparities, which largely aligned with the framework developed by Wang et al. (2015) conceptualising dimensions of greenspace accessibility. This framework draws some parallels with the social-ecological model, which illuminates the dynamic interplay between people and their physical and social environments that shapes behaviour (Sallis et al., 2015). Wang et al. (2015)'s framework aided in identifying the many dimensions of green space access and the intersections between individual, social, and environmental factors that determine access to NGS for SA people in the UK and their relationship to PWB.

The included studies indicate that the physical characteristics of NGS are often critical for enhancing use of these spaces within SA communities. For example, the lack of adequate social infrastructure in NGS is misaligned with social motivations driving many SA's to visit. Moreover, it is difficult for people with mobility impairments, pushchairs, and wheelchairs to visit certain NGS due to a lack of facilities and paths, exacerbating feelings of exclusion experienced by people with disabilities or impairments (Corazon et al., 2019). Barriers related to mobility impairments are particularly important to consider for SA communities who face certain health challenges more commonly than the wider population (Gholap et al., 2011). These findings resonate with wider research emphasising the importance of family-friendly and physically accessible spaces (Navarrete-Hernandez et al., 2021). NGS can support more frequent family visits through enhanced design. For example, urban developers could include accessible paths leading to large open spaces designated for families to gather, including supportive infrastructure (e.g., a sufficient number of benches and picnic tables). Such improvements could significantly enhance access for SA communities by creating physically accessible and culturally appropriate environments and helping people balance home-related commitments, thereby easing the burden of such responsibilities and integrating family roles with leisure.

Findings suggest that racial discrimination and safety concerns also inhibit access to NGS. These results are well aligned with the broader literature on the challenges that minority ethnic groups experience while visiting NGS (Ho and Chang, 2021). Although feelings of intimidation and safety concerns in NGS exist in wider populations (Navarrete-Hernandez et al., 2021), insecurities are amplified for ethnic minority groups due to differences of identity and racial tensions (Boyd et al., 2018). Racial prejudice and safety concerns lead to discomfort and detract from one's sense of belonging. This negatively impacts PWB both directly and indirectly through deterring visitation and thus limits the equitable distribution of the wellbeing benefits associated with nature. Fostering inclusivity through increased representation and safety can create more welcoming and safe environments for all and as such, recreational strategies should prioritise diversity and inclusion. For example, organising community events that celebrate cultural diversity and providing clear, accessible information in NGS could help foster more welcoming environments.

Our results indicate that SA communities frequently face challenges such as geographic inequities, poor infrastructure, and a lack of opportunities for preferred recreation, which are exacerbated by transportation constraints and access to information on where and how to access NGS. While such challenges are often shared with the general population in socio-economically disadvantaged areas (Boulton et al., 2018; Rigby et al., 2020), the barriers experienced by SA communities are exacerbated by factors associated with their ethnicity. For instance, SA individuals may feel alienated in certain contexts due to the visibility of their identity, including their skin color, which can be compounded by racial stereotypes and underrepresentation in NGS, leading them to feel unwelcome (Green and Singleton, 2016). Additionally, issues related to infrastructure and inaccessible paths are particularly problematic for some SA communities, who face a prevalence of health issues that impact mobility (Emadian and Thompson, 2017; Gholap et al., 2011). Economic disadvantages heighten these challenges as SA communities often experience higher levels of poverty, increasing the difficulties associated with travel costs and leading individuals to prioritise paid work over recreational activities (Laar et al., 2019).

The present review highlights how views and experiences of NGS varied across SA participants, reflecting how experiences of NGS are

associated with individual identities. For example, fears associated with NGS are more prevalent among females than males and are compounded by multiple factors of unfamiliarity with environments, distances of travelling alone as a female, lack of knowledge/confidence, presence of antisocial behaviour/crime, and lack of representation. Our review underscores the systemic inequalities faced by SA communities at the intersection of their ethnic, religious, economic, and geographical identities, emphasising the need to address these specific disparities to promote equitable access to nature and its associated health benefits.

In addition to highlighting the factors underlying NGS accessibility, this review supports wider literature evidencing the relationship between NGS use and PWB (Raman et al., 2021). The reviewed studies indicate that stress reduction, enhanced emotional regulation, and better overall mental health are associated with NGS. These findings are consistent with research in the general population (Douglas et al., 2017). Indeed, connection with nature and natural features in NGS positively affect PWB through encouraging health enhancing activity such as reflection (Rogerson et al., 2019). Visitors are given the opportunity to escape from the mundane schedules and stressful environments encountered in urban life, helping them to identify solutions for life's problems (Birch et al., 2020). Whilst our findings show how SA's use NGS to improve mental health, they also highlight the unique dimensions of PWB associated with NGS influenced by SA cultural identity. For instance, NGS present opportunities for visitors to connect with their religious beliefs. Although previous work portrays NGS as restorative (Gascon et al., 2015), less research links spirituality to NGS engagement and PWB. Given that many SAs hold religious beliefs, further research exploring the link between spirituality, wellbeing, and NGS is needed.

This review indicates that engaging with NGS can motivate health promoting behaviours like exercise, which is strongly linked to PWB (Richardson et al., 2013). Whilst this finding is consistent with broader work on NGS (Rogerson et al., 2019), it holds particular significance in the context of SA communities. SA groups in the UK exhibit disproportionately higher rates of health challenges such as mental health concerns, obesity, type 2 diabetes mellitus, and cardiovascular disease (Abu-Lughod, 2015; Alexander, 2008; Anand and Cochrane, 2005). Physical inactivity is a major risk factor for these conditions, which can be mitigated through the use of NGS. However, as discussed throughout this review, SA communities face a multitude of challenges in accessing NGS, reducing the potential for NGS-PWB associations to be harnessed in public health policy and practice. This review supports prior research, highlighting how enhancing access to NGS for underrepresented groups could contribute to reducing current health inequalities (Boulton et al., 2018; Charles Rodriguez et al., 2022).

When considering methodologies employed in the reviewed studies, many quantitative approaches relied on geographic proximity to NGS as a measure of access, whilst none focused on frequency of visitation and behavioural engagement. Portraying geographic proximity as synonymous with access to NGS is an oversimplification that fails to acknowledge the variety of barriers and opportunities linked to access for SA communities. This methodological limitation is also prevalent in quantitative research focusing on NGS in broader samples (Van den Berg et al., 2015). Additional research is needed that analyses the multiplicity of factors influencing access to health enhancing activity, taking into account the diverse perspectives and needs of SA groups. Furthermore, our review emphasises the importance of considering subjective experiences when evaluating access to NGS. For example, research in the field of PA has holistically investigated SA people's individualised perspectives and experiences (Horne et al., 2018). Adopting similar approaches in the context of NGS would clarify specific steps that can be taken to improve access beyond NGS distribution. Nonetheless, our findings provide valuable information on the barriers SA individuals encounter when accessing NGS and the psychological benefits that engagement with these spaces can offer, which are consistent with broader research (Gascon et al., 2015; Jay et al., 2012; Kloek et al., 2017).

4.2. Literature gaps and opportunities

Most studies were published after 2015, illustrating the relative nascency of research that includes data on SA interactions with NGS. Most studies were deemed of good or excellent quality, reflecting the rigour involved in this field. However, many qualitative studies did not report on researcher positionality (See Supplementary Material Table S3a). This omission is notable as researchers' biases, backgrounds and preconceptions influence how data is collected, analysed, and interpreted. Lessons emerge here when considering the barriers associated with studying SA communities, stemming from stereotypes about their disconnection from Western leisure and wellbeing activities (Caperchione et al., 2015). Authors should strive for reflexivity and transparency in their work to deconstruct stereotypes and provide lessons of sensitive and culturally ethical engagement with diverse communities. In this research, we endeavored to be transparent on author positionality and worked to mitigate bias through interrater contributions and diverse authorship.

Our review synthesised several quantitative, qualitative, and mixed-methods studies, focusing specifically on data from SA individuals or from samples which were over 50% SA. No included study focused solely on SA populations in relation to their access to NGS. This is problematic given this population's particular health challenges and the potential for NGS to support health-promoting behaviours. Although there is a substantial body of research exploring how ethnic minority communities use and benefit from NGS (e.g., Gascon et al., 2015), the exclusive focus on SA communities presented in this review adds unique insight to this body of knowledge which tends to homogenise ethnic minority groups and thus obscure the specific issues faced by SAs. This review identified the nuanced difficulties SAs experienced and their compounding effects on access, including the lack of infrastructure for prayer, racism, and a lack of halal food options. There is a significant need for primary research in this area that focuses specifically on SA people's experiences of NGS which can capture how NGS access intersects with religious beliefs, cultural stigma, stereotypes, and health that has been presented in wider leisure and PA research.

To help challenge stereotypes, it is critical to refrain from referring to distinct groups of people under broad umbrella terms when possible. Kloek et al. (2017) emphasise the need to recognise the diversity of identities and experiences that exist among different ethnic groups in their study of disparities in outdoor recreation practices between immigrants and non-immigrants. Understanding the unique experiences within and among SA communities is crucial for promoting equitable access to and use of NGS, as well for the development of associated policies and interventions. It must also be emphasised that SA themselves are not a homogeneous community. Indeed, intersectional factors such as gender, religion, geography, and socioeconomic level, also affect one's ability to access NGS and should not be overlooked. Similarly, the label 'South Asian' refers to a wide range of cultures, languages, and traditions. It is important to recognise the diversity of this group, some of which may have been underrepresented in the included studies.

There has been an emphasis on urban spaces in research on SA communities and NGS, overlooking rural experiences, particularly in the context of PWB. Rural areas have distinct cultural and environmental dynamics from urban settings that support different perspectives and experiences and are associated with distinct access barriers, opportunities, and PWB outcomes (Avery et al., 2020). For instance, rural green spaces have been linked with stronger feelings of nature connectedness and escapism (Rupprecht et al., 2015). However, rural environments have also been identified as sites of ethnic contestation and ingrained racism, leading to the exclusion of ethnic minorities (Garland and Chakraborti, 2006). Further research is needed on SA people's rural green space experiences to provide a more comprehensive understanding of the relationship between PWB, culture, ethnicity, and nature engagement. These perspectives could be further enriched by exploring SA people's experiences of NGS in other regions.

4.3. Strengths and limitations

This review systematically synthesised a range of studies adopting diverse methods, including samples of pregnant women, the elderly, children, and socioeconomically disadvantaged people, providing a holistic view of current research on South Asian people's access to NGS and PWB associations. Adhering to the PRISMA guidelines ensured a systematic and rigorous approach to our study, enhancing the reliability and validity of our findings. By including studies of diverse methodologies such as auditing, questionnaires, interviews, GPS monitoring and geographical data, we gained a multifaceted understanding of the importance of NGS for PWB. However, the review faced several limitations which reduce the extent to which findings can be generalised. Firstly, the diversity of outcomes, samples, and measurement tools used across studies complicated direct comparisons between findings. Reporting bias also posed a potential issue in the context of quantitative studies, as studies with positive outcomes are generally more likely to be published. Furthermore, while the rationale and focus of this research justified limiting the review to studies published in the UK, this constrains the applicability of our findings to other countries. Lastly, although the search strategy was carefully developed through meticulous trials and testing, it is important to acknowledge the limitations that may impact future studies on this topic. For example, some relevant databases like Medline and PsycINFO were not included in the search, and specific terms, such as "park*," were also excluded.

4.4. Conclusions

Overall, this review provides fresh insights into the multidimensional factors shaping access to NGS for SA people in the UK and the potential for these environments to promote PWB. The findings of the review on the positive associations between NGS engagement and psychological health are consistent with a larger body of research on the benefits of NGS for mental health, which emphasise the healing, community-building, and nostalgic benefits of immersion in nature (Keniger et al., 2013). Our findings suggest that adopting a holistic approach to addressing access inequalities and harnessing the mental health benefits of nature within public health policy and practice could contribute to addressing current health inequalities in the UK (Grant and Pollard, 2022).

The results of this review also highlight the need for strategies to increase SA's access to NGS so that they can benefit equitably from the PWB outcomes associated with these spaces. While developing interventions that promote engagement with NGS, the numerous cultural and societal factors that influence SA's access should be considered. For example, community-based activities and organised visits celebrating cultural diversity could foster engagement. Improving physical infrastructure, designing accessible paths, providing information on how to use these spaces, and cultivating a safe and inviting environment could further enhance access. Such actions could also enhance the inclusivity of NGS for many other underrepresented communities. This field of work could benefit from research that explores different types of NGS use and their impact on PWB. There is also a need for primary research on NGS access and PWB associations which focuses solely on SA communities in the UK.

Ethics approval

Ethical approval was not required for this study as it involved a systematic literature review of previously published research and did not involve the collection of primary data from human subjects. All data analysed were from publicly available sources, and no individual-level data were included.

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CRediT authorship contribution statement

Mohammed Hamza: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Rachael C. Edwards:** Writing – review & editing, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Jordan D. Beaumont:** Writing – review & editing, Validation, Methodology, Data curation, Conceptualization. **Laura De Pretto:** Writing – review & editing, Visualization, Validation, Supervision, Methodology, Conceptualization. **Alison Torn:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2024.117265.

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