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What are the psychological and cognitive wellbeing benefits as reported by people experiencing green space? A meta-ethnography☆

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ABSTRACT

Background: The world is increasingly subject to urbanisation. This has been associated with deleterious effects on mental health, as urban living can decrease access to green space. The benefits of green space for wellbeing have been investigated by a widely interdisciplinary field, however the majority of the evidence base is quantitative and does not offer exploration of individual experiences. This qualitative synthesis offers insight into the psychological and cognitive benefits reported by individuals experiencing green space.
Methods: Following a systematic electronic database and hand-search of qualitative and mixed-methods studies from 2009 to the present, a meta-ethnography was undertaken. The thematic findings of the studies were related and translated into each other to give new third order constructs. These were then juxtaposed, and thematic constructs grouped to form an explanatory theoretical model.
Results: 141 studies were screened at full text. 23 studies were included. 11 constructs were identified: Memory/connection, Freedom/escape, Peace/restoration, Symbolism/metaphor/perspective, Social, Not restorative, Agency, Sensory, Safety/protection, Emotion and Different way of thinking. A novel theoretical model was developed which proposes that the concepts "sense of self and others" together with "altered thinking" contribute to psychological wellbeing via the filter of "emotional processes".
Conclusions: A sense of self and others is an important part of the pathway for mental wellbeing in green space, demonstrating a need for individual and contextual factors to be included in future theory. Specific research and policy recommendations are discussed, especially in light of the green space inequality highlighted by the current COVID-19 pandemic.

Introduction

Background

The world is increasingly subject to urbanisation (Capaldi, 2015; Cox et al., 2017) with 55% of the global population residing in urban areas. This is projected to become 68% by 2050, with the figure already estimated as 78% in Europe (United Nations, 2018). This has been associated with deleterious effects on mental wellbeing, as urban living can decrease access to nature as well as increase exposure to potential hazards such as air and noise pollution (WHO, 2017). Access to green space (GS) has been advocated as an upstream intervention for non-communicable diseases and mental health World Health Organisation Regional Office for Europe (2016) and provision of GS cited within the United Nations (2016). sustainable development goal 11.

Understanding 'green space' (GS)

There is no current consensus regarding an ultimate definition of 'green space' partly as a result of the interdisciplinary nature of the field. In a recent literature review of definitions of GS, Taylor & Hochuli (2017) found two overarching interpretations, suggesting that GS can be understood as meaning nature in a general sense or to represent urban vegetation such as parks, gardens, yards, urban forests and urban farms. Urban green space (UGS) cited as relevant to overall wellbeing also

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includes informal GS such as green roofs or street trees (Hunter et al., 2019), cemeteries Quinton and Duinker (2019) and urban forests Van den Bosch and Ode Sang (2017).

A range of explanatory mechanisms for GS effects on psychological WB

The role of GS in psychological wellbeing (WB) has been increasingly examined and researched for the last four decades by a wealth of diverse disciplines (Seymour, 2016) with the current evidence base reflecting "the different worlds inhabited by the multitude of researchers" Phoenix et al. (2013)

There are multiple theories used to understand the effects of GS on psychological WB. A significant amount of GS-related research draws heavily from stress reduction theory (SRT) proposing that humans have an evolutionary positive cognitive reaction to natural surroundings and that this relegates negative thoughts, therefore causing relaxation and reducing physiological stress (Ulrich, 1983). A competing and equally prevalent theoretical framework is attention restoration theory (ART) in which the benefits of mental restoration are explained with reference to one being present in GS. The premise of the theory is that "being away" in natural settings allow attention to be focused without directed cognitive effort- termed "soft fascination". This in turn is thought to aid restoration by providing a break from the directed attention and mental fatigue that modern life demands (Kaplan, 1995). A third, commonly-cited theory is the evolutionary theory of biophilia, in which all humanity is thought to inherently connect to nature in order to thrive (Kellert & Wilson, 1993). More recently, the three circle model of emotion (Gilbert, 2005) has been adopted to explain the benefits of nature suggesting that exposure and connection to nature can affect emotion regulation and mood from a physiological stance (Richardson et al., 2016; Richardson, 2019).

Current collaborative work that seeks to integrate multiple theoretical elements across disciplines suggests three main mechanisms by which GS provides benefits: reducing harm (e.g. air pollution, noise, heat), restoring capacity (stress reduction, attention restoration) and building capacities (e.g. physical activity, social cohesion) (Hartig et al., 2014; Markevych et al., 2017). This is complimented by the theoretical work of Bratman et al. (2019) who suggest that the type of nature and the individual interaction with it contribute specifically to psychological wellbeing. The importance of a variety of nature elements e.g., biodiversity is developed by Marselle et al. (2020) who tie together and build on these previous theoretical frameworks and add a fourth pathway: causing harm (e.g., dangerous wildlife, disease).

The importance of the individual interacting with the landscape is key in Gibson's (1979) affordance theory which hails from the therapeutic landscape discipline. It suggests a pathway for a landscape and a persons' characteristics to provide boundaries within which an "affordance" for behavioural possibilities can exist. The individual is seen as relating to the landscape psychologically rather than the landscape having passive intrinsic value (Conradson, 2005; Bell et al., 2018a). Whether a landscape is experienced as therapeutic then, would depend on the feelings and perceptions of the person having the experience within the GS landscape (Gesler, 2005). This enhanced sense of self can be further explained through the work of Menatti & Casado da Rocha (2016). The authors suggest a theoretical framework of a "processual landscape" which is the product of co-creational interaction between the individual as a biological and cultural agent and the landscape affordances offered.

Within primary research, there are also further specific concepts that link with these theories; subjective wellbeing (SWB), nature connection and place connection. SWB is comprised of two related but differing philosophical concepts: hedonic wellbeing (HWB) and eudaimonic wellbeing (EWB). HWB is concerned with the pursuit of pleasure and avoidance of pain. EWB encompasses concepts such as fulfilment, purpose and self-actualisation rather than restoration of ill health (Ryan and Deci, 2001). Both types of wellbeing are therefore important to consider in order to move towards a more salutogenic rather than purely pathogenic approach to GS and health.

SWB has been linked with GS (Abraham et al., 2010; White et al., 2019; Kruize et al., 2020) although it is a generally difficult concept to operationalise. HWB is represented in the literature as positive affect, defined as the subjective level of pleasurable and positive mood experiences (Miller, 2011). Exposure to GS has been associated with positive affect and a small but consistent decrease in negative affect (McMahan and Estes, 2015). Intentional mindfulness in GS has shown a positive effect on psychological measures such as depression compared to non-natural settings and has also been shown to increase positive affect and connection to other people, nature and life (Passmore and Holder, 2017; Djernis et al., 2019). Positive emotional response has been linked with absorption in GS experiences, awe Ballew and Omoto (2018) and self-reported happiness Roberts et al. (2019); Seresinhe et al., 2019). GS exposure has also been associated with positive hedonic and self-transcendent emotions (Neill et al., 2019).

The EWB dimension of SWB is less well researched, however there is emerging evidence that high frequency of visits to GS has positive associations with life satisfaction and vitality and recent evidence has shown a significant improvement in SWB and life satisfaction (Van den Berg et al., 2016; White et al., 2017; Yuen and Jenkins, 2020).

Nature connection (NC) is an emerging area of research within GS and psychological WB (Natural England, 2016). The concept describes one's cognitive and affective connection to the natural environment and has been associated with higher levels of EWB which may moderate the effect of GS visits and perceived self-restoration (Berto et al., 2018; Martin et al., 2020; Pritchard et al., 2020). Recent research has also shown that increasing NC through an app-based intervention increased SWB (McEwan et al., 2019) and that happiness, and therefore HWB, have been linked with NC (Capaldi et al., 2015). GS has also been cited as a physical and mental "secure base" to find new perspectives and connections, to connect with what is valued; to see and feel differently and to have value as a symbolic filter (Blaschke, 2017). These psychological and emotional links between people and place is a broad area of research examining individuals "place connection" (PC) regarding specific locations and how this affects WB (Cleary et al., 2017). PC is the least examined area in the GS WB literature although it has been linked with increased restoration in GS over urban spaces and with stress reduction (Ward Thompson et al. 2016; Menatti et al., 2019).

Rationale for the review

GS research regarding health and psychological WB has rapidly proliferated in the last decade. Input from environmental sciences, landscape and urban planning, public health and psychology as well as other disciplines makes this a complex and interdisciplinary field with differing research priorities. Although there seems to be a link between GS and psychological WB benefits, the majority of the evidence base hails from the positivist paradigm and is focused on the "materialities" of the settings rather than individual agency (Public Health England, 2014; Seymour, 2016; Bell et al., 2018a).

Within the GS literature it is becoming more apparent that the parameters of affordances differ between individuals as "Nature means different things to different people in different places and times" Morton et al. (2017) and that it is key to ensure that research captures contextual variation (Lennon et al., 2017; Menatti et al., 2019). It's important to acknowledge that although GS often provokes a common-sense reaction that it is intrinsically positive (Pinder et al., 2009), it is not a panacea nor is it experienced as positive for all members of society (Bell et al., 2018a).

Interestingly, other than Abraham et al. (2010) outdated scoping review and Blaschke's (2017) earlier meta-synthesis on the role of nature in cancer patients' lives, there are no attempts to qualitatively synthesise the effects of GS on psychological wellbeing.

Qualitative meta-synthesis will not only help further elucidate

theoretical mechanisms, but importantly develop a "more nuanced understanding of the ways in which nature does and doesn't impact psychological WB" (McMahan, 2018 p.29). Additionally, an increased qualitative understanding of the intangible and individual aspects of GS may increase resonation for the topic with policy makers (Bell et al., 2018a).

Objective

To explore the subjective experience of how being in or viewing green space is interpreted as beneficial for psychological WB.

Research questions

1 What are the psychological and cognitive effects of being in, imagining or viewing GS that people experience as beneficial for their psychological WB?
2 Do these experiences differ between GS types or populations?
3 How does nature/place connection form part of the experienced benefit?

Methods

This review follows Noblit & Hare's seven stages of meta-ethnographic synthesis and analysis Noblit and Hare (1988). The structure of this report complies with the Meta-Ethnography Reporting Guidelines (eMERGe) (France et al., 2019b) (see supplementary Appendix 1).

Phase 1: Selecting meta-ethnography

Meta-ethnography is a form of qualitative synthesis that aims to offer new insights or theoretical concepts that transcend the singular study findings (France et al., 2019a). Meta-ethnography was chosen as the most suitable method due to its more interpretivist approach that allows findings to arise from the data rather than fitting a pre-conceived coding frame that may reflect the preconceptions of the researchers, rather than the true experiences of the participants (Braun and Clarke, 2006). Table 1.

Phase 2: Deciding what is relevant

Rationale for search strategy

The SPIDER tool (Cooke et al., 2012) was chosen over the commonly used PICOS as SPIDER is more aligned with qualitative methodology as it examines research type and methods rather than comparison groups. It also has higher specificity (Methley et al., 2014).

Search details

We used STARLITE reporting (Booth, 2006) to outline the search processes for the review as it is more sensitive for a qualitative focus, as opposed to the commonly used quantitatively orientated PRISMA (Moher et al., 2009). Search terms are presented in Appendix 2.

Systematic database searches were initially undertaken on 8/8/2020 and rerun between 10/8/2020 and 14/8/2020. Search results were uploaded to Mendeley Desktop bibliographic software (Mendeley, 2022) where duplicates were removed. Unique citations were screened against our inclusion and exclusion criteria (see Table 2). Screening was carried out by the corresponding author alone with discussion around inclusion against the protocol provided by the co-author.

Phase 3: Reading the studies

Data were extracted between 23/08/2020 and 08/09/2020 using a standardised form designed by the first author that amalgamated the JBQARI Qualitative data extraction tool and the requirements of the eMERGe guidance (available on request). This included contextual data, methodology, methods, data collection & analysis (see Table 3).

Each study was coded inductively using codes derived from the authors' words, to stay true to study meanings (Braun and Clarke, 2014), using NVivo 11 QSR International Pty Ltd (2020). If codes used by authors were identical then the same code was used. Second order constructs (study author interpretation) presented with the first order constructs (participants quotes) were used as the raw data as the meaning may be misinterpreted if new analysis is applied to first order outside of the context of the original study setting (Toye et al., 2014).

Codes were then analysed in an iterative process using thematic analysis whereby groups of codes were organised together into a theme that represented similar and conceptually-related data (Braun and Clarke, 2014). Changes made and reasons were noted in a log for transparency as well as a reflective journal to increase trustworthiness (available from author on request). Accuracy of data extraction of study details and coding was spot checked on 6 studies by the co-author and no

Table 1
SPIDER search strategy.

Sample	Adults of western culture as concepts of nature depend upon contextual social and cultural constructs, for example differences between European and Asian countries (Jordan and Hinds, 2016).
Phenomenon of Interest	Mental WB benefits experienced in GS
Design	Interview, focus group, case study, ethnography
Evaluation	Experiences, beliefs, understandings, reflections
Research Type	Qualitative with a text output-either stand alone or mixed-methods if the aim was not solely to explore trial results but to explore experience in an interpretative manner

Table 2
STARLITE search details.

Sampling strategy: Selective as limits applied rather than comprehensive
Type of study: Qualitative Interview, focus group, phenomenological case study, ethnographies
Approaches: Database search, electronic hand search undertake of the most prolific journals identified in the scoping review that published qualitative work: Health and Place, Social Science and Medicine, Landscape and Urban Planning and International Journal of Environmental research and Public Health. Snowballing of scoping review studies and included studies. grey literature was not searched.
Range of years: 2009–2020 Studies from 2009 onwards will be included as this was the date of the last known similar review.
Limits: Adults over age of 18, English language.
Inclusion and exclusions:
Inclusion: Studies examining GS including urban parks, forests, green nature reserves, gardens, views of GSs, studies examining green/blue spaces or "nature" if the data relating to green elements is explicitly separate from blue, studies examining perceived benefits of GS on psychological WB. Qualitative studies including interviews and focus groups or elicited diary responses. Case studies and ethnographies that include direct participant data. Mixed methods studies if the qualitative element meets the above criteria and is not solely to explain a trial outcome.
Exclusion: Under 18, not in English language, physical activity, group or conservation activities, wilderness expeditions or adventure therapy as these are not accessible for the majority of urban dwellers or focusing on physical activity or group activity e.g. therapy/conservation/gardening as these have separate group and activity benefits. Qualitative data that does not come from participants e.g. observation. Studies examining solely blue space. Studies examining specific cohorts with unique niches. Papers not culturally applicable to UK.
Terms used: Search terms were developed by reference to research question elements of 1) GS 2) psychological effects and c) qualitative methodologies. Existing GS reviews were used for comparison. The search was piloted and reviewed to check expected relevant studies identified in the scoping review were identified (Bramer et al., 2018).
Search terms are reported in supplementary appendix 1.
Electronic sources: The databases were chosen by comparison with other GS reviews and studies of similar topics. Five electronic database were searched: Medline, Embase, Allied and Complementary Medicine Database (AMED), Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO.

Table 3
Study characteristics.

	Author/s	Methodology & method	Phenomenon of interest	Setting	Participants	Codes generated	CASP
1	Bell et al. (2017)	Mixed-method with qualitative interpretive element Geonarrative interviews Go-along interviews	Temporal qualities of people's routine green and blue space-based therapeutic geographies	Southwest UK	33 adults from 2 coastal towns in Cornwall, between 25 and 85 years old (with a median age of between forty-six and fifty-five); twenty women and thirteen men; in full- time or part-time employment or retired; with or with- out children; and included households with an annual income of less than £20,000 to over £70,000 per year	Childhood association Freedom Adaptive agency Temporal agency Restorative time Temporal perspective Past place experiences Nature engagement formed as adult	6
2	Bell et al. (2018b)	Mixed-method with qualitative interpretive element Geonarrative interviews Go-along interviews	The role of wildlife encounters in shaping the well-being potential of people's routine green/blue space interactions, particularly amongst non-specialists	Southwest UK	33 adults from 2 coastal towns in Cornwall, between 25 and 85 years old (with a median age of between forty-six and fifty-five); twenty women and thirteen men; in full- time or part-time employment or retired; with or with- out children; and included households with an annual income of less than £20,000 to over £70,000 per year	Wildlife Valued impromptu social interactions Wildlife immersion/ switching off Temporal agency Wildlife symbolism/ perspective Childhood association	6
3	Bergeron et al. (2014)	Qualitative Go along interviews of the urban and natural environments of the town The project was part of a broader research program that fosters dialogue between various stakeholders around the future of landscapes of the cities of Greater Montreal	What meanings do residents of Saint-Bruno hold for their landscapes and how do they make sense of local landscape transformations and dynamics? How can we reveal these meanings without divorcing them from their everyday living environment?	Montreal, Canada	10 residents of Saint-Bruno-de-Montarville Varying from age bracket 20–29 to 60–69 4 retired, 2 unemployed, 4 working	Peace relaxation Social contacts Too many people to escape urban not restorative	6
4	Bingley (2013)	Qualitative Secondary narrative analysis of oral history interviews and newsletters written by local people historically and currently engaged in coppicing and woodland work	To explore whether forest work is in fact a healthy lifestyle simply because workers are in a landscape deemed, from a public health perspective, to be 'therapeutic'.	UK	23 oral histories of forest and woodland work spanning nearly 60 years from post WW2 to the present day Unreported number of sample of writings about working in the woods published in newsletters over the last five years	Not restorative Woodland work restorative	3
5	Birch et al. (2020)	Qualitative strand of larger multi- disciplinary mixed-methods study: 'Improving Wellbeing through Urban Nature' (IWUN). Semi-structured interviews (n = 20) Narratively decoded photos, drawings and other visual data produced of arts workshops (n = 4) examining memories of nature; relationality of nature experiences; the value of nature at different points of mental health difficulty; nature inside and outside; material, social, cultural and symbolic aspects of nature	Subjective youth experiences of mental wellbeing in relation to encounters with the urban natural environment	Sheffield, UK	24 participants aged 17–27 In total, 9 out of 24 participants had mental health difficulties 15 of the 24 participants lived in an area of urban deprivation. Participants included 12 White British people and 12 with a Black, Asian and Minority Ethnic (BAME2) background: 4 of whom were first generation migrants 1 Romanian and 3 asylum seekers from Kurdistan, Iran and Sudan. Other BAME participants born in Britain variously had Pakistani and Persian heritage. 14 participants were female; 10 male	Symbolism-it's all connected Sense of self /perspective Escape Freedom from judgement Too many people not restorative Support from peace and detachment Childhood association Not restorative Not restorative judgement from others	6
6	Dinnie et al. (2013)	Qualitative Semi-structured face-to-face interview, a go-along (or walking) interview in the park/greenspace, video filming of the greenspace by participants and/or	The socio-cultural meanings through which greenspaces are perceived, experienced, understood and contested.	Dundee, UK	10 local people specifically not recruited from health groups such as cycling or walking All participants were white (the most recent data from the 2001 census shows that more than 96% of Dundee's	Social contact Escape from others/ peace and quiet Place connection/ Extension of self and values	4

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Table 3 (*continued*)

	Author/s	Methodology & method	Phenomenon of interest	Setting	Participants	Codes generated	CASP
		researchers, and a video review with participants			population is white), ages ranged from 19 to 65, six were female and four male		
7	Henderson-Wilson et al. (2017)	Mixed-methods Semi-structured interview following survey	The "benefits" parks may/ may not provide participants	Melbourne, Australia	17 park users across 3 different parks who agreed to interview following survey The findings indicate that the majority of participants were female, aged 35–64 years, working full-time, with a weekly income of more than $1000 (AUD). They also tended to have children, own a dog, and have "very good" health.	Peace/relaxation Stress reducing Sense of self/new perspective Being present to stop worrying about pressures Spirituality	5
8	Lengen (2015)	Qualitative Phenomenological Participants asked "what is your place" and asked to paint it, followed by semi-structured interview using psychoanalytical approach	To better understand how individuals relate to specific places, and in particular how visually triggered perception, emotion and mentalising impact on sense of place and place identity	Zurich, Switzerland	Twenty adult clients suffering from a range of mood disorders (7 men and 13 women) aged 23–59 The clients originated from three continents: Europe (Switzerland, Germany, Denmark, Belgium), Africa (Morocco) and North America (USA)	Not restorative Symbolism nature reflecting human life	5
9	Loder (2014)	Qualitative Phenomenological Semi-structured interviews	How office workers think and feel about real green roofs from their daily- lived experience Lived experiences of nature, nature in the city, green roofs, and their health and well-being.	Toronto, Canada Chicago, USA	55 office workers of which 26 Toronto & 29 Chicago predominantly white and middle to upper income	Stress reducing Breaking monotony/ intrigue Escape Childhood association Perspective/clear head	8
10	McEwan et al. (2020)	Mixed methods as part of larger IWUN project (Improve Well-being through Urban Nature) Qualitative element is app based text responses to noticing good things about green spaces	Elucidate the mechanisms between nature connectedness and wellbeing in an urban environment.	Sheffied, UK	228 adults 130 participants were female and 98 male, with 47 participants identifying as Black, Asian and Minority Ethnic (BAME) with a mean age of 29.19 years (SD=10.81).	Gratitude trees passing seasons Sensory Reflection/symbolism Change of seasons Perspective clear head Awe/emotion Peace/relaxation Stress reducing View inspiration	6
11	Nordh et al. (2017)	Qualitative explorative approach Semi-structured interviews	To explore whether descriptions of restorative components spontaneously emerged in interviews about visitors' use and experiences of a cemetery in Oslo.	Oslo, Norway	Fifty-nine adult visitors to the cemetery took part 48% of them men	Source of fascination Place to withdraw Relax/reflect Cemetery vs park	7
12	O' Brien et al. (2014)	Qualitative Focus Groups after a woodland walk and photo elicitation	The benefits people perceive as influencing their health and well-being in peri-urban woodland	Peri-urban woodland, England	49 participants 1 x green gym group, 1 x Nordic walking group, 1 x wood volunteer group, 1 x deaf group, 2 x mixed groups in response to an advert Demographic data from a short questionnaire showed that out of a total of forty nine people involved in the study, 35% ($n = 17$) were men and 63% ($n = 31$) were women. Just over half (54%, $n = 25$) were in the 45–64 age range. Most were working or retired. All classed their ethnicity as White'. Eight (16%) people stated they were registered as disabled,	Be alone Perceived challenge Sense of self Trees and reflection safety, security and protection. Wilderness and freedom Trees symbolic adapt, regenrate, survive Peace/calm/ restoration Reinforcing nature connection Childhood association Vicarious connection to others or enjoyment Escape especially view	7

(*continued on next page*)

Table 3 (*continued*)

	Author/s	Methodology & method	Phenomenon of interest	Setting	Participants	Codes generated	CASP
					and two of these were from the deaf group. Seven people (14%) stated that their daily activities were limited significantly by a health problem or disability. Thirteen (26%) said their activities were limited a little by a health problem or disability.	Feel part of society	
13	Petersen (2013)	Qualitative, ? part of a larger mixed methods but not clear Semi-structured interviews	How green areas are integrated in everyday practices and life courses of urban dwellers and how people interact with the materiality of urban greenspace.	Denmark	28 or 50: not clear "28 interviews with about 50 people"	Breathing space Stress reduction Connection to trees	5
14	Pinder et al. (2009)	Mixed-methods Mainly observation but some interviews-data used linked to interviews only	To explore how use of Thames Chase Community Forest might impact on how people conceptualise relationships between health, wellbeing and the environment.	UK	Adult users of the community Forest and professionals working in the forest Number not reported	Extension of self and values Sensory	3
15	Plane and Klodawsky (2013)	Qualitative Feminist methodological framework Photovoice, interviews, observation	The links between access to nearby urban green space, health, and having a sense of belonging to the broader community Experiences of the park as not only a therapeutic or health-promoting place, but also an un-therapeutic or health-denying place.	Ottawa, Canada	Nine formerly homeless women who live in a supportive housing development	Normal social interactions Social cohesion Untherapeutic	6
16	Renee-Hordyk et al. (2015)	Hermeneutic phenomenological approach Drawing and story-telling, family interviews	Examining whether migrant families experience contact with urban green spaces as promoting their own health and well-being	Montreal, Canada	Seven immigrant families consisting of 13 children (ages 7–13), and 10 adults Participating families came from the Caribbean, Central Asia, Western Europe, Central America, South America, North Africa, and West Africa	Coping with inadequate housing Social contact Maintaining social ties with home countries "Far from noise, far from problems, far from work Stress reducing Perspective/ metaphor Childhood association	4
17	Richardson and Hallam (2013)	Qualitative Auto-ethnography Retrospective analysis of subjective diary account of 1 year engaging with semi-rural agricultural landscape	Positive effects of nature and nature connectedness	Staffordshire, UK	1 male 42 years old cognitive ergonomist at University of Derby at time of writing	Journey to Nature connection Sensory and immersive Environment as energy source Nature connection as emotional connection Beauty and being present	6
18	Sefcik et al. (2019)	Qualitative Focus groups	Attitudes towards nature and use of green space in urban areas	Philadelphia, USA	42 adults from four low resource neighbourhoods Three of the neighborhoods were predominantly comprised of Black/African American residents, and one predominately comprised of Asian and White residents. Twenty-five to 44% of residents in these neighborhoods lived in single-parent households with a median household income between US $20,840 and $42,903.	Escape Peace relaxation Place to withdraw	6

(*continued on next page*)

Table 3 (*continued*)

	Author/s	Methodology & method	Phenomenon of interest	Setting	Participants	Codes generated	CASP
19	Shaw et al. (2015)	Qualitative Semi-structured interviews	Exploring nature experiences of people with visual impairments	UK	4 males and 2 females with visual impairments 37 to 58 years	Revitalised refreshed Positive emotions Escape Time to stop and think Peace relaxation Less effort to be in nature Mind can wander Not restorative Sound or silence Smell as positive emotion	5
20	Skår (2010)	Qualitative Phenomenology Part of a larger qualitative study Walking interviews and interviews	Identify and explore the characteristics of nature experiences as dynamic, variable and situational, and to examine them, at the same time, as existential elements within human–nature relationships	Norway	20 residents local to the forest between 18 and 72 yrs old, equal male and female	Being far away Safe place Not restorative	5
21	Stigsdotter et al. (2017)	Mixed-methods Qualitative element interpretative phenomenology Guided walk around health forest followed by a "walk and talk" interview conducted in each of the eight "rooms"	How do the participants rank and experience the eight different rooms in the Health Forest Octovia with regards to promoting psychological restoration? Which nature qualities and spatial aspects in the Health Forest promote psychological restoration?	Denmark	26 female university students taking part in the overall study "Health Forest project"	Memories of nature Woodland restoration private den Woodland restoration Safety with a view	6
22	Thomas (2015)	Qualitative Interviews Focus groups	To understand the ways that women from different socio-demographic backgrounds interact with and give meaning to diverse natural spaces in terms of their physical health and psycho-logical wellbeing, and to develop understanding of the socio-cultural issues that impacted upon women's use or non-use of such spaces	Copenhagen, Denmark	Women aged 18–60 from two areas of the city with mixed socio- demographic characteristics 25 plus non reported number of participants from focus groups	Seeking restoration Change of seasons Back at the desk within an hour Space from others See the wider picture Symbolic safety comfort continuity Childhood association View of home positive emotions Not restorative	6
23	Weimann et al. (2019)	Qualitative Semi-structured interviews	Increase the understanding of different pathways between green environments, well-being and health by exploring perceptions and experiences amongst adults residing in a semi-urban to urban area.	Scania region, southern Sweden	16 adult residents of the area aged 26–70 (mean age 50 years) 50:50 split male/ female	Sensory Sound or silence Change of season Freedom from demands Social coherence Interconnectedness with nature	6

disagreement was identified.

Critical appraisal

Notwithstanding the contentious nature of quality appraisal within qualitative reviews (Thorne, 2017), we decided to use a common checklist with the ultimate aim of increasing trustworthiness (Hannes, 2011). Quality was assessed using the CASP (Critical Appraisal Skills Programme, 2018) qualitative critical appraisal tool. The tool provides 10 questions regarding methodological quality and transferability. A basic scoring system was applied to allow comparison between studies, based on the number of positive responses. The quality score of papers was not used to exclude studies or to build a hierarchical result but rather for transparency and trustworthiness. The CASP scores are shown in Table 3.

Phase 4: Determining how the studies are related

Phase 4 entailed making a judgement based on the studies and themes that had been developed if the studies reciprocated or refuted one another's findings, in order to decide how to proceed with phase 5.

The synthesis stages are notoriously poorly defined in practical detail (France et al., 2019a). Multiple examples and discourses were studied and contrasted to better understand existing methods utilised (Britten et al., 2002; Atkins et al., 2008; Malpass et al., 2009; Malterud and Ulriksen (2011); Toye et al., 2014; Lee et al., 2015; Blaschke et al., 2017). The examples of 3 studies were followed to guide phase 5 methods (Toye et al., 2014; Flemming et al. (2019); Malterud (2019)

Phase 5 translating studies

The unique element of the meta-ethnography is the "translation" of the studies into one another in which the studies are compared and

contrasted with one another. As suggested by France et al. (2016), due to the large number of studies, the studies were translated by theme as opposed to in sequence. For each of the themes, second order constructs from the various studies within the theme illustrated with first order data to maintain "groundedness" in the original data were tabulated into grids using Microsoft Word with horizontal rows. These rows were then read and analysed together to form a third order construct that aimed to synthesise similarities whilst also capturing the essence and individual detail. To aid this retention of individual findings, second order constructs were placed on different rows if there was a recurrent subtheme to allow multiple third order constructs for each theme if needed. An example for one theme can be seen in Appendix 3. Full tables for all themes with first, second and third order data are available upon request from the author.

Phase 6: Synthesising translations

This process entails constructing an argument or "overarching explanation" that explains the third order findings and can be used to develop a theoretical model (Noblit & Hare, 1989; France et al., 2019a). A third-order construct is the reviewer's interpretation of second-order concepts. One commonly reported method is to create a visual representation to allow analysis (France et al., 2019a). Third order constructs were visually laid out within their themes as a mind map on paper and conceptual links marked between them in an iterative process to identify reciprocal and refutational relationships (France et al., 2019a).

Phase 7: Expressing the synthesis

A conceptual model was developed to represent the synthesis of the third order synthesis within phase 6 (Fig. 2).

Positionality

The lead author is a physiotherapy lecturer and outdoor educator. The second author is a counselling psychologist, with a particular interest in children and young people's psychological WB.

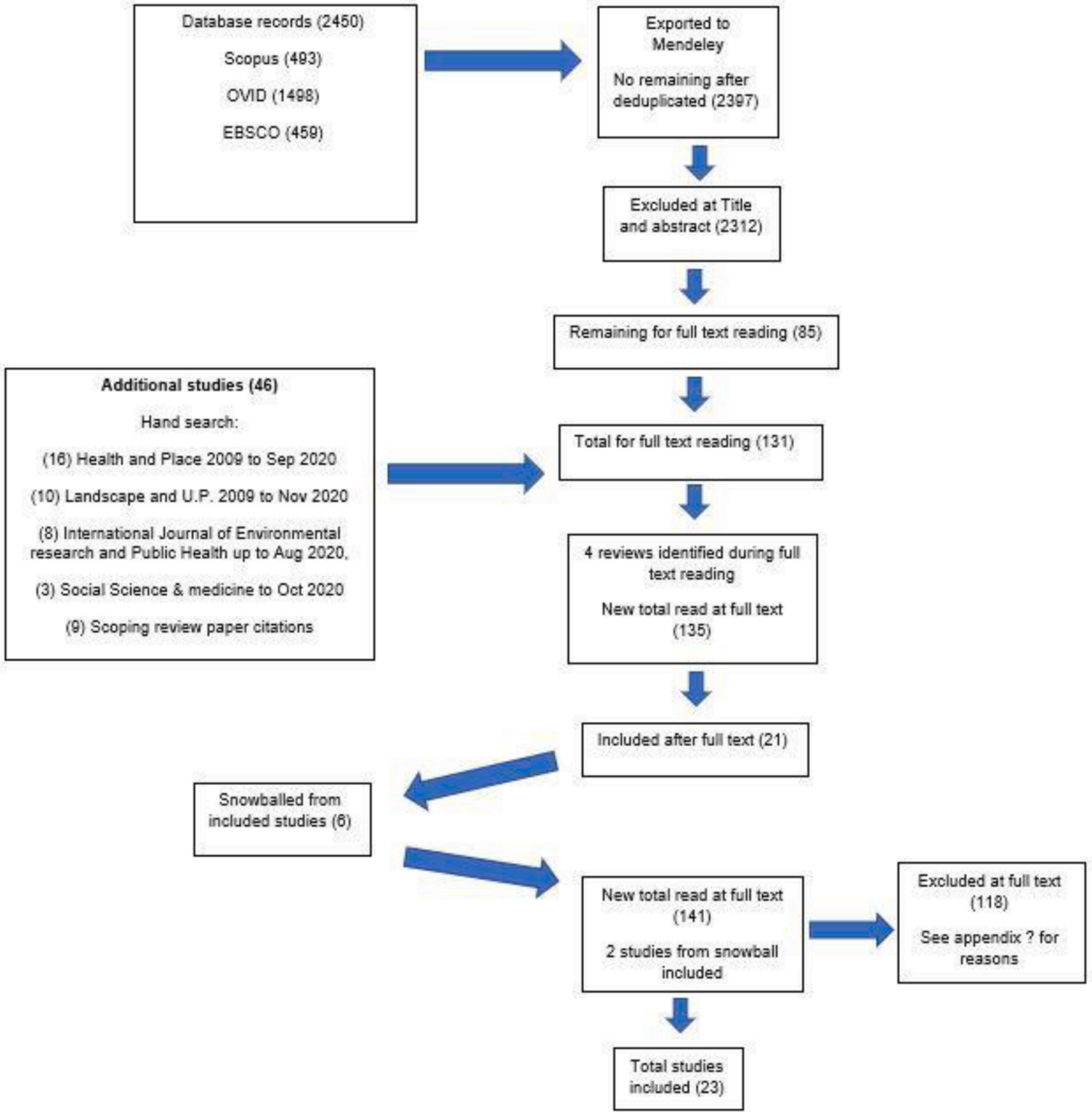

Fig. 1. Search results flow diagram.

Ethics

Ethical approval was obtained from the University of Bristol as part of a supervisory process.

Results

Outcome of study selection

Electronic searching resulted in 2450 records, with 2397 remaining after de-duplication. Screening of titles and abstracts resulted in 85 studies to be read at full text. A further 46 studies were identified through the hand search and scoping review, these were added to full text screening making a total of 131. During full text reading, 4 further studies were identified and read at full text. 21 studies met inclusion criteria and from snowballing of their reference lists 6 further studies were read at full text, 2 of which were included, making a total of 23 studies. Fig. 1 shows the screening process with reference to the individual journals and databases. Full details of excluded studies are available upon request.

Characteristics of studies

The 23 studies report on 683 participants and ranged from 2009 to 2020. Ten studies were from the UK, four from Canada, three from Denmark, two from Norway and one each from the USA, Australia, Switzerland and Sweden (see Table 3).

The GS settings varied with the majority being reported as UGS (10), woodland (5), and parks (3). One study was set in UK semi-rural GS, one in an urban Cemetery and one exploring urban green rooves. Two studies were more conceptual and used an individual's therapeutic personal spaces as part of a psycho-analytical approach and lastly individual remembered experience of GS.

Although there were variations in context, methods and primary aims of studies, findings were judged not so disparate that they should not be grouped together for reciprocal translation in thematic groups.

Initial thematic analysis

11 themes were identified from thematic analysis. The final thematic groups are seen below in Table 4 along with the number of studies that contributed to each theme. This information was not used to order studies hierarchically and is presented solely for discussion and transparency. Third order constructs produced for each theme can be found in Appendix 3.

Peace/restoration

The peace and restoration theme shows that GS allows people to slow down and be present in the moment which gives a sense of peace, calm and relaxation. This construct was present across various settings such as parks, urban forests and cemeteries. For some of the young people from minority backgrounds, this peace gave a feeling of emotional support that was missing. Cemeteries provided unique restorative qualities, both to withdraw and relax in solitude and to experience sensory stimulation.

Table 4
Final thematic groups.

Theme	No. of studies	Studies of origin (see table 3)
Peace/restoration	14	1, 2, 3, 4, 5, 6,7,9,10,11,12,18,19,22
Symbolism/metaphor/ perspective	12	1,2,5,7,8,9,10,12,16,17,22,23
Freedom/escape	12	1,5,6,9,11,12,13,16,18,20,22,23
Memory/connection	10	1,2,5,6,9,12,14,16,17,21
Emotion	8	7,9,10, 13,16,17, 19,22
Social	7	2,3,6,12,15,16,23
Not restorative	7	4,5,8,15,19,20,22
Sensory	6	10,14,17,19,22,23
Different way of thinking	5	9,11,12,17,19
Safety/protection	4	12,20,21,22
Agency	4	1,2,16,22

Symbolism/metaphor/perspective

GS helps people put things in perspective, including offering respite from a faster paced daily life. The natural elements such as the seasonal cycle, wildlife, plants and trees allow symbolic reflection on our lives that can help rationalise problems and provide emotional support in times of challenge or for everyday perspective. For example, reflection on the lifespan of trees in relation to human lifespans giving a sense of comfort and a metaphor for survival. The physical settings of GS such as trees provided a sense of wilderness and freedom or symbolic safety and protection.

Some availability of perceived challenge for people of all abilities in the green landscape was noted as important to provide a sense of wildness and subsequent symbolic feeling of contrast to everyday experiences. This symbolic reflection engendered by the natural elements in GS appears to give individuals a sense of "being part of something bigger", linking with connection. This connection to "something bigger" allowed a sense of perspective of the self and was found in this synthesis to give feelings of energy and strength if an individual feels connected to nature.

Freedom/escape

The idea of having time to oneself to think differently provided a feeling of mental freedom from daily demands and judgement of others. For some, solitude was important and for others it is the contrast with daily urban preoccupations that is essential and this can be achieved alone or with others. Views are important to provide a sense of escape and even a view of far-off GS such as a green roof can provide momentary cognitive escape from daily demands. Urban participants used their local park as an escape from poor housing conditions and parks provided space "to be yourself" when in shared housing.

Memory/connection

Memory/connection represents a connection to an individuals' own memories, to nature, to specific places and to others. Positive experiences of nature as a child in the studies allowed positive emotions to be re-lived when in GS as can adult memories. People used GS such as specific viewpoints over a city or particular parks to create an extension of self and foster self-identity in relation to that place e.g. place connection. Lastly, GS allowed symbolic social reflection on the universality of nature and so increased connection to family and friends in other countries for those that are separated from loved ones, in this case for the immigrant population.

Social

Seeing others use and enjoy the space created vicarious positive feelings and the presence of wildlife provided valued chances for social interaction between all ages. Two unique constructs emerged showing that GS provides opportunities to feel part of society and develop friendships via providing a physical space and to take part in "normal" social interactions which was especially important for EWB for immigrant families and a minority group of formerly homeless women.

Not restorative

GS can be viewed as a space in which strangers have opportunity to negatively affect others such as expressing racialised judgement. Young people felt that being in GS is not a panacea for those experiencing severe mental health difficulties and GS that was perceived as in poor condition had a negative psychological effect. Parks were sometimes avoided by women due to judgement around body size and shape. Although generally reported as restorative, woodlands and parks are also equally capable of inspiring negative emotional reactions

depending on the context. For example, perceptions change in different conditions e.g., darkness in forests or the behaviour of other park users after dark can cause fear and the space is no longer viewed as restorative.

Emotion

The 'Emotion' construct showed that GS allows individuals an opportunity to feel awe and positive emotions from aesthetic experiences of natural beauty. This gives a chance to notice nature and if natural elements are interpreted symbolically by the individual, they can use this for emotional regulation. Within the synthesis, t pleasant views and aesthetically pleasing diversity inspiring positive emotion, whereas "ugly" views inspire negative emotions.

Sensory dimension

The sensory element of GS allows the mind to be stimulated in a different way, allowing creative thinking such as symbolic reflection. GS provided a reduction in background noise that gives a sense of relief and an ability to experience nature and wildlife more fully through the senses. This in turn gave rise to positive affect, as does association with smell and sounds which can elicit a positive psychological response without visual input.

Different way of thinking

The mindful attention to natural stimuli was found to break up cognitive monotony for example colours, curiosity towards unknown trees and wildlife. This attentiveness in turn provided clarity of thought by blocking intrusive mundane worries and gave a feeling of "time to think", "breathing space" and allowing the "mind to wander" which induced imaginative thoughts and problem solving.

Safety/protection

The physical structure of woodland and trees provided a symbolic feeling of safety and protection and this positive affect is enhanced if enclosed spaces are juxtaposed with open views.

Agency

One way in which individuals enacted their individual agency was seen as a compensatory mechanism where urban GS provides a "fix of greenery" for individuals who value larger GS as important for their WB. UGS also provided an emotional coping mechanism for those with less space or no garden at home.

Synthesis of findings

The line of argument analysis identified three overlapping but distinct concepts that encapsulated the relationships between the themes and their third order constructs; "sense of self and others", "altered thinking" and "emotional processing" (Fig. 2).

The conceptual "Emotion filter" model proposes that by filtering awareness of "sense of self and others" and "altered thinking" through their own emotional processes, the individual can derive benefits from GS for both HWB and EWB.

The concepts of HWB and EWB were utilised to account for eudaimonic ideas such as fulfilment within connection as well as hedonic concepts e.g. peace. Agency was not directly reciprocated within any of the other thematic groupings. It is conceptualised as a contributing factor in EWB, due to facilitating individual ability to achieve eudaimonic goals such as the ability to problem solve life's challenges or feel meaningfully connected with others. This process can bring about increase or decrease in psychological WB depending on the negative or positive individual experience in GS .

Discussion

The meta-ethnographic approach of this synthesis resulted in an "emotion filter" theoretical model that offers an explanation of how people experiencing GS gain benefits for their psychological WB. The model is an approximation based on the data within the synthesis and although it overlaps with the theories discussed in Section 1.3, it is not entirely encompassed within one existing explanation. We will now consider to what extent our model complements and extends knowledge in this research area.

Sense of self and others

Within the "emotion filter" model, sense of self represents the themes memory/connection, freedom/escape, social and emotion. These concepts can be seen to complement the affordance-based research that emphasises the individual interaction with the GS landscape (Gibson, 1979; Gesler, 2005; Menatti and Casado da Rocha, 2016; Bratman et al., 2019; Richardson, 2019). This aspect of the model also adds the importance of a sense of self to allow connection to nature and to others as well as escape from others to be viewed as emotionally relevant to psychological WB. The connection constructs within sense of self also complement the literature regarding NC through the lens of relatedness (Cleary et al., 2017). Relatedness assumes that there is an inherent human need to relate and connect to others and the surrounding world.

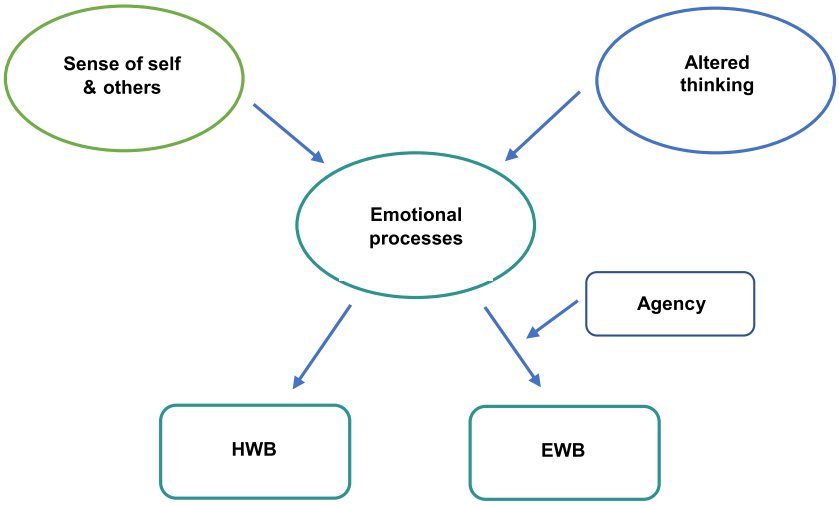

Fig. 2. Emotion filter model.

Cleary et al. (2017) suggest that NC fulfils the psychological need for relatedness, therefore increasing psychological WB. The authors also propose that NC increases EWB though increasing internal aspirations.

Lastly, PC has been described as allowing individuals to "position the psychological self" via ties with specific places and that this place identity can mediate the relationship between nature and WB (Knez et al., 2018). This attachment to place has been shown to increase a sense of belonging and self-esteem Scannell and Gifford (2017). Within the model, PC is seen within sense of self and others and although it was represented in a minority of the data, complements these understandings and also highlights a possible connection between PC and the need for freedom and escape that is satisfied by particular places or views. The model accords with Markevych et al. (2017) and Marselle et al. (2020) regarding social connection benefits, especially the latter regarding the category of causing harm as this mirrors our findings concerning the non-restorative elements. Social connection in our model can also be further understood within the theoretical framework offered by Jennings & Bamkole (2019) examining social interaction in GS, whereby access to GS can increase social cohesion and increase empowerment, belonging, social support and place attachment which subsequently can change behavioural responses and psychological health.

Altered thinking

This concept links the themes of different way of thinking, symbolism/metaphor, freedom/escape, sensory and peace/restoration. Within this concept, there are direct parallels with Stress Reduction (Ulrich, 1983), Attention Restoration (Kaplan, 1995) and Biophilia theories (Kellert & Wilson, 1993). Although these are the primarily researched theories, they do not wholly explain the GS effects from a salutogenic stance, as they refer to pathogenic mechanisms e.g. recovery from stress or restoration from mental fatigue. The concepts of peace and restoration and sensory are also encompassed within the recent framework offered by Marselle et al. (2020) as relating to restoring capacity and biodiversity. The concept of symbolism and metaphor as identified in our model has not yet been explicitly incorporated into a theoretical pathway although our proposition that the benefit of this is gained through emotional filtering does accord with the nature-based three circle model (Richardson et al., 2016; Richardson, 2019).

Emotional processes

The central filter of "emotional processes" encompasses the themes of emotion, symbolism (including security and protection), peace and sensory. This includes positive emotional effects from NC and connection to previous emotional experiences, as well as reduced stress by providing a sense of emotional peace, calm and relaxation. The placement of emotional processes as the central element for psychological WB in GS mirrors the theoretical understandings offered by the recent adoption of the three-circle model for nature-based benefits (Richardson et al., 2016; Richardson, 2019). The model proposes two types of positive affect: drive and contentment, additional to the concept of threat. It is linked with physiological and emotional response, with drive being regulated by the activating sympathetic nervous system and contentment by the calming parasympathetic. Threat is understood as a rapid activation of the sympathetic nervous system in response to anxiety. It could be argued that "sense of self" and "altered thinking" are encompassed within the constructs of drive and contentment however our model offers an additional concept regarding position to the outside world as seen in "sense of self and others". Their model is synergistic and may also explain the phenomenon of feeling relaxed from stimulation and individual variances in threat responses, e.g. the non-restorative elements in this synthesis.

The role of agency

Agency enables individuals to make purposeful choices that can increase EWB by increasing satisfaction and fulfilment (Welzel and Inglehart, 2010). In our model, agency is related to EWB in GS by facilitating individual ability to achieve eudaimonic goals. For example, local UGS provided an important "fix of greenery" for those who valued more wild GS as important for their mental WB, allowing them to fit this need around temporal demands from other life roles (Bell et al., 2017). The proximity and accessibility of the UGS allowed those individuals to fit their use of GS for mental WB around other demands which increased their sense of successful agency and subsequent EWB. This complements the representation in the literature of a conscious interaction between people and the GS landscape.

Overall completeness and transferability of evidence

The data from our model come from English-language studies referring to mostly western culture settings (real or imagined) of urban or semi-rural GS, woodland, parks, cemeteries, and urban green rooves. These settings reflect the UGS contexts for urban dwellers.

As the majority of participants within the synthesis were adult females of white ethnicity, the extent to which the findings are applicable to other gender and/or ethnicities remains to be verified in future research. Furthermore, only two studies reported whether participants had any health conditions or impairments and only five studies provided detail on socioeconomic status. As such, the synthesis does not reflect complete findings about (1) children's and young people's experiences (2) people from minority ethnic backgrounds, (3) people from hard-pressed social contexts and (4) people with serious health conditions or impairments. As characteristics such as ethnicity, socio-economic status and disability are associated with GS inequalities (Lachowycz and Jones 2013; *Cronin-de-Chavez et al., 2019*; Burnett et al., 2022), current understandings would benefit from increased research in these populations.

Strengths of the synthesis

The use of specific meta-ethnography reporting guidelines (and associated protocol) rather than generic qualitative guidelines strengthens this review. A further strength of this review is the inductive nature of this synthesis, in line with an interpretive epistemology. The steps taken to code authors' second order constructs inductively to prevent bias in formation of themes adds congruence between the research question and methods, as does the demonstrated reflexivity. Additionally, the detailed explanation and examples of the processes for each stage of the translation and synthesis increases the transparency and therefore trustworthiness. Lastly, trustworthiness was increased by use of a reflective journal and explicit statement of positionality as required by the eMERGe reporting guidelines.

Limitations of the synthesis

Given the inter-disciplinary nature of the field of GS research, a research team comprised of several disciplines may have increased the quality by highlighting for example other possible databases or search terms, as well as providing rigour when screening the large number of titles within the synthesis. A larger inter-disciplinary team may also have facilitated wider consideration of theoretical findings. As four journals were hand searched taking several days, including thousands of titles, there is an element of human error that may have been reduced with a team.

Implications for future research, policy & practice

Further qualitative research is recommended into how diverse urban

populations that are less represented in the literature experience GS, for example people from minority ethnic backgrounds, areas of urban deprivation and those with health conditions or disability. This is especially pertinent given the GS inequalities highlighted by the COVID-19 pandemic (Burnett et al., 2022). Further qualitative research is also needed regarding agency and the role of PC and NC. It is suggested that future applied research also includes co-produced work exploring use of GS in urban communities to ensure local contexts are accounted for.

UGS provision may benefit from varied sensory experiences including views and auditory/olfactory affordances and biodiversity in terms of colours, tree species and wildlife habitat opportunities. Ensuring access to wilder GS offering escape, solitude and a sense of awe is important to ensure that the full range of benefits are available. The social affordances also need consideration in local planning. This may mean in practice ensuring provision of both a wilder and more challenging GS as well as more accessible well maintained UGS that allow safe social affordances within access of all urban inhabitants, including inner city and deprived areas. The physical quality and safety of the GS should be equitable across both affluent and deprived urban areas to ensure GS is helpful not harmful and to reduce inequalities in GS access and use. Additionally, as this review is excluding the associated benefits of physical activity in GS, it is hoped that any practice contributions would be extended to those who are less able to enjoy active participation in GS such as those with chronic health or pain conditions or limited mobility.

Further promotion of the benefits of GS may also increase equitable access to GS at a public health level. Whilst it is not a moral imperative for every individual to spend time in nature, opportunities to experience GS positively, allows chances for an association to develop, which for some may bring life-long WB benefits.

Conclusion

This synthesis has found a range of reported beneficial effects for psychological WB from individuals across eight countries. The findings were mirrored across multiple samples suggesting common experiences. However, some of these findings have also shed light on particular contexts both positive and negative that contribute to experiences of GS. These understandings are valuable for policy makers and urban planning, public health and green infrastructure disciplines. The findings suggest that both NC and PC are linked with GS and psychological WB, however further research is needed in this area. As there is less literature regarding NC and PC in GS, the insights from this synthesis will add to the growing evidence base. The meta-ethnographic approach produced an "emotion filter" model that explained the synthesis findings. This model compliments current theoretical understandings and adds the importance of a sense of self and others and the use of symbolism and metaphor for emotional filtering in order to gain psychological benefits from being in GS. The model adds to developing interdisciplinary salutogenic theoretical understandings that seek to further acknowledge the role of the self, emotional processing and additionally highlighting the role of individual agency in gaining therapeutic benefits from GS.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.wss.2023.100158.

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