University of Kent

Kent Academic Repository

Wendleboe-Nelson, C., Fisher, Jessica C., Straka, T.M., Sousa-Silva, R, Menzel, C, Alejandre, J.C., de Bell, S, Oh, R.R.Y., Bonn, A and Marselle, M. (2025) *Outdoor health intervention for refugees, migrants, and asylum-seekers: A mixed-methods pilot study*. Health and Place, 91 . ISSN 1353-8292.

Downloaded from

https://kar.kent.ac.uk/107865/ The University of Kent's Academic Repository KAR

The version of record is available from

https://doi.org/10.1016/j.healthplace.2024.103387

This document version

Publisher pdf

DOI for this version

Licence for this version

CC BY (Attribution)

Additional information

Versions of research works

Versions of Record

If this version is the version of record, it is the same as the published version available on the publisher's web site. Cite as the published version.

Author Accepted Manuscripts

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding. Cite as Surname, Initial. (Year) 'Title of article'. To be published in ***Title of Journal*** , Volume and issue numbers [peer-reviewed accepted version]. Available at: DOI or URL (Accessed: date).

Enquiries

If you have questions about this document contact ResearchSupport@kent.ac.uk. Please include the URL of the record in KAR. If you believe that your, or a third party's rights have been compromised through this document please see our Take Down policy (available from https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies).

Health & Place 91 (2025) 103387



Contents lists available at ScienceDirect

Health and Place

journal homepage: www.elsevier.com/locate/healthplace



Outdoor health intervention for refugees, migrants, and asylum-seekers: A mixed-methods pilot study

Charlotte Wendelboe-Nelson [a,*,1], Jessica C. Fisher [b,1], Tanja M. Straka [c,1], Rita Sousa-Silva [d,e,1], Claudia Menzel [i], Julius C. Alejandre [j], Sian de Bell [k], Rachel R.Y. Oh [f,g,2], Aletta Bonn [f,g,h,2], Melissa R. Marselle [l,2]

[a] OPENspace Research Centre, Edinburgh College of Art, School of Architecture and Landscape Architecture, University of Edinburgh, EH3 9DF, UK
[b] Durrell Institute of Conservation and Ecology, School of Anthropology and Conservation, University of Kent, CT2 7NR, UK
[c] Institute for Biology, Freie Universität Berlin, Königin-Luise-Str. 1-3, 14195 Berlin, Germany
[d] Institute of Environmental Sciences, Leiden University, P.O.Box 9518, 2300 RA Leiden, the Netherlands
[e] Young Academy for Sustainability Research, Freiburg Institute for Advanced Studies, University of Freiburg, 79104 Freiburg im Breisgau, Germany
[f] German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, 04103 Leipzig, Germany
[g] Helmholtz Centre for Environmental Research - UFZ, Department of Biodiversity and People, 04318 Leipzig, Germany
[h] Friedrich Schiller University of Jena, Institute of Biodiversity, 07743 Jena, Germany
[i] Social, Environmental, and Economic Psychology, University of Kaiserslautern-Landau, 76829 Landau (Pfalz), Germany
[j] JCA: Water Research Group, School of Computing, Engineering and Built Environment, Glasgow Caledonian University, UK
[k] Exeter Health Service Delivery Research (HSDR) Evidence Synthesis Centre, University of Exeter, 79 Heavitree Rd, Exeter, EX2 4TH, UK
[l] Environmental Psychology Research Group, School of Psychology, University of Surrey, Guildford, Surrey, UK

ARTICLE INFO

Keywords:
Mental health
Mixed methods
Place attachment
Social cohesion
Transdisciplinary
Wellbeing

ABSTRACT

Despite the multifaceted and diverse challenges that refugees, migrants, and asylum-seekers experience when entering a new country, they remain notably underrepresented in the evaluation and understanding of the health and wellbeing impacts of outdoor health interventions. We addressed this knowledge gap by a mixed-methods evaluation (questionnaires, focus groups and photo elicitation activity) facilitated by a community researcher. Qualitative data (focus groups and photo elicitation activity) revealed that the participants saw the social component of outdoor activities as a critical factor in improving their wellbeing, an insight not captured by established quantitative wellbeing scales. Given the diverse backgrounds of refugee, migrant, and asylum-seeker populations, we underline the importance of a transdisciplinary, collaborative, and mixed-methods research approach.

1. Introduction

Spending time in outdoor spaces (e.g., parks, woodlands, riversides) can have a positive impact on human mental health and wellbeing, including reduced stress, improved mood, and enhanced cognitive performance (Buxton et al., 2021; Frumkin et al., 2017; Hartig et al., 2014; van den Berg et al., 2015). These beneficial outcomes may be particularly strong for people who are considered vulnerable, at risk, or structurally disempowered and who have certain social-emotional or practical needs (Ermansons et al., 2023; Kirmayer et al., 2011; Rigolon et al., 2021). Refugees, migrants, and asylum-seekers represent a rapidly growing demographic: in 2020 alone, over 281 million people were forcibly displaced, approximately 1% of the global human population, from a wide variety of social, political, and environmental causes (McAuliffe and Triandafyllidou, 2021). With increasing environmental instability and associated geopolitical conflicts stimulating human migration (Hoegh-Guldberg et al., 2018), improving our understanding of how to better accommodate new arrivals from diverse circumstances

* Corresponding author.
E-mail addresses: cwendelb@ed.ac.uk (C. Wendelboe-Nelson), J.C.Fisher@kent.ac.uk (J.C. Fisher), tanja.straka@fu-berlin.de (T.M. Straka), a.r.de.sousa.e.silva@cml.leidenuniv.nl (R. Sousa-Silva), claudia.menzel@rptu.de (C. Menzel), julze.alejandre@gcu.ac.uk (J.C. Alejandre), s.c.de-bell@exeter.ac.uk (S. de Bell), rachel.oh@idiv.de (R.R.Y. Oh), aletta.bonn@idiv.de (A. Bonn).
[1] Shared first authorship.
[2] Shared last authorship.

https://doi.org/10.1016/j.healthplace.2024.103387
Received 23 February 2024; Received in revised form 13 November 2024; Accepted 18 November 2024
Available online 30 November 2024
1353-8292/© 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

is critical (Daar et al., 2018; Platts-Fowler and Robinson, 2015).

When refugees, migrants, and asylum-seekers enter a new country, they may experience multifaceted and diverse challenges, including poor living conditions, limited social opportunities, underemployment, and difficulties navigating a foreign health and social care system (Jankovic et al., 2013; Paudyal et al., 2021; Pumariega et al., 2005; Turner et al., 2003). These challenges take place against a backdrop of potential financial difficulties, language barriers, and unstable accommodation (Asif and Kienzler, 2022; Ermansons et al., 2023). When combined with experiences of forced migration and, in some cases, trauma, refugees, migrants, and asylum-seekers are often at greater risk of developing or worsening mental health difficulties (De Vries and Van Heck, 1994; Hollifield et al., 2002). Furthermore, the stigma in many cultures surrounding common psychological disorders might prevent people from seeking help, alongside concerns about authority figures and confidentiality (Byrow et al., 2020). These complex and multifaceted health and social care challenges may lead to perceived barriers to participating in programmes designed to offer support, such as outdoor health interventions. It is therefore imperative to explore innovative and supportive strategies that can contribute to the mental health and wellbeing of affected individuals and communities.

The cost-effectiveness and scalability of outdoor health interventions suggest they have the potential to improve mental health and wellbeing outcomes amongst refugees, migrants, and asylum-seekers. This is particularly relevant in the context of rising costs of living, public health crises, and the need to support structurally disempowered communities in their transition to new environments (Ermansons et al., 2023; Paudyal et al., 2021; Pumariega et al., 2005). Hence, public health interventions that incorporate outdoor activities are an emerging strategy for tackling the rising burden of mental ill-health on national health systems and service provisions (Shanahan et al., 2019) and are needed to reduce the production and consumption of pharmaceutical products to minimise their adverse impacts on climate and biodiversity (Helwig et al., 2024). For instance, globally, productivity lost as a result of anxiety and depression costs the global economy US$ 1 trillion each year, a cost projected to rise to US$ 6 trillion by 2030 (The Lancet Public Health, 2022). In contrast, in the UK, frequent use of outdoor salutogenic spaces – outdoor environments that can improve people's health and wellbeing – is estimated to be worth approximately £34.2 billion (US$ 42.5 billion) per year in terms of avoided costs related to anxiety, depression, and other mental health disorders (Fields in Trust, 2018).

Incorporating outdoor activities into resettlement programs can play a facilitating role in enhancing the mental health and wellbeing of refugees, migrants, and asylum-seekers. For instance, such interventions can be sensitive to differences in culture and language (Rai et al., 2023). They can also strengthen place attachment while addressing the challenges of engagement and tailored support (Gladkikh et al., 2019). Developing an emotional attachment to somewhere new can enhance their wellbeing through a sense of place, belonging, and connection (Lewicka, 2011; Scannell and Gifford, 2010). Outdoor health interventions can introduce a sense of novelty and encourage participants to interact with unfamiliar environments in new ways. These interactions can stimulate reflection, evoke positive emotions, and facilitate mental restoration, leading ultimately to enhanced social interactions and social integration (Brooke and Williams, 2021; Irvine et al., 2022; Keniger et al., 2013; Marselle et al., 2021). Through this social, place-based engagement, outdoor activities may therefore help improve psychological resilience (a person's ability to adjust, bounce back, and thrive in the face of adversity; Fletcher and Sarkar, 2013) and attachment to a new place. Still, the effectiveness of outdoor health interventions for refugees, migrants, and asylum-seekers remains largely underexplored.

The aims of this pilot study were to (a) better understand the context surrounding refugees, migrants, and asylum-seekers and their participation in outdoor health interventions; (b) evaluate the effectiveness and beneficial mental health and wellbeing outcomes for refugees, migrants, and asylum-seekers of established outdoor health interventions (c) explore which factors (e.g., nature components, place attachment, etc.); are important for a positive participant experience and wellbeing during/after the interventions; and (d) reflect on the suitability of combining quantitative (questionnaires) and qualitative (focus groups and photo elicitation activity) methods to assess the benefits of outdoor health interventions for refugees, migrants, and asylum-seekers.

2. Materials and methods

2.1. Study background

The research presented here builds upon preliminary work conducted by the GroundsWell Research Consortium (https://ukprp.org/what-we-fund/groundswell/), funded by The UK Prevention Research Partnership. GroundsWell aims to maximise the contribution of urban environments in the primary prevention of non-communicable diseases by using participatory processes (i.e., co-design, citizen science, and systems science). This initiative also strives to bridge the gap between research, communities, and policymaking, driving the creation of research-informed policies that can deliver tangible, lasting impacts on public health.

The selection of scales included in this study was based on findings by GroundsWell: a panel discussion consisting of experts with knowledge and expertise on appropriate mental health outcomes and how to measure these in areas of high deprivation according to the Scottish Index of Multiple Deprivation (SIMD; https://simd.scot/(accessed March 2023)). The SIMD looks at the extent to which an area is deprived across the following domains: income, employment, education, health, access to services, crime, and housing. Following the expert panel discussion, a consensus-list of mental health outcome measures was put forward to inform decision-making and strategic planning of study design for intervention evaluation in different contexts, with a focus on structurally disadvantaged communities. The data gathered via this process is not presented in this paper. In collaboration with The Welcoming, the following health outcome measures were chosen for piloting from the consensus-list: Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS); Conventional Question (CQ); Amnestic Comparative Self-Assessment (ASCA); and UWIST Mood Adjective Checklist (UMACL). In addition to the specific aims for the work presented here, this evaluation is also a part of the piloting process of the health outcome measures identified as part of the initial GroundsWell work. The piloting process is designed to explore the practicability of using the health outcome measures from the consensus-list within structurally disadvantaged groups (i.e., refugees, migrants, and asylum-seekers).

2.2. Evaluation design

To investigate our research questions, we collaborated with a non-government organisation (NGO), The Welcoming (www.thewelcoming.org), a Scottish charity with the mission to welcome 'New Scots' (a term used by the Scottish Government, which encompasses refugees from a range of communities, including migrants and asylum-seekers) to Edinburgh, UK. The Welcoming offers advice, language classes, and activities designed to improve the quality of life of asylum seekers, refugees, and migrants in Edinburgh and help them assimilate into the local culture. Some activities are designed for small groups and take place outdoors. The outdoor health interventions in this study consisted of regular outdoor group walking and cycling activities designed by The Welcoming and had been successfully implemented prior to this study. Dedicated members of The Welcoming staff lead the delivery of these activities each week (note: while The Welcoming did not explicitly categorise these activities as outdoor health interventions, we refer to their activities as such for the purpose of this study). The

Welcoming interventions were planned independently before this research project commenced. However, all participants in the evaluated activities provided informed consent to be part of both the research and evaluation processes, and recruitment was specifically tailored for their involvement in the health intervention as well as its assessment (Fig. S1). Besides smaller adjustments (e.g. photo activity), we also worked to ensure that the delivery of activities remained consistent with standard practices to minimise any potential disruptions caused by the evaluation process. We therefore worked closely with the activity coordinator from The Welcoming, who acted as a community researcher on our project and had built pre-existing rapport with the target community. The community researcher was an important link between the community and research team, during the stages of planning and delivery and during the evaluation process of the outdoor health interventions. The major roles of the community researcher were to engage intervention participants, deliver the activities, and conduct the data collection. This approach was chosen to minimise disruptions to the activities, leading to a more robust data collection process, ensuring that the study was culturally appropriate and that it addressed the needs of the community (Viswanathan et al., 2004).

We anticipated that using a community researcher would foster a trusting environment encouraging participants to share more personal and emotive experiences. In our previous work as researchers, we have experienced challenges engaging with local communities, particularly in fostering the level of trust necessary for participants to fully 'open up' during intervention monitoring and evaluation. Without this trust, there is a risk of drawing inaccurate conclusions, generating incomplete findings, and overlooking the subtle nuances of participants' experiences, the intervention's context, or its impact. In addition, our theoretical expertise on the benefits of green spaces and ecology, and the positive effects of urban salutogenic environments might predispose us to seek out positive outcomes related to nature, potentially biasing our interpretation of the intervention's effects.

In contrast, we acknowledge that using a community researcher, someone already embedded within the community, presents its own set of biases. In our project, the community researcher was already employed by the NGO and might therefore have an interest in showcasing the intervention in the best possible light, which could cause them to ask leading questions and give inappropriate prompts. The community researcher's pre-existing perception of the intervention's benefits could also hinder their ability to capture the full spectrum of participant experiences, both positive and negative. To mitigate these biases, both from the community researcher and the academic researchers, we held multiple meetings during the planning stages of our project and before commencing the data collection for the evaluation process. We discussed these potential biases at length, and all team members could raise questions, comments, or concerns. Regular team meetings continued throughout the data collection process, the data analysis process, and the writing process. A record was kept of these meetings (data not presented here) and helped guide the reflexive thematic analysis. The community researcher was invited to contribute to the manuscript of this paper but declined due to concerns that being a co-author on a scientific paper would compromise their position of trust within the local community. However, the community researcher's experiences and reflections on the whole process has fed into the analysis and played a significant part in the generation of themes.

This pilot study took place in January and February 2023. For the evaluation design, we used an exploratory mixed-method design, with an initial quantitative questionnaire followed by a focus group and a photo elicitation activity, to further explore the experiences of participants in response to the intervention (Fig. 1).

2.3. Participant recruitment

Participants were actively recruited through The Welcoming's established engagement channels. Typically, once individuals engage in an initial activity, they are more likely to access additional support offered by The Welcoming and participate in multiple activities. To minimise potential recruitment bias, of either the academic team or the community researcher, we deliberately opted to adhere to The Welcoming's existing recruitment pathways.

The recruitment took place through an advert with text (in English only) and a graphic posted on The Welcoming's social messenger groups (poster for the research project and activities; Fig. S1). The advert was also emailed to all registered members. The only eligibility criteria for taking part in the evaluation study was an intermediate level of English language. Individuals participating in the cycling and walking activities without intermediate English were unable to take part in the evaluation study. Beyond this research project, limited English would not be a hindrance to participating in activities by The Welcoming. Participants were offered £10 for answering the evaluation questionnaires, and £10 if they participated in a subsequent focus group. No remuneration was

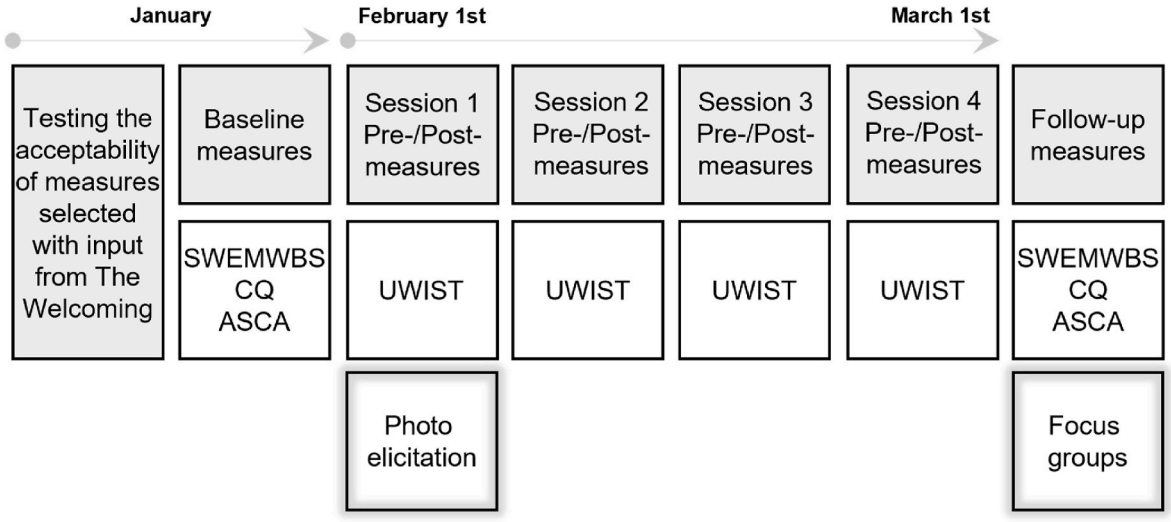


Fig. 1. Evaluation timeline for the outdoor health interventions. Both cycling and walking activities ran over the course of four weeks, with one session per week, commencing in February. Schedule run by The Welcoming (grey boxes), evaluated using quantitative (white boxes) and qualitative activities (white boxes with grey outline). Measures acronyms: SWEMWBS, Short Warwick-Edinburgh Mental Wellbeing Scale; CQ, Conventional Question; ASCA, Amnestic Comparative Self-Assessment; UMACL, UWIST Mood Adjective Checklist. See main text for references.

given to participants taking part in the activity session only, without involvement in the research project. The Welcoming does not usually pay participants to take part in their various activities. In total, 23 individuals participated in the walking and cycling activities, with one person participating in both activities (16 for walking and 8 for cycling; see Results section and Table 1 for further details).

Ethics approval was granted by the University of Edinburgh Research Ethics Committee (No. 193402-193395-99852913). All participants provided written consent for the study and were informed that data would be anonymised, securely stored, and analysed for publication. Participation was voluntary, and participants were free to withdraw from the study at any time without explanation. Participant information was written in English, and the community researcher was there to elaborate and explain should anyone require further support to understand the information. This was done to ensure the consent given was truly informed and the participants fully understood the aim of the project and what their involvement entailed.

2.4. Outdoor health activities

Our study focussed on two activities: an outdoor walking group activity and an outdoor cycling group activity. Each session for both the walking and cycling activities was held once per week on a Saturday from 10:00am to 12.30pm. Participants could choose either or both activities. For the cycling group, bicycles were provided to those who did not have access to one, ensuring accessibility for all participants. The routes for both activities were intentionally unplanned and were guided by participants' preferences, allowing for a diverse experience that included both nature-rich and urban pathways. The focus of the interventions was to expose the participants to salutogenic spaces while enabling them to foster social bonds, place attachment, and a sense of belonging.

2.5. Health and wellbeing measures

Participants' general wellbeing was measured at two time points: at *baseline*, before the start of the intervention (i.e., before the first of the four walking or cycling sessions), and a *follow-up,* at the end of the entire intervention four weeks later (i.e., after the last of the four walking or cycling sessions) (Fig. 1). As part of the baseline questionnaire, participants were also asked to provide socio-demographic information, including their gender, country of birth, whether they grew up in an urban or rural area, and the duration of their residence in the UK (Table 1).

Before and after each session, all participants were also asked to complete a *pre-post activity* questionnaire to capture how participants' momentary wellbeing was affected by the activity compared to before (Fig. 1). All items were provided in English. The questionnaires used self-reported Likert scales designed to capture subjective general and momentary wellbeing (Table S1). The selection and/or modification of these questionnaires was the result of an iterative process, involving extensive discussions and trialling with staff at The Welcoming, including active input from the community researcher. This was done as part of the expert panel discussions conducted by GroundsWell to ensure cultural appropriateness and that the chosen scales were easily understood by participants from different backgrounds. Furthermore, several studies have previously validated some of these measures in populations similar to those from the participants' countries of origin. For example, the SWEMWBS (Tennant et al., 2007) has been validated in Brazil (Santos et al., 2015), China (Dong et al., 2019), Pakistan (Waqas et al., 2015), and Spain (Castellví et al., 2014). The UMACL (Matthews et al., 1990) has not been validated cross-culturally.

Table 1
Sociodemographic characteristics of participants in the cycling (n = 8) and walking (n = 16) activities as part of the community assimilation programme for refugees, migrants, and asylum-seekers run by The Welcoming in Edinburgh, UK.

Background	Walking		Cycling	
	n	%	n	%
Gender				
Female	11	68.8	7	87.5
Male	4	25.0	1	12.5
Prefer not to say	1	6.3	0	0
Country of birth				
Belarus	1	6.3	0	0
Brazil	2	12.5	0	0
China	3	18.8	0	0
Hong Kong	4	25.0	3	37.5
India	1	6.3	1	12.5
Italy	1	6.3	0	0
Pakistan	0	0	1	12.5
Philippines	1	6.3	0	0
Saudi Arabia	0	0	1	12.5
Spain	0	0	1	12.5
Ukraine	3	18.8	1	12.5
Where did you spend most of your childhood?				
Village (countryside)	3	18.8	1	12.5
Small city	3	18.8	2	25.0
Medium-size city	4	25.0	0	0
Large city	6	37.5	5	62.5
When did you arrive in the UK?				
<1 year	12	75.0	4	50
1–2 years	2	12.5	0	0
>2 years	2	12.5	4	50

2.6. Baseline and follow-up questionnaires

The baseline and follow-up questionnaires included three tested, validated scales to capture participants' general wellbeing before and after they participated in the activities (Fig. 1). Mental wellbeing was measured using the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS; Tennant et al., 2007), which asks participants to recall their thoughts and feelings over the last two weeks. It comprises seven positively worded statements (e.g., "I have been feeling optimistic about the future"), and responses are made on a 5-point scale ranging from 1 (none of the time) to 5 (all of the time). The total scale score is calculated by summing the seven individual item scores (minimum score is 7 and the maximum is 35), with a higher score indicating better mental wellbeing. Secondly, we asked participants about their overall satisfaction with life using a single-item question: "All things considered, how satisfied are you with your life as a whole these days?" (conventional question, CQ, according to Veenhoven, 2005), with responses on a five-point scale from 1 (very dissatisfied) to 5 (very satisfied). At the suggestion of the community researcher, we added descriptors to the response options to ensure that participants could understand the response scale better (e.g., "very dissatisfied (I am often *un*happy)", "neutral (I am neither happy nor *un*happy)", or "very satisfied (I am often happy")). To measure current overall quality of life, we used the Amnestic Comparative Self-Assessment scale (ASCA; Bernheim et al., 2006). As ACSA uses the respondents' best and worst periods as anchor points, its frame of reference is specific to each individual (Verhofstadt et al., 2019). The ASCA contains one-single item which asks the participants to remember the worst (0) and best (10) periods in their lives, and then to rate their quality of life in relation to their individual anchors on a 0 to 10 scale.

The baseline and follow-up questionnaires were filled out by the participants online at their own convenience (e.g., at home) within 3–5 days prior or after the intervention. Both questionnaires were hosted on Google Forms (Google, USA), and the responses were exported, password-protected, and stored on the server of the Steinbuch Centre for Computing in Germany. Further information on scale wording can be found in Supplementary Materials, Table S1.

2.7. Pre-post activity questionnaires

To test how the activities affected participants' momentary mood, we used in our pre-post activity questionnaire a shortened version of the UWIST Mood Adjective Checklist (UMACL; Matthews et al., 1990). It consists of 12 adjectives describing mood, grouped into three dimensions – energetic arousal (*active, energetic, sluggish, passive*), tense arousal (*edgy, nervous, relaxed, calm*), and hedonic tone (*contented, happy, sad, sorry*). Participants were asked to rate the applicability of each adjective to their current mood using a four-point scale from 1 (definitely not) to 4 (definitely). The 12 mood adjectives were presented in a randomized order, and for some words, additional meanings were provided by the community researcher (e.g., that '*sluggish*' means '*with no energy*'). The pre-post activity questionnaires were filled out on paper at a designated community learning space where the participants began and ended each activity.

2.8. Focus group discussions

Upon the conclusion of the walking and cycling activities, all participants from both activities were invited to take part in a focus group discussion. Three mixed-gender focus group discussions were held, each including 6, 9, and 4 participants respectively, from both the cycling and walking groups. These were held online within three days of the end of the last activity to minimise recollection bias (Althubaiti, 2016). The aim of these discussions was to explore what aspects of the intervention played a role in influencing participants' experiences and how this might relate to their wellbeing. The community researcher, who had an established rapport with the participants, led the discussions using prompts from a topic guide (Supplementary Materials, Text S1) designed to probe which particular aspects of the activities the participants enjoyed or did not enjoy and how they considered each activity. Care was taken to ensure all participants were able to contribute equally and dominant voices were reduced. No amount of time was set for discussions, which were unstructured to enable participants to speak freely about what was important to them, lasting as long as participants were able and willing to give time (between 20 and 41 min), and within the bounds of the time available with the community researcher.

2.9. Photograph activity

Using photographs is an approach to assess people's experiences that enables a creative outlet for those who might otherwise struggle to communicate using traditional auditory or written communication methods or who have language difficulties (Petersen and Martin, 2021). The community researcher invited participants to take photos during the walking activities, specifically of places or things they liked or found inspiring, as well as of those they did not like. Participants were asked to indicate their preferences by adding a thumbs-up or thumbs-down on each photo. Participants were instructed that they could photograph anything except people to protect their privacy. Participants ($n = 7$) took the photos ($n = 15$) on their (smart)phones and shared them with the community researcher through a private WhatsApp group created specifically for this purpose.

2.10. Data analysis

2.10.1. Quantitative analysis

All data were anonymised to ensure the participants' privacy. Given that both cycling and walking activities were outdoors and shared a similar context, groups of participants from both activities were aggregated to maximise analytical power (cycling: $n = 8$, walking: $n = 16$; Table 1). We used descriptive statistics to explore the distribution of responses at baseline and follow-up, as well as pre- and post-activities. As participants completed pre-post questionnaires each session, scores were averaged across sessions for each activity. Means, standard deviations, and Cronbach's alpha values are provided for all the scales used in the study. For the UWIST Mood Adjective Checklist (UMACL) questions, mean scores for each mood dimension were obtained by averaging item scores for each dimension, but negative items were reverse-scored. Cronbach's alpha for each mood dimension was determined including the reverse-coded items. Differences between baseline and follow-up, as well as between pre- and post-activities, were assessed using Wilcoxon signed-rank tests. We chose the Wilcoxon signed-rank test as it is suitable for small sample sizes and non-normally distributed data, providing a reliable means of comparing paired samples without relying on parametric assumptions. Comparisons between the cycling and walking groups were done using ANOVA followed by Tukey's HSD post-hoc test (Figs. S3–S5 and Tables S3–S14). Statistical analyses and plotting were done in R version 4.1.1 using packages *dplyr* (Wickham et al., 2021), *ggplot2* (Wickham, 2016), *multcompView* (Graves, 2024), and *tidyr* (Wickham, 2021).

2.10.2. Qualitative analysis

Focus group discussions: The objective and aims of this pilot underpin our approach to the qualitative analysis. We chose to use a reflexive thematic analysis, guided organically by the contemporary six-phase approach proposed by Braun and Clarke (2021, 2020, 2019a, 2019b, 2006): 1) data familiarisation and writing familiarisation notes; 2) systematic data coding; 3) generating initial themes from coded and collated data; 4) developing and reviewing themes; 5) refining, defining and naming themes; and 6) writing the report.

We adopted a critical constructionist epistemology, with meaning and meaningfulness of the focus group participants' comments underpinning the coding process, while also acknowledging the importance of recurrence (Braun and Clarke, 2021; 2019b). We chose a more inductive way of coding, primarily guided by the data, while also considering existing research, understanding and theory to provide the lens through which to analyse and interpret our data (Braun and Clarke, 2020; 2006). We believe this more open and organic coding approach is best suited to also capture latent meanings, which we anticipated could be the result of conducting focus groups comprising of participants with different nationalities and backgrounds, all conversing in English. We also wanted to ensure the qualitative paradigm appropriately underpins our analysis in a way that enables us to identify and understand the nuances of individuals and their experiences.

Qualitative data from the focus group discussions were transcribed verbatim and analysed iteratively by authors (CWN, JCF, RSS, TS). Conversations were interpreted both through an existing understanding of outdoor health interventions, combined with the participants' views and opinions as they expressed them during the focus groups. We sought to highlight areas of convergence and divergence, to represent the diversity of participants and their experiences. In addition, the community researcher provided some immediate written reflections upon facilitating the focus groups, which were referred to by the authors when contributing to analytical discussions about interpretation. The author team is also internationally diverse, comprised of academics living and working in countries and languages outside of where they were born. These subjective perspectives fed into the interpretation of focus group discussions, together with our experience as nature-health researchers.

The data was first transcribed and entered into NVIVO software, with CWN and JCF generating an initial set of guiding questions (familiarisation). These questions guided the coding, and features of interest were identified across the entire data set, with data relevant to each feature collated under the respective codes (generating initial codes). The initial coding was reviewed and discussed across a team of authors (CWN, JCF, TMS, RSS) and initial themes were formed (searching, reviewing, defining, and naming themes). Throughout the analysis, the specifics of each theme were refined, and the codes were further collated into subthemes within each main theme. Clear definitions for each main theme and subthemes were then chosen.

Photograph activity: Since participants only shared photos without

additional comments or descriptions, we first sorted them into positive (i.e., showing thumbs up) and negative (i.e., showing thumbs down) evaluations (Fig. S2). The photos were then grouped by two authors (TMS, CM) into photos with natural elements (e.g., trees and plants, rivers), photos with anthropogenic features (e.g., castles and bridges) and photos with natural elements and anthropogenic features labelled as 'mixed,'. This approach followed a content analyses to quantify the content depicted on the photographs (Bryman, 2016). The photos were also used by the community researcher during the focus groups to prompt the participants if necessary to keep the discussion flowing.

3. Results

3.1. Questionnaires

In total, 23 individuals participated in the walking and cycling activities (16 in the walking group, 8 in the cycling group, with 1 individual participating in both activities; Table 1). The majority of participants were female (76.9%) and from urban areas (80.8%). A highly diverse range of participants in terms of countries took part in the activities (Table 1). More participants in the walking group were new arrivals in the UK, within their first year of being in Edinburgh (72%), compared with the cycling activity (50%).

3.2. Baseline and follow-up questionnaires

Out of the 23 participants in the study, only 15 completed both the baseline and follow-up questionnaires. There was no notable difference between the eight participants who did not complete the follow-up questionnaire and those who did; i.e., there were no identifiable patterns in the baseline data to suggest who would or would not complete the follow-up questionnaire. The participant information for the subset of these 15 is detailed in Table S2. Mental wellbeing, as measured by the SWEMWBS, suggested increases of mean scores from 24.87 (SD = 4.14) at baseline to 26.33 (SD = 6.18) at follow-up (Table 2). For both the overall SWEMWBS scale and for each statement, individual scores for all participants increased by a clinically meaningful amount (1–3 points; Shah et al., 2018). However, a clinically meaningful increase is not necessarily statistically significant, and only the statement 'feeling useful' showed a statistically significant increase ($p = 0.05$). Cronbach's alpha values indicated consistent internal reliability (0.76 at baseline and 0.87 at follow-up).

Measures of how participants felt about their overall satisfaction with life indicated a marginal positive increase in the way participants felt after the activities. Specifically, baseline scores had a mean of 3.33 (SD = 1.40), increasing in the follow-up to a mean of 4.00 (SD = 1.00). Similarly, scores capturing how participants felt about their life as a whole on the ACSA scale also indicated that participating in the activities made them feel marginally better in the follow-up compared to baseline: the average score at baseline was 6.93 (SD = 2.31) and increased in the follow-up to 7.40 (SD = 2.32). Differences between the baseline and follow-up were not statistically significant. Comparisons between the cycling and walking groups also showed no statistically significant differences (Fig. S4, Tables S5–S7).

Table 2
Sum and mean scores (and standard deviation) for wellbeing were measured using the Short Warwick-Edinburgh Scale (SWEMWBS) scale, comprised of seven items at the baseline and follow-up surveys (results combined of cycling and walking groups, $n = 15$). p-values are based on Wilcoxon signed-tank test.

Item	Baseline Mean (SD)	Follow-up Mean (SD)	p-value
SWEMWBS, sum score	24.87 (4.14)	26.33 (6.18)	0.34
Dealing with problems well	3.60 (0.83)	3.67 (1.18)	0.82
Feeling close to others	2.93 (1.03)	3.13 (1.46)	0.24
Feeling hopeful and positive	3.73 (1.03)	3.67 (1.35)	0.39
Feeling relaxed	3.47 (0.92)	3.73 (1.10)	0.92
Feeling useful	3.53 (0.92)	3.87 (1.06)	0.05
Making up own mind	3.80 (0.77)	3.87 (1.19)	0.41
Thinking clearly	3.80 (0.94)	4.40 (0.74)	0.86

3.3. Pre-post activity questionnaires

We received pre-post activity questionnaires from 23 participants, with one participant engaging in both walking and cycling activities. Overall, our evaluation indicated that the outdoor health intervention positively influenced the mood of participants. Using the UWIST Mood Adjective Checklist, we were able to identify individual improvements in positive mood items (i.e., active and energetic, relaxed and calm, contented and happy) and reductions in negative items (i.e., sluggish, passive, edgy, nervous, sad, and sorry) (Table 3). The highest improvements in mood were observed in the energetic arousal scale, with individuals feeling more 'active' (increased from a mean of 3.62 pre-activity to 3.83 post-activity; $p = 0.04$) and 'energetic' (from 3.17 to 3.50; $p = 0.04$) rather than 'sluggish' and 'passive'. Individuals also described feeling less 'edgy' and less 'nervous', and more 'relaxed,' 'contented', and 'happy' post-activity. Cronbach's alpha ranged from 0.40 to 0.74 across the three dimensions of mood, with some variation between pre- and post-activity assessments (Table 3). Comparisons between the cycling and walking groups showed no statistically significant differences (Fig. S5, Tables S8–S14).

3.4. Focus group discussions

There were 19 participants in the three mixed-gender focus group discussions describing experiences of the cycling and walking activities. An overview of the coding process is summarised in Table 4.

Following the systematic data coding, and generation of initial themes, the coding team convened to refine and review the main themes identified. During this meeting, we established four main themes that were prominent in all three focus groups: mental health, barriers and facilitators for participation, trusted relationships, and the impact of the outdoor environment. When consolidating the data, it became clear that forming discrete main themes was challenging. Many of the participants' sentiments overlapped several themes; for example, while the

Table 3
Scores (and standard deviation) for wellbeing measured using the UWIST Mood Adjective Checklist (UMACL) shortened version pre- and post-each activity (results combined of cycling and walking sessions, $n = 24$). Scores are averaged per participant over the four sessions for each activity. Mean values of negative wellbeing measures are not inverted in the table.

Item	Pre- Mean (SD)	Post- Mean (SD)	p-value	Cronbach's α
Energetic Arousal, mean score	**3.42 (0.78)**	**3.71 (0.61)**	**0.01**	Pre-: **0.68** Post-: **0.56**
Active	3.62 (0.58)	3.83 (0.48)	0.04	
Energetic	3.17 (0.82)	3.50 (0.78)	0.04	
Sluggish	1.67 (0.96)	1.21 (0.51)	0.04	
Passive	1.46 (0.66)	1.29 (0.62)	0.07	
Tense Arousal, mean score	**3.12 (0.76)**	**3.29 (0.83)**	**0.08**	Pre: **0.53** Post: **0.59**
Edgy	2.21 (0.72)	1.96 (0.95)	0.10	
Nervous	1.79 (0.59)	1.50 (0.78)	0.08	
Relaxed	3.29 (0.81)	3.46 (0.66)	0.24	
Calm	3.21 (0.83)	3.17 (0.87)	0.80	
Hedonic Tone, mean score	**3.68 (0.64)**	**3.83 (0.50)**	**0.02**	Pre: **0.74** Post: **0.40**
Contented	3.50 (0.78)	3.79 (0.51)	0.05	
Happy	3.75 (0.44)	3.88 (0.34)	0.15	
Sad	1.33 (0.76)	1.17 (0.64)	0.07	
Sorry	1.21 (0.51)	1.17 (0.48)	1.00	

Table 4
Main themes and subthemes generated following analysis of the focus group discussions.

Study aim	Initial questions guiding the coding	Main themes	Subthemes
Better understand the context surrounding refugees, migrants, and asylum-seekers and their participation in outdoor health interventions	What are the barriers preventing them from participating? What are the facilitators encouraging them to participate? What can we do to facilitate participation?	Barriers and Facilitators	Novelty/ Familiarity Accessibility
Evaluate the effectiveness and beneficial outcomes for refugees, migrants, and asylum-seekers, of established outdoor health interventions	What are the participants' subjective feelings about changes to their wellbeing after participation? What types of changes did they experience to their wellbeing? What types of changes did they expect in relation to their wellbeing? Were there expected changes to their wellbeing that did not materialise?	Mental health Trusted relationships	Wellbeing Confidence Resilience Social cohesion Group Activities Cultural assimilation
Explore which factors (e.g. nature components, place attachment, etc.) are important for a positive experience and for wellbeing during/after the interventions	What nature-based factors did the participants perceived as positive, in relation to their overall subjective experience? What other factors (non-natural) did the participants perceived as positive, in relation to their overall subjective experience? What factors (natural and non-natural) did the participants perceive as negative, in relation to their overall subjective experience?	Outdoor environment	Nature Weather Seasonality Scenery

group setting was perceived as a facilitator for participation and engagement, it was also seen as beneficial in enabling new friendships, which could, in turn, facilitate social cohesion and improve mental health and confidence levels. Acknowledging the connections between the four main themes and the complexity of benefits from outdoor activities delivered in group settings, we have organised the following sections presenting our qualitative data according to these four main themes.

3.4.1. Barriers and facilitators for participation

A prominent facilitator for participation among participants was the novelty of the landscape where the activities took place, in contrast with their previous memories and experiences. The greenery of the landscape was perceived as very novel to one participant from Saudi Arabia, who described a deep sense of transformation from the landscape and climate of Edinburgh: *"Rarely you see pockets of nature there* [in Saudi Arabia]*, and if we opted to go to, you know, in our outings, it's more of a desert outing. You know, you have your own tents, we gather with a family, it's more of a family occasion around a dry place. That usually would go in the Spring, not during the hot season … So when I came to Edinburgh … I mean 40% of the city is greener. I found my soil here when I came and I just fell in love with the city because of its greenery … it has this therapeutic effect of changing people, making you more calm. I don't know how to explain it, but I sensed it very deeply when going to parks"* (Speaker 3, female). Some participants perceived Edinburgh as even more *'beautiful'* and *'relaxing'*, due to this contrast in the scenery between the area they grew up and Edinburgh.

Activities took place during winter months, providing novel weather experiences for many, which was a clear facilitator for continued participation over the winter months: *"Honestly, because I'm a desert lady. I come from the desert, so I appreciate every drop of rain and everything about the greenery. I really embraced it with all its weather, whether it's rainy or not, I really loved it and it's quite therapeutic, you know, especially for us"* (Speaker 3, female). For others, the novel weather enabled feelings of distraction, and although participants found it difficult to convey the reasons why, they described feelings of freedom and positive effects on their physical and emotional wellbeing: *"… back then in Belarus, it was like the same scenery all the time … and it's flat and it's not hilly at all, so I just see the same things every day, really … And it's sometimes it's boring and it's kind of a bit depressing, but here it's so much different … The weather is different, but to be honest, for me it's a plus because I don't know, I like differences. I don't know why it helps me be distracted … Even* [when] *we went to the top of the Blackfoot Hill. It was so windy … It kind of helps me express my emotions and they feel so free and they just squeeze my, kind of, arms like wings and digests, feel the wind"* (Speaker 10, female). However, these experiences were not consistent across participants, with others describing the wet and windy weather as *'scary'* and as a barrier to participation.

For participants with mobility challenges activities such as walking or cycling may be a barrier, while those who were unable to ride a bike could only participate in the former: *"Need to have a very good experience with this cycling after some 20 years back during my schooling only I did cycling while going to school. I was a very small kid that as I was going to school, I had a lot of energy with my friends riding and I want to and also in India it's very flat"* (Speaker 4, female). Nonetheless, the experience of participating within a group and making friends was a facilitator to engagement, enabling social cohesion through shared experiences.

3.4.2. Mental health

Participants articulated feelings of calmness, relaxation, and happiness, both as a result of the activities, and about their life overall. The physical aspects of cycling, which was a novel activity for many participants, led to descriptions of enhanced overall health: *"I go cycling … I feel better after that session"*, and: *"it makes you feel healthy"*. Others described feelings of *"my stresses are going somewhat out"*, as well as *"very relaxing and a sense of freedom"*. Many participants described the role of nature in enhancing their wellbeing, although they did not articulate what characteristics of nature were important to these improvements. Nonetheless, nature was in general described as giving cognitive benefits of *"calm … really refreshing your mind"*. Another participant articulated the emotional benefits of nature, and the contrast with their typical feelings in the winter: *"sometimes you feel very boring* [sic] *or depressed, especially in the winter. You just stayed in your house, in your flat.* [This] *is a very good chance for me to join this cycling group to go outdoors to feel the nature* [and] *I find myself more happy"* (Speaker 1, male). Feelings of being away from daily tasks and worries were also reported to positively affect wellbeing.

Taking part in the activities helped participants build confidence as a result of better mental health and wellbeing. This, in turn, appeared to improve participants' resilience, enabling them to thrive in Edinburgh and explore the city beyond the activities: *"I have more confidence in overcoming* [a] *different environment now"*, and: *"it made me feel, Wow! I can do it!"*.

As mentioned above, the experience of participating within a group and making new friends facilitated confidence building and improvements to wellbeing through shared experiences: *"You know nature here around this community, you know, it's wonderful actually … and it's motivating to probably buy my own bike and ride of course with so many new friends here* [at The Welcoming]" (Speaker 6, female).

3.4.3. Trusted relationships

The Welcoming was the crucial linchpin through which participants could engage in these activities, providing accessibility and equipment. This clearly shows the importance of trusted relationships between the community and the NGO: *"So doing activities in the nature which is a low cost … for some of the events like the cycling group, it's very good that The Welcoming partner with other organisation to provide the equipment …. Also, one of the very key elements that make the migrants, like, more like eager to join"* (Speaker 2, female). In particular, the presence of knowledgeable staff enabled participants to learn more about their new environment and culture: *"It was really nice and enjoyable and also interesting to have a group leader who had information and knowledge to share with you about history and local places"* (Speaker 2, female). This might, in turn, lead to cultural assimilation and the formation of place attachment.

Activities took place as a group, and participants often described that joining with others enabled a more comfortable, meaningful experience. The opportunity to meet other participants from diverse backgrounds enhanced one participant's mood: *"There were people from backgrounds and there are like Europeans, and there are volunteers and local volunteers. And so am I filled. It's very refreshing and it gets me away from my worries and I also get to explore a new place and on that date"* (Speaker 2, female). For others, the diversity of migrant backgrounds helped build a sense of social cohesion through the shared experience, reducing feelings of loneliness and isolation: *"Because being exposed, not alone, not being alone, being with other people, sharing our experience, the essence of socialising with others gave it a new meaning. You know, we found out about, you know, our interests, disinterests and something like that … you don't feel alone anymore … There are other people that went through the same motion that you went through"* (Speaker 3, female).

As well as improvements to wellbeing and feelings of confidence built through the support of The Welcoming, as described above, participating in activities helped participants feel a sense of cultural assimilation. One participant articulated this in detail: *"So joining this group, first of all, is safe. And second, because I don't know this place a lot … that makes me be more familiar with this place. And I feel more confident because if you ask me to cycle on my own or with even with some friends because they are also new, we we're not sure where we should go. And it was because I think this group has a very special quality. Would have been less likely to go out cycling just on your own … because first of all, I'm not very good at cycling and second, I don't. I don't really know the place here" feel more confident* (Speaker 5, female). This suggests the intervention enabled a sense of familiarity, social cohesion, and confidence.

3.4.4. Outdoor environment

As described above, natural elements of the landscape, and seasonal changes, provided a wellbeing boost for some participants: *"I am happy being outside and I enjoy walks and I think I enjoy them the most because I am distracted from everything, to be honest, from everything … it helps me to clear my mind and I just can observe and just be active. I don't know. It helps me when I see it. I don't know why I am nervous and I have like, enough tension in my body. But when I walk, it's easier for me to relax … And just the nature it's just amazing to observe the differences like flora and fauna. It changes every day"* (Speaker 10, female). Another participant described elements of seasonal affective disorder (Magnusson and Boivin, 2003) but mentioned that, unlike in their country of origin, it was possible to visit the outside during winter in the UK.

The change from winter to spring provided a great contrast, with the presence of birds and plants being described as beneficial to their wellbeing: *"You know, when it's winter, short days usually give you that worse mood. And if you have some anxiety to grow and walking across the water usually is, for me, the best therapy to improve my mood. But when in February it's like, I can't do it in my country, so I have to look for something other like indoor sports or something … but in Edinburgh it's really like great possibilities … even in* [the] *city, you don't have to go far away to find birds, flowers and even in February. Yeah, we enjoyed the first flowers last week"* (Speaker 4, female).

3.4.5. Photograph activity

Altogether, participants took 15 photos during the walking activity (none during the cycling activity), with 13 indicating positive (thumbs up) and 2 indicating negative (thumbs down) evaluations (Fig. S2). According to our thematic analysis regarding the depicted environment, most photos were within the "mixed" category ($n = 8$), for instance, containing both trees and human-built structures such as houses or human-built riverbeds. This was followed by photos with only natural elements ($n = 6$), showing trees, evergreen plants, a forest or a river; with one photo showing a person playing with a dog. One photo showed only built structures (underground street art). The two photos with thumbs down depicted pollution, namely garbage bags and a rusted and damaged bike.

4. Discussion

This pilot study used quantitative (questionnaires) and qualitative (focus groups and photo elicitation activity) methods to assess the benefits of outdoor health interventions for refugees, migrants, and asylum-seekers. We explored potential barriers and/or facilitators for participation in outdoor health interventions and which factors are important for a positive participant experience. Finally, we reflected on the suitability of using mixed-methods to assess the benefits of outdoor health interventions for refugees, migrants, and asylum-seekers.

When consolidating the qualitative and quantitative data, it became apparent that explaining our findings as a linear process within discrete themes was challenging. Many of the participants' experiences and feelings towards the activities overlapped between themes, held different or even opposing meanings, and occurred in different, non-linear processes. Reflecting on this complexity, we produced Fig. 2, capturing the connections between our project aims, the identified themes, and subjective feelings of wellbeing, while acknowledging the layered benefits from outdoor activities delivered in group settings.

Here, we discuss the implications of our findings, in relation to the four research aims.

(a) Better understand the context surrounding refugees, migrants, and asylum-seekers and their participation in outdoor health interventions;

Study participants' diverse experiences of migration, together with the stark contrast in scenery from their home countries, were important in shaping how these interventions delivered benefits for them. A central mechanism underlined by participants was the opportunity to meet others, form shared experiences, and gain new knowledge about a novel urban landscape. Social cohesion is a known mediator between nature and health (Irvine et al., 2022; Marselle et al., 2021) and is a particularly important mechanism for refugees, migrants, and asylum-seekers (Mulvaney-Day et al., 2007; Pumariega et al., 2005; Qu et al., 2023), who may struggle with social isolation and integrating into a new culture and landscape (Gladkikh et al., 2019). So, it appears that a key facilitator for participation for many is the opportunity to socialise and connect with people with shared experiences. However, the outdoor elements seem to increase in importance when set against a backdrop of social cohesion (discussed in the following section). The outdoor setting during the winter months was a clear facilitator for participation; the organised activities provided a welcomed incentive for participants to venture outside during a time where many prefer to stay indoors. We found that some participants experienced nature during the winter months as *'scary'*, and for them, an activity provided by an organisation with whom they have a trusted relationship may be the only scenario in which they feel comfortable in engaging in outdoor activities.

Our study also raises new research questions about seasonality, documenting some positive effects of outdoor health interventions in the winter months. While most studies on the mental wellbeing benefits of

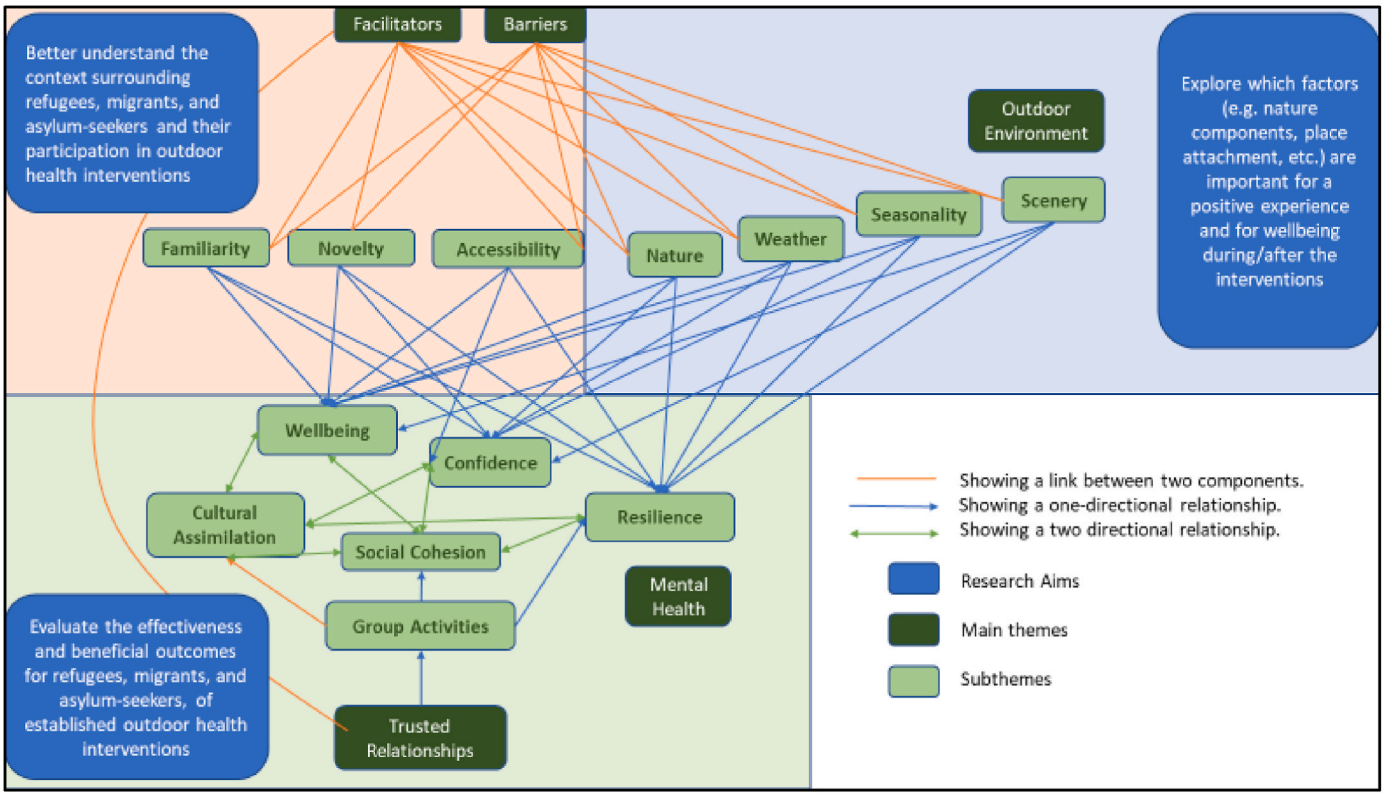


Fig. 2. Visual reflections on the complexity of the benefits from outdoor activities delivered in group settings, illustrating the connections between our project aims, the identified themes, and subjective feelings of wellbeing.

exposure to nature focus on the spring and summer months, with milder weather and faster vegetation growth, our results align with those from Passmore et al. (2022), who showed that spending time outside during late Winter can still provide the wellbeing boost associated with engaging with nature. Yet one participant in our study also described the winter weather as 'scary', inviting further investigation into which specific attributes of an outdoor health intervention affect participants' experiences, and when (e.g. seasonally), to optimise a design with maximum impact.

(b) Evaluate the effectiveness and beneficial mental health and wellbeing outcomes for refugees, migrants, and asylum-seekers of established outdoor health interventions;

Our qualitative analysis, supported in part by our quantitative findings, suggested that the cycling and walking activities offered by The Welcoming provided opportunities for social cohesion and cultural assimilation, facilitated through trusted relationships, which in turn improved the participants' wellbeing. Participants showed improved (self-reported) physical, emotional, social, and overall wellbeing during the cycling or walking activities, supporting existing models that outline the mental health benefits of outdoor environments (Irvine et al., 2013).

Although participants' backgrounds, social support networks, and individual resilience may have influenced changes in wellbeing, the timing of our pre- and post-activity questionnaires suggests most of the observed improvements in wellbeing can be attributed to the intervention itself. While our sample size was small ($n = 23$), and the short length of the focus groups may have limited the depth of insights garnered from participants, this pilot evaluation demonstrates potential for understanding the experience of refugees, migrants, and asylum seekers participating in outdoor health interventions.

The outdoor activities facilitated by a guide provided opportunities for participants to learn about Edinburgh and improve their sense of cultural assimilation, as shown with refugees elsewhere (Albers et al., 2021; Rishbeth and Finney, 2006). During the focus group discussions, participants noted how the activities enabled them to see different parts of the city, including the historical and architectural sites, which helped them form attachments to the place. This is supported by evidence that the cultural and architectural elements of urban environments can also benefit human wellbeing (Weber and Trojan, 2018). Importantly, there is some evidence that refugees, migrants, and asylum-seekers may feel excluded from public spaces due to incidents of social exclusion and fear of standing out (Birch et al., 2020; Rishbeth and Finney, 2006). Indeed, personal experiences outside of the guided activities may be very different. This nonetheless reinforces the benefits of undertaking activities in groups and as part of a facilitated resettlement program.

(c) Explore which factors (e.g., nature components, place attachment, etc.) are important for a positive participant experience and wellbeing during/after the interventions;

Besides the wellbeing benefits of being in a group, spending time outdoors in nature also played a significant role. Participants often described Edinburgh's scenery, weather, and seasonality as novel, contrasting with their experiences of home and providing a sense of being away (Kaplan and Kaplan, 1989), which could have enhanced the wellbeing benefits gained. Novelty, although specific to individuals' personalities, is believed to be intrinsic to eliciting emotions, as well as the memorability of experiences (Skavronskaya et al., 2020). For instance, El-Bialy and Mulay (2015), studying the place-related factors which influenced the wellbeing of a group of refugees resettled in a small urban centre in Canada, reported that participants considered the natural environment a source of 'emotional healing' and a reason to remain there. Natural elements in the landscape are more 'universal' and can foster a sense of belonging among refugees, migrants, and asylum-seekers by providing a link between host and home countries

through memories of past life stages (Egoz and De Nardi, 2017). Elsewhere in the UK, Rishbeth and Finney (2006) showed that urban greenspaces provided a sense of familiarity and psychological connection to their respective countries of origin for refugees and asylum-seekers, even when the new landscapes presented very different characteristics. Likewise, participants in our study described experiencing nostalgia for their home country while also appreciating the novelty of the new environment.

The photos of natural elements taken by the participants were all perceived as positive, although we also observed that participants took more photos of human-made structures. On the one hand, having only two scenes being captured as negative supports the generally positive evaluation of the activities and environments; on the other hand, it may also reflect that some cultural norms inhibit expressing negative opinions or emotions openly as this is perceived impolite or disrespectful; (e.g., for participants from East Asian societies; Stadler, 2011).

(d) Reflect on the suitability of using mixed-methods to assess the benefits of outdoor health interventions for refugees, migrants, and asylum-seekers.

A key part of the methodology used for this study was the involvement of a community researcher to lead the engagement of intervention participants, deliver the outdoor activities, and conduct the data collection. The roles and responsibilities of a community researcher vary depending on the context. However, a community researcher is typically an individual from the local community who has participated in the activities and/or interventions, thus has 'lived experience' and is known, respected and trusted within the community (Viswanathan et al., 2004; Bindels et al., 2013; Handler, 2018; Dembele et al., 2024).

Our approach was based on the idea that a community researcher would foster a trusting environment, encouraging participants to share more meaningful experiences. When researching a particularly sensitive issue specific to certain social groups involving structurally disadvantaged communities, community researchers (also known as co-investigators, or co-researchers) have proven effective in improving the engagement of people who live in the community, in research, and increasing the validity of both qualitative and quantitative data (Blair and Minkler, 2009; Buffel, 2015; Buffel et al., 2017). Reflecting on the engagement and data collection process for this project, we believe there are clear benefits to employing a community researcher to work in partnership with academic researchers, particularly in relation to engagement and building trust with structurally disadvantaged communities. However, there were also some unforeseen challenges, and the community researcher expressed some concern that the close collaboration and interaction with the academic team of researchers could breach the community trust. We would recommend further investigation of this concern in future projects with a primary focus on the use of community researchers in structurally disadvantaged communities.

We would like to also highlight that research projects spanning academia and community planning organisations (i.e., The Welcoming), requires strong, collaborative, and integrated ways of working to be successful. To improve the co-production process, we suggest that the NGO is more heavily involved in the initial stages of planning and designing the evaluation.

Reflecting on the photograph activity, we would recommend follow-up interviews or focus groups, to help elucidate the intent behind the photos taken of human-made or natural environments. This would have allowed us to clarify which specific aspects may have been construed as important, as well as unpacking the reasoning behind why these photos were taken. Further research incorporating participatory visual methods with photo or video activities could be more inclusive, offering alternative modes of communication, providing more nuance through multisensory engagement, and helping navigate certain power dynamics (e.g., Nawrath et al.,). Such an engaging approach may therefore also help increase participation, increasing the sample size through which more affirmative conclusions from both the quantitative and qualitative data can be made.

For the quantitative data, using both online and paper questionnaires may also improve survey completion rates. For example, in our study, more participants filled out the paper-printed pre- and post-activity questionnaires ($n = 24$) compared to the online-only baseline and follow-up questionnaires ($n = 15$).

Reflecting on the use of focus groups, we noticed that participants often found it difficult to articulate their experiences and reasoning, highlighting the need for interpreters to capture more authentic emotions and impressions. Indeed, those with a limited capacity for the English language may also be more vulnerable to social isolation (Johnson et al., 2019). One-to-one interviews with multilingual facilitators could be beneficial in future research to capture linguistic and cultural nuances. The community researcher highlighted that the translation of certain words and concepts in the quantitative questionnaires, such as 'sluggish,' was difficult due to the lack of direct equivalents in other languages. Furthermore, despite revising the wording of the scales, many still relied on translating applications to grasp the meaning of terms in their native languages. While these revisions were intended to enhance clarity and cultural relevance, they may have inadvertently simplified complex and emotional experiences, possibly hindering an accurate interpretation of the gathered data. For example, these challenges were similarly experienced by the international authors, who also struggled to connect with the emotions conveyed by words like 'sluggish' or 'edgy.' One author even encountered the word 'sluggish' for the first time during the research process and found it difficult to determine the appropriate emotional equivalents when discussing feelings with the English-native speakers.

Based on our research, to better capture the nuance of participants' emotions and experiences, and given the linguistic diversity of refugees, migrants, and asylum-seekers, any wellbeing scales used in such studies must be translated and validated in the native languages of participants to ensure that they are culturally appropriate. This is particularly important when participants are from the so-called non- WEIRD (Western, Educated, Industrial, Rich, Democracies) cultures (Henrich et al., 2010; Schulz et al., 2018). Additional resources may be necessary to access professional translation services or create multilingual resources for participants with limited English language proficiency to ultimately promote inclusivity and improve data accuracy. Given this, we recommend that evaluations of outdoor health interventions for migrant populations should prioritize the translation and validation of widely-used measures such as the SWEMWBS into other languages, as well as consider other relevant scales for such constructs (e.g., social cohesion, Sampson et al., 1997; place attachment, Boley et al., 2021; brief resilience scale, Smith et al., 2008).

Recognizing the challenges associated with scales and communication barriers in diverse groups, a mixed-methods approach is recommended for triangulating data and understanding the intervention's impact on migrant populations' wellbeing. For example, if survey results (quantitative data) reveal a certain trend, interviews or focus groups (qualitative data) can be used to explore and explain the underlying reasons for that trend or outcome. Alternatively, qualitative data, obtained through interviews or focus groups, are useful when developing new quantitative instruments and identifying trends within specific populations. Combining these data ensures that these tools encompass nuance in the backgrounds, experiences and perceptions of the study population. Our self-selected sample may have been skewed towards those who were more comfortable with approaching something new, and with a positive attitude. Certainly, establishing a baseline for this sub-population is also challenging, given that the feelings of safety and security associated with the resettlement process, alongside support from The Welcoming, may have influenced the initial wellbeing reports in the baseline and pre-activity surveys. Even within this sub-population, the mental health and wellbeing needs of refugees and asylum seekers, as well as what works to support them, might be

different than those of other migrant groups (e.g. Hollifield et al., 2002). Information in this regard was not available for this study but future studies could seek to further differentiate these needs and responses, thereby proposing more tailored and effective interventions for each group. As international researchers, our personal experiences of living in various countries and navigating the challenges of settling into new environments shaped our interpretation of the project. We recognized the privilege we have had in our migration experiences when compared to refugees and asylum seekers, whose mental health and wellbeing needs are often exacerbated by far more complex and burdensome circumstances. This reflection underscored our understanding that the support required by these groups might differ significantly from that of other migrant populations. Participants' engagement with The Welcoming in other activities could also have contributed to changes in wellbeing. Using a control group to underpin findings, as well as targeted recruitment processes for those who may be more vulnerable to social isolation and mental ill-health, are both therefore recommended.

5. Conclusions

In this study, we used quantitative and qualitative methods to assess the benefits of outdoor health interventions for refugees, migrants, and asylum-seekers. We explored potential barriers and/or facilitators for participation, identified factors important for a positive participant experience, and concluded with a reflection on the suitability of using mixed-methods to assess these benefits.

Our findings highlighted that the opportunities for shared experiences, being outdoors, and gaining new knowledge about the local landscape helped to enhance health outcomes. Moreover, our study contributes evidence of the benefits of nature during the often-overlooked winter season, suggesting that interventions implemented in this period can be beneficial. This highlights the potential for outdoor-based activities that migrant populations could immediately access to improve the success of resettlement processes. We also emphasise the importance of using mixed-methods approaches to fully capture the impacts of these interventions, and advocate for a transdisciplinary, collaborative research model that integrates academic, NGO, and community researchers.

CRediT authorship contribution statement

Charlotte Wendelboe-Nelson: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jessica C. Fisher:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Tanja M. Straka:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Rita Sousa-Silva:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Claudia Menzel:** Writing – review & editing, Formal analysis, Conceptualization. **Julius C. Alejandre:** Writing – review & editing, Formal analysis, Conceptualization. **Sian de Bell:** Writing – review & editing, Formal analysis, Conceptualization. **Rachel R.Y. Oh:** Writing – review & editing, Conceptualization. **Aletta Bonn:** Writing – review & editing, Formal analysis, Conceptualization. **Melissa R. Marselle:** Writing – review & editing, Formal analysis, Conceptualization.

Conflicts of interest

The authors declare no conflict of interest.

Acknowledgements

The authors would like to thank respondents for their time and participation in this project. We also wish to express our deep appreciation to The Welcoming and the community researcher for their invaluable support and dedication in facilitating the study. We also acknowledge funding from the British Council through the Researcher Links Challenge Grants. The project was funded by a Researcher Links Challenge Grants UK-Germany Public Health workshops grant from the British Council. 'Researcher Links Challenge Grants' is part of a wider British Council programme called Going Global Partnerships, which builds stronger, more inclusive, internationally connected higher education and TVET systems. AB and RRYO acknowledge the support of the German Centre for Integrative Biodiversity Research (iDiv) funded by the German Research Foundation (DFG-FZT 118, 202548816). JCA acknowledges the support of the Scottish Government Hydro Nation Scholars Programme. JCF was supported by the European Research Council under the European Union's Horizon 2020 research and innovation programme (Consolidator Grant No. 726104). RSS was supported by a fellowship from the Eva Mayr-Stihl Foundation. TMS was supported by the Berlin University Alliance funding 'Grand Challenge Initiative Global Health'. CWN was supported by the GroundsWell Research Consortium, funded by the UK Prevention Research Partnership (MR/V049704/1), which is funded by the British Heart Foundation, Cancer Research UK, Chief Scientist Office of the Scottish Government Health and Social Care Directorates, Engineering and Physical Sciences Research Council, Economic and Social Research Council, Health and Social Care Research and Development Division (Welsh Government), Medical Research Council, National Institute for Health Research, Natural Environment Research Council, Public Health Agency (Northern Ireland), The Health Foundation and Wellcome.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.healthplace.2024.103387.

Data availability

The data that has been used is confidential.

References

Albers, T., Ariccio, S., Weiss, L.A., Dessi, F., Bonaiuto, M., 2021. The role of place attachment in promoting refugees' well-being and resettlement: a literature review. Int. J. Environ. Res. Publ. Health 18, 11021. https://doi.org/10.3390/ijerph182111021.

Althubaiti, A., 2016. Information bias in health research: definition, pitfalls, and adjustment methods. J. Multidiscip. Healthc. 9, 211–217. https://doi.org/10.2147/JMDH.S104807.

Asif, Z., Kienzler, H., 2022. Structural barriers to refugee, asylum seeker and undocumented migrant healthcare access. Perceptions of Doctors of the World caseworkers in the UK. SSM - Mental Health 2, 100088. https://doi.org/10.1016/j.ssmmh.2022.100088.

Bernheim, J.L., Theuns, P., Mazaheri, M., Hofmans, J., Fliege, H., Rose, M., 2006. The potential of anamnestic comparative self-assessment (ACSA) to reduce bias in the measurement of subjective well-being. J. Happiness Stud. 7, 227–250. https://doi.org/10.1007/s10902-005-4755-0.

Bindels, J., Baur, V., Cox, K., Heijing, S., Abma, T., 2013. Older people as co-researchers: a collaborative journey. Ageing Soc. 34 (6), 951–973. https://doi.org/10.1017/S0144686X12001298, 2014.

Birch, J., Rishbeth, C., Payne, S.R., 2020. Nature doesn't judge you – how urban nature supports young people's mental health and wellbeing in a diverse UK city. Health Place 62, 102296. https://doi.org/10.1016/j.healthplace.2020.102296.

Blair, T., Minkler, M., 2009. Participatory action research with older adults: key principles in practice. Gerontol. 49 (5), 651–662. https://doi.org/10.1093/geront/gnp049. October 2009.

Boley, B.B., Strzelecka, M., Yeager, E.P., Ribeiro, M.A., Aleshinloye, K.D., Woosnam, K. M., Mimbs, B.P., 2021. Measuring place attachment with the abbreviated place

attachment scale (APAS). J. Environ. Psychol. 74, 101577. https://doi.org/10.1016/j.jenvp.2021.101577.
Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3, 77–101. https://doi.org/10.1191/1478088706qp063oa.
Braun, V., Clarke, V., 2019a. Novel insights into patients' life-worlds: the value of qualitative research. Lancet Psychiatr. 6, 720–721. https://doi.org/10.1016/S2215-0366(19)30296-2.
Braun, V., Clarke, V., 2019b. Reflecting on reflexive thematic analysis. Qualitative Research in Sport, Exercise & Health 11 (4), 589–597. https://doi.org/10.1080/2159676X.2019.1628806.
Braun, V., Clarke, V., 2020. One size fits all? What counts as quality practice in (reflexive) thematic analysis? Qual. Res. Psychol. 18 (3), 328–352. https://doi.org/10.1080/14780887.2020.1769238.
Braun, V., Clarke, V., 2021. Can I use TA? Should I use TA? Should I not use TA? Comparing reflexive thematic analysis and other pattern-based qualitative analytic approaches. Counsell. Psychother. Res. J. 21 (1), 37–47. https://doi.org/10.1002/capr.12360.
Brooke, K., Williams, A., 2021. Iceland as a therapeutic landscape: white wilderness spaces for well-being. Geojournal 86, 1275–1285. https://doi.org/10.1007/s10708-019-10128-9.
Bryman, A., 2016. Social Research Methods. Oxford university press.
Buffel, T., 2015. Researching Age-Friendly Communities. Stories from Older People as Co-investigators. The University of Manchester, Manchester.
Buffel, T., Skyrme, J., Phillipson, C., 2017. Connecting research with social responsibility: developing 'age-friendly' communities in manchester, UK. In: Shek, D., Hollister, R. (Eds.), University Social Responsibility and Quality of Life. Quality of Life in Asia, vol. 8. Springer, Singapore. https://doi.org/10.1007/978-981-10-3877-8_7.
Buxton, R.T., Pearson, A.L., Allou, C., Fristrup, K., Wittemyer, G., 2021. A synthesis of health benefits of natural sounds and their distribution in national parks. Proc. Natl. Acad. Sci. USA 118, e2013097118. https://doi.org/10.1073/pnas.2013097118.
Byrow, Y., Pajak, R., Specker, P., Nickerson, A., 2020. Perceptions of mental health and perceived barriers to mental health help-seeking amongst refugees: a systematic review. Clin. Psychol. Rev. 75, 101812. https://doi.org/10.1016/j.cpr.2019.101812.
Castellví, P., Forero, C.G., Codony, M., Vilagut, G., Brugulat, P., Medina, A., Gabilondo, A., Mompart, A., Colom, J., Tresserras, R., Ferrer, M., Stewart-Brown, S., Alonso, J., 2014. The Spanish version of the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) is valid for use in the general population. Qual. Life Res. 23, 857–868. https://doi.org/10.1007/s11136-013-0513-7.
Daar, A.S., Chang, T., Salomon, A., Singer, P.A., 2018. Grand challenges in humanitarian aid. Nature 559, 169–173. https://doi.org/10.1038/d41586-018-05642-8.
De Vries, J., Van Heck, G.L., 1994. Quality of life and refugees. Int. J. Ment. Health 23, 57–75.
Dembele, L., Nathan, S., Carter, A., Costello, J., Hodgins, M., Singh, R., Martin, B., Cullen, P., 2024. Researching with lived experience: a shared critical reflection between Co-researchers. Int. J. Qual. Methods 23. https://doi.org/10.1177/16094069241257945.
Dong, A., Zhang, X., Zhou, H., Chen, S., Zhao, W., Wu, M., Guo, J., Guo, W., 2019. Applicability and cross-cultural validation of the Chinese version of the Warwick-Edinburgh mental well-being scale in patients with chronic heart failure. Health Qual. Life Outcome 17, 55. https://doi.org/10.1186/s12955-019-1120-2.
Egoz, S., De Nardi, A., 2017. Defining landscape justice: the role of landscape in supporting wellbeing of migrants, a literature review. Landsc. Res. 42, S74–S89. https://doi.org/10.1080/01426397.2017.1363880.
El-Bialy, R., Mulay, S., 2015. Two sides of the same coin: factors that support and challenge the wellbeing of refugees resettled in a small urban center. Health Place 35, 52–59. https://doi.org/10.1016/j.healthplace.2015.06.009.
Ermansons, G., Kienzler, H., Asif, Z., Schofield, P., 2023. Refugee mental health and the role of place in the Global North countries: a scoping review. Health Place 79, 102964. https://doi.org/10.1016/j.healthplace.2023.102964.
Fields in Trust, 2018. Revaluing Parks and Garden Spaces. UK.
Fletcher, D., Sarkar, M., 2013. Psychological resilience: a review and critique of definitions, concepts, and theory: European psychologist: vol 18, No 1. Eur. Psychol. 18, 12–23. https://doi.org/10.1027/1016-9040/a000124.
Frumkin, H., Bratman, G.N., Breslow, S.J., Cochran, B., Kahn, P.H., Lawler, J.J., Levin, P. S., Tandon, P.S., Varanasi, U., Wolf, K.L., Wood, S.A., 2017. Nature contact and human health: a research agenda. Environ. Health Perspect. 125. https://doi.org/10.1289/EHP1663.
Gladkikh, T.M., Gould, R.K., Coleman, K.J., 2019. Cultural ecosystem services and the well-being of refugee communities. Ecosyst. Serv. 40. https://doi.org/10.1016/j.ecoser.2019.101036.
Handler, S., 2018. Alternative age-friendly initiatives: redefining age-friendly design'. In: Buffel, Tine, Handler, Sophie, Phillipson, Chris (Eds.), Age-Friendly Cities and Communities: A Global Perspective https://doi.org/10.1332/policypress/9781447331315.003.0011 (Bristol, 2018; online edn, Policy Press Scholarship Online, 20 Sept 2018). (Accessed 5 November 2024).
Hartig, T., Mitchell, R., De Vries, S., Frumkin, H., 2014. Nature and health. Annu. Rev. Publ. Health 35, 207–228. https://doi.org/10.1146/annurev-publhealth-032013-182443.
Henrich, J., Heine, S.J., Norenzayan, A., 2010. The weirdest people in the world? Behav. Brain Sci. 33, 61–83. https://doi.org/10.1017/S0140525X0999152X.
Hoegh-Guldberg, O., Jacob, D., Bindi, M., Brown, S., Camilloni, I., Diedhiou, A., Djalante, R., Ebi, K., Engelbrecht, F., Guiot, J., Hijioka, Y., Mehrotra, S., Payne, A., Seneviratne, S.I., Thomas, A., Warren, R., Zhou, G., Halim, S.A., Achlatis, M., Alexander, L.V., Allen, M., Berry, P., Boyer, C., Byers, E., Brilli, L., Buckeridge, M., Cheung, W., Craig, M., Ellis, N., Evans, J., Fischer, H., Fraedrich, K., Fuss, S., Ganase, A., Gattuso, J.P., Greve, P., Bolaños, T.G., Hanasaki, N., Hasegawa, T., Hayes, K., Hirsch, A., Jones, C., Jung, T., Kanninen, M., Krinner, G., Lawrence, D., Lenton, T., Ley, D., Liverman, D., Mahowald, N., McInnes, K., Meissner, K.J., Millar, R., Mintenbeck, K., Mitchell, D., Mix, A.C., Notz, D., Nurse, L., Okem, A., Olsson, L., Oppenheimer, M., Paz, S., Petersen, J., Petzold, J., Preuschmann, S., Rahman, M.F., Rogelj, J., Scheuffele, H., Schleussner, C.-F., Scott, D., Séférian, R., Sillmann, J., Singh, C., Slade, R., Stephenson, K., Stephenson, T., Sylla, M.B., Tebboth, M., Tschakert, P., Vautard, R., Wartenburger, R., Wehner, M., Weyer, N.M., Whyte, F., Yohe, G., Zhang, X., Zougmoré, R.B., 2018. Impacts of 1.5°C Global Warming on Natural and Human Systems.
Hollifield, M., Warner, T.D., Lian, N., Krakow, B., Jenkins, J.H., Kesler, J., Stevenson, J., Westermeyer, J., 2002. Measuring trauma and health status in refugees. A critical review. JAMA 288, 611–621. https://doi.org/10.1001/jama.288.5.611.
Irvine, K.N., Fisher, D., Marselle, M.R., Currie, M., Colley, K., Warber, S.L., 2022. Social isolation in older adults: a qualitative study on the social dimensions of group outdoor health walks. Int. J. Environ. Res. Publ. Health 19, 5353. https://doi.org/10.3390/ijerph19095353.
Irvine, K.N., Warber, S.L., Devine-Wright, P., Gaston, K.J., 2013. Understanding urban green space as a health resource: a qualitative comparison of visit motivation and derived effects among park users in sheffield, UK. Int. J. Environ. Res. Publ. Health 10, 417–442. https://doi.org/10.3390/ijerph10010417.
Jankovic, J., Bremner, S., Bogic, M., Lecic-Tosevski, D., Ajdukovic, D., Franciskovic, T., Galeazzi, G.M., Kucukalic, A., Morina, N., Popovski, M., Schützwohl, M., Priebe, S., 2013. Trauma and suicidality in war affected communities. Eur. Psychiatr. 28, 514–520. https://doi.org/10.1016/j.eurpsy.2012.06.001.
Johnson, S., Bacsu, J., McIntosh, T., Jeffery, B., Novik, N., 2019. Social isolation and loneliness among immigrant and refugee seniors in Canada: a scoping review. IJMHSC 15, 177–190. https://doi.org/10.1108/IJMHSC-10-2018-0067.
Keniger, L.E., Gaston, K.J., Irvine, K.N., Fuller, R.A., 2013. What are the benefits of interacting with nature? Int. J. Environ. Res. Publ. Health 10, 913–935. https://doi.org/10.3390/ijerph10030913.
Kirmayer, L.J., Narasiah, L., Munoz, M., Rashid, M., Ryder, A.G., Guzder, J., Hassan, G., Rousseau, C., Pottie, K., 2011. Common mental health problems in immigrants and refugees: general approach in primary care. CMAJ (Can. Med. Assoc. J.) 183, E959–E967. https://doi.org/10.1503/cmaj.090292.
Lewicka, M., 2011. Place attachment: how far have we come in the last 40 years? J. Environ. Psychol. 31, 207–230. https://doi.org/10.1016/j.jenvp.2010.10.001.
Magnusson, A., Boivin, D., 2003. Seasonal affective disorder: an overview. Chronobiol. Int. 20, 189–207. https://doi.org/10.1081/CBI-120019310.
Marselle, M.R., Hartig, T., Cox, D.T.C., de Bell, S., Knapp, S., Lindley, S., Triguero-Mas, M., Böhning-Gaese, K., Braubach, M., Cook, P.A., de Vries, S., Heintz-Buschart, A., Hofmann, M., Irvine, K.N., Kabisch, N., Kolek, F., Kraemer, R., Markevych, I., Martens, D., Müller, R., Nieuwenhuijsen, M., Potts, J.M., Stadler, J., Walton, S., Warber, S.L., Bonn, A., 2021. Pathways linking biodiversity to human health: a conceptual framework. Environ. Int. 150, 106420. https://doi.org/10.1016/j.envint.2021.106420.
Matthews, G., Jones, D.M., Chamberlain, A.G., 1990. Refining the measurement of mood: the UWIST mood adjective checklist. Br. J. Psychol. 81, 17–42. https://doi.org/10.1111/j.2044-8295.1990.tb02343.x.
McAuliffe, M., Triandafyllidou, A., 2021. World Migration Report 2022. International Organization for Migration (IOM), Geneva.
Mulvaney-Day, N.E., Alegría, M., Sribney, W., 2007. Social cohesion, social support, and health among Latinos in the United States. Soc. Sci. Med. 64, 477–495. https://doi.org/10.1016/j.socscimed.2006.08.030.
Nawrath, M., Fisher, J.C., ArotomaRojas, I., Davies, Z.G., Elsey, H., Cooke, P., Dallimer, M2024 Using participatory video in environmental research. People and Nature https://doi.org/10.1002/pan3.10646.
Passmore, H.-A., Yargeau, A., Blench, J., 2022. Wellbeing in winter: testing the noticing nature intervention during winter months. Front. Psychol. 13.
Paudyal, P., Tattan, M., Cooper, M.J.F., 2021. Qualitative study on mental health and well-being of Syrian refugees and their coping mechanisms towards integration in the UK. BMJ Open 11, e046065. https://doi.org/10.1136/bmjopen-2020-046065.
Petersen, E., Martin, A.J., 2021. Kama muta (≈ being moved) helps connect people in and to nature: a photo elicitation approach. Ecopsychology 13, 37–47. https://doi.org/10.1089/eco.2020.0032.
Platts-Fowler, D., Robinson, D., 2015. A place for integration: refugee experiences in two English cities. Popul. Space Place 21, 476–491. https://doi.org/10.1002/psp.1928.
Pumariega, A.J., Rothe, E., Pumariega, J.B., 2005. Mental health of immigrants and refugees. Community Ment. Health J. 41, 581–597. https://doi.org/10.1007/s10597-005-6363-1.
Qu, X., Qi, X., Wu, B., Yu, J., Zhang, H., 2023. Perceived social cohesion and depressive symptoms among internal migrants in China: the mediating role of social adaptation. Front. Public Health 11.
Rai, S., Kangas, K., Turtiainen, K., Stamm, I., Tolvanen, A., 2023. Nature-based integration of migrants: a cross-national systematic literature review. Urban For. Urban Green. 88, 128089. https://doi.org/10.1016/j.ufug.2023.128089.
Rigolon, A., E M Browning, M.H., McAnirlin, O., Yoon, H., 2021. Green space and health equity: a systematic review on the potential of green space to reduce health disparities. Int. J. Environ. Res. Publ. Health 18, 2563. https://doi.org/10.3390/ijerph18052563.
Rishbeth, C., Finney, N., 2006. Novelty and nostalgia in urban greenspace: refugee perspectives. Tijdschr. Econ. Soc. Geogr. 97, 281–295. https://doi.org/10.1111/j.1467-9663.2006.00520.x.
Sampson, R.J., Raudenbush, S.W., Earls, F., 1997. Neighborhoods and violent crime: a multilevel study of collective efficacy. Science 277, 918–924. https://doi.org/10.1126/science.277.5328.918.

Santos, J.J., Costa, T.A., Guilherme, J.H., Silva, W.C., Abentroth, L.R., Krebs, J.A., Sotoriva, P., 2015. Adaptation and cross-cultural validation of the Brazilian version of the Warwick-Edinburgh mental well-being scale. Rev. Assoc. Med. Bras. 61, 209–214. https://doi.org/10.1590/1806-9282.61.03.209.

Scannell, L., Gifford, R., 2010. Defining place attachment: a tripartite organizing framework. J. Environ. Psychol. 30, 1–10. https://doi.org/10.1016/j.jenvp.2009.09.006.

Schulz, J., Bahrami-Rad, D., Beauchamp, J., Henrich, J., 2018. The origins of WEIRD psychology. https://doi.org/10.2139/ssrn.3201031.

Shah, N., Cader, M., Andrews, W.P., Wijesekera, D., Stewart-Brown, S.L., 2018. Responsiveness of the short Warwick Edinburgh mental well-being scale (SWEMWBS): evaluation a clinical sample. Health Qual. Life Outcome 16, 239. https://doi.org/10.1186/s12955-018-1060-2.

Shanahan, D.F., Astell–Burt, T., Barber, E.A., Brymer, E., Cox, D.T.C., Dean, J., Depledge, M., Fuller, R.A., Hartig, T., Irvine, K.N., Jones, A., Kikillus, H., Lovell, R., Mitchell, R., Niemelä, J., Nieuwenhuijsen, M., Pretty, J., Townsend, M., van Heezik, Y., Warber, S., Gaston, K.J., 2019. Nature–based interventions for improving health and wellbeing: the purpose, the people and the outcomes. Sports 7, 141. https://doi.org/10.3390/sports7060141.

Skavronskaya, L., Moyle, B., Scott, N., Kralj, A., 2020. The psychology of novelty in memorable tourism experiences. Curr. Issues Tourism 23, 2683–2698. https://doi.org/10.1080/13683500.2019.1664422.

Smith, B.W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., Bernard, J., 2008. The brief resilience scale: assessing the ability to bounce back. Int. J. Behav. Med. 15, 194–200. https://doi.org/10.1080/10705500802222972.

Stadler, S., 2011. Intercultural communication and East Asian politeness. In: M, S., K, D. (Eds.), Politeness in East Asia. Cambridge University Press, Cambridge, pp. 98–124.

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkinson, J., Secker, J., Stewart-Brown, S., 2007. The warwick-edinburgh mental well-being scale (WEMWBS): development and UK validation. Health Qual. Life Outcome 5, 63. https://doi.org/10.1186/1477-7525-5-63.

The Lancet Public Health, 2022. No public health without planetary health. Lancet Public Health 7, e291. https://doi.org/10.1016/S2468-2667(22)00068-8.

Turner, S.W., Bowie, C., Dunn, G., Shapo, L., Yule, W., 2003. Mental health of Kosovan Albanian refugees in the UK. Br. J. Psychiatry 182, 444–448.

van den Berg, M., Wendel-Vos, W., van Poppel, M., Kemper, H., van Mechelen, W., Maas, J., 2015. Health benefits of green spaces in the living environment: a systematic review of epidemiological studies. Urban For. Urban Green. 14, 806–816. https://doi.org/10.1016/j.ufug.2015.07.008.

Veenhoven, R., 2005. Return of inequality in modern society? Test by dispersion of life satisfaction across time and nations. J. Happiness Stud. 6, 457–487. https://doi.org/10.1007/s10902-005-8858-4.

Verhofstadt, E., Bleys, B., Van Ootegem, L., 2019. Comparing the anamnestic comparative self-assessment (ACSA) to a conventional happiness question without anchoring. Applied Research Quality Life 14, 237–251. https://doi.org/10.1007/s11482-017-9589-5.

Viswanathan, M., Ammerman, A., Eng, E., Garlehner, G., Lohr, K.N., Griffith, D., Rhodes, S., Samuel-Hodge, C., Maty, S., Lux, L., Webb, L., Sutton, S.F., Swinson, T., Jackman, A., Whitener, L., 2004. Community-Based Participatory Research: Assessing the Evidence: Summary, AHRQ Evidence Report Summaries. Agency for Healthcare Research and Quality (US).

Waqas, A., Ahmad, W., Haddad, M., Taggart, F.M., Muhammad, Z., Bukhari, M.H., Sami, S.A., Batool, S.M., Najeeb, F., Hanif, A., Rizvi, Z.A., Ejaz, S., 2015. Measuring the well-being of health care professionals in the Punjab: a psychometric evaluation of the Warwick–Edinburgh Mental Well-being Scale in a Pakistani population. PeerJ 3, e1264. https://doi.org/10.7717/peerj.1264.

Weber, A.M., Trojan, J., 2018. The restorative value of the urban environment: a systematic review of the existing literature. Environ. Health Insights 12, 1178630218812805. https://doi.org/10.1177/1178630218812805.

Wickham, H., 2021. Tidyr: Tidy Messy Data.

Wickham, H., 2016. ggplot2: Elegant Graphics for Data Analysis. Use R! Springer International Publishing, Cham. https://doi.org/10.1007/978-3-319-24277-4.

Wickham, H., François, R., Henry, L., Müller, K., 2021. Dplyr: A Grammar of Data Manipulation.