

Results

Cite this article: Sterckx A, Delbaere B, De Blust G, Spacova I, Remmen R, and Keune H (2023). Quality criteria of nature-based interventions in healthcare institutions: a scoping review protocol. *Research Directions: One Health*, 1, e16, 1–4. <https://doi.org/10.1017/one.2023.8>

Received: 29 April 2023

Accepted: 11 July 2023

Keywords:

mental health; physical health; social health; nature-based intervention; healthcare; healthcare professional; relationship with nature; quality assessment

Corresponding author:

Ann Sterckx;

Email: ann.sterckx@uantwerpen.be

Quality criteria of nature-based interventions in healthcare institutions: a scoping review protocol

Ann Sterckx¹ , Ben Delbaere¹, Geert De Blust¹, Irina Spacova², Roy Remmen³ and Hans Keune¹ 

¹Chair Care and the Natural living environment, Department of Primary and Interdisciplinary Care, Faculty of Medicine and Health Sciences, University of Antwerp, Antwerp, Belgium; ²Department of Bioscience Engineering, University of Antwerp, Antwerp, Belgium and ³Department of Primary and Interdisciplinary Care, Faculty of Medicine and Health Sciences, University of Antwerp, Antwerp, Belgium

Abstract

For reasons of human health and sustainability, there is a growing interest in the potential of integrated nature-based interventions in healthcare. However, it is not clear which quality criteria underlie these interventions. Here, we develop a study protocol for a scoping review to explore potential quality criteria relating to the design, implementation and evaluation of nature-based interventions in healthcare institutions. The literature search will be conducted in PubMed, MEDLINE, Web of Science and Scopus, focusing on studies published in English between January 2005 and April 2023. The Joanna Briggs Institute Scoping Review methodology and Preferred Reporting Items for Systematic Reviews with extension for scoping reviews will be used. Search terms were developed stepwise and in consultation with the interdisciplinary research team and the project steering group. Two researchers will perform the screening of the papers independently. Using descriptive content analysis, identified quality criteria will be classified according to the applied theoretical frameworks, outcomes, levels (institutional, professional and patient) and the domains of biodiversity, human health or intervention processes. Ultimately, this descriptive work will result in a set of quality indicators and a prototype nature-based intervention quality assessment framework, which will be presented to the project steering group and multi-stakeholder assembly for further refinement.

Introduction

Several literature reviews and intervention studies have examined and reported on the psychological, physiological and social health benefits of human exposure to nature (Ulrich et al., 1991; Kaplan, 1995; Barton and Pretty, 2010; Hartig et al., 2014; Seymour, 2016; Martin et al., 2020; Jones et al., 2021). Given this growing body of evidence, healthcare institutions are interested in leveraging the potential for integrating nature into their healthcare practice as a complementary health-promoting approach.

Recently, a number of reviews discussed nature-based interventions (NBI) implemented in an organizational or institutional health care setting (Moeller et al., 2018; Shanahan et al., 2019; Gritzka et al., 2020), considering evidence on NBI-mediated health benefits for their target population. NBI can be defined as follows: “*Nature-based interventions are planned, intentional activities to promote individuals’ optimal functioning, health and well-being or to enable restoration and recovery through exposure to or interaction with authentic nature or technological nature.*” (Gritzka et al., 2020). Typical of this emerging field, is that there is a variety of NBI (e.g., ecotherapy, horticulture, outdoor therapy) used in different contexts for different purposes, making comparisons between NBI challenging (Shanahan et al., 2019; Gritzka et al., 2020). Furthermore, many questions crucial for efficient NBI implementation remain unanswered. For example, it is often not specified which evidence-based or theoretical frameworks underlie the NBI. Moreover, it is not always clear at which type of nature interaction a particular NBI aims (Frumkin et al., 2017) and the specific role of healthcare professionals in NBI is not defined (Lauwers et al., 2020). Next, given the urge for climate change mitigation and biodiversity restoration, and the emerging link with human health (Lindley et al., 2019; Marselle et al., 2021), healthcare institutions are examining how surrounding natural environments can be designed to restore biodiversity. As such, integrated NBI could be designed and implemented that simultaneously benefits human health and environmental sustainability, as found in a One Health- approach (Rüegg et al., 2018). However, the implementation of this human-nature-health interdependence in healthcare practice appears to be challenging due to its complexity (Lauwers et al., 2020). Another significant aspect is that NBI in healthcare institutions can be considered complex health interventions (Skivington et al., 2021).

© The Author(s), 2023. Published by Cambridge University Press. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted re-use, distribution and reproduction, provided the original article is properly cited.

Despite the recommendations for the evaluation of complex health interventions (Skivington et al., 2021) and the process of intervention mapping (Bartholomew Eldredge, 2016), it is not always obvious which quality criteria are or should be monitored during the design, implementation and evaluation of NBI to guarantee its quality, predefined outcomes, sustainability and integrated character. Having more insight in these quality criteria would advance evidence-based research and effective implementation of NBI. In addition, a well-developed NBI quality assessment framework will help policymakers and healthcare professionals to design, implement and evaluate NBI.

Therefore, this scoping review aims to identify quality criteria that are relevant in the different phases of the NBI (be it in the design, implementation and/or evaluation phase). We ask the question “*What is known in the literature about the quality criteria of nature-based interventions in healthcare institutions?*.” The final aim of this study is to develop an NBI quality assessment framework, to be tested and refined in a subsequent qualitative study including seven NBI cases in healthcare institutions in Flanders, Belgium.

Methods

An exploratory scoping review will be conducted in accordance with the Joanna Briggs Institute methodology for scoping reviews (Peters et al., 2022), including qualitative, cross-sectional and other quantitative peer-reviewed studies. Scoping reviews “*map systematically the breadth of evidence available on a particular topic, field, concept, or issue, often irrespective of source (i.e., primary research, reviews, non-empirical evidence) within or across particular contexts. Scoping reviews can clarify key concepts/definitions in the literature and identify key characteristics or factors related to a concept, including those related to methodological research*” (Munn et al., 2022). Scoping reviews are considered a legitimate and rigorous methodology (Peters et al., 2022) and are appropriate for poorly known, interdisciplinary, complex research topics (Peters et al., 2020). This methodology, in combination with the use of the Preferred Reporting Items for systematic reviews and Meta-Analysis extension for Scoping Reviews consisting of conducting and reporting standards, underpins the quality of this review (Tricco et al., 2018). A first screening process will be conducted independently by the two PRs based on published peer-reviewed study titles and abstracts. Disagreements will be solved by discussion, consensus and by consultation with the wider interdisciplinary research team (e.g., human health, biodiversity, bioscience engineering). Potential researchers' bias in screening will be taken into consideration and discussed as well. A second screening will take place while the full texts are being read. Finally, for the sake of rigor, feedback on the findings of the review (Arksey & O'Malley, 2005) will be solicited first from the project steering group, composed of members of a larger research project of which this study is part of, and subsequently from a multi-stakeholder assembly (e.g., healthcare or ecology practitioners, managers, policymakers).

Search strategy

Up to date, a preliminary search was conducted across four databases, PubMed, MEDLINE, Scopus and Web of Science focusing on reviews of NBI, to identify the most relevant search terms according to the topic of NBI. Titles and abstracts, keywords and index terms were screened to identify all possible search terms.

Concerning the topic of biodiversity, a set of search terms was compiled by an expert researcher in ecology, and completed by the wider interdisciplinary research team.

Search terms

The scoping review protocol and its search terms were discussed with the interdisciplinary research team and the project steering group. For example, the types of NBI (e.g., care farm vs. green care farm, traditional prisons vs. prisons with a healthcare unit and surrounded by nature), the proximity of the healthcare institution to the natural environment and types of nature (e.g., indoor vs. outdoor, view on nature or physical contact with nature) were discussed regarding their relevance for the aim and the review question of the study.

Several sets of search terms were developed and tested. Each set and its combination were refined by an experienced librarian at the University of Antwerp, Belgium. Finally, two remaining sets with the use of filters in certain databases gave the best quality and practicality of search results in view of the aim and research question of this study (Table 1). The same databases mentioned above will be used in the final study on NBI for which this protocol is developed.

Eligibility criteria (population, concept and context)

Population

The target populations of these NBI studies may be healthcare professionals (as NBI users or either prescribers or practitioners), or other staff or patients.

Concept

We will include studies in which individuals or groups participate in NBI. Studies discussing care farms will be included when they focus on the benefits of the natural environment on human health (e.g., green care farms). Purely animal-assisted therapies such as equine-assisted therapy or working with dogs or similar are also not included for the same contextual reason.

Context

NBI should be implemented in an institutional setting (e.g., hospital, residential care facility, nursing or retirement home), surrounded by green or blue space. Quality criteria will be understood as factors that mediate or support the success of the intervention processes, the health benefits for the participant and the biodiversity of the surrounding natural environment of the health institution.

Type of studies

This scoping review will consider qualitative, cross-sectional and other quantitative peer-reviewed studies. The review will be limited to studies published in English between January 2005-April 2023. Additionally, we will hand-check the references of all included articles to identify all relevant literature.

Exclusion criteria

Studies will be excluded when limited to animal-assisted care interventions, individual cases, community gardening, focus on other objectives than care (e.g., recreation), indoor and virtual nature and no institutional healthcare setting.

Table 1. Sets of keywords and used filters

Set 1 Nature-based	“Nature-based care” or “nature-based care” or “nature-based intervention*” or “nature-based intervention*” or “nature therap*” or “nature-based therap*” or “nature-based practice*” or “nature-based practice*” or “nature-based program*” or “nature-based program*” or “nature practice*” or “ecotherap*” or “nature-based health promotion*” or “nature-based health promotion*” or “wilderness therap*” or “nature-assisted therap*” or “nature-assisted therap*” or “nature-assisted care*” or “nature-assisted care*” or “nature-based approach*” or “nature-based approach*” or “garden therap*” or “horticultur* therap*” or “green therap*” or “environmental therap*” or “outdoor therap*” or “green prescription*” or (rehab* and garden*) or “nature-based rehab*” or “nature-based rehab*” or (“walk and talk”) or “health walk*” or “nature-based social prescribing” or “nature-based social prescri*” or “green care” or “care farm”
Set 2 Biodiversity	“green space” or greenspace or nature or forest or garden or green roof or green wall or wetland or pond or blue space or “green infrastructure” or “urban green” or “urban blue space” or “natural environment” or access or accessibility or “green views” or cultivation or duration or greenery or NDVI or trees or vegetation or diversity or “species diversity” or “species composition” or area or “crown width” or “vegetation layer” or “vegetation structure” or biodivers* or divers* or species richness or biome or ecotone
Filters	
PubMed	Title and abstract (otherwise over the 7000 results), English
MEDLINE	Abstract; English
Web of Science	Topic; English
Scopus	English
Strings have been adapted to the respective database	

Selection of studies

All identified citations will be collected and uploaded into a shared group in Rayyan, a web-based platform for reviews, and duplicates will be removed. Then, a step-by-step tabular process will be undertaken. First, based on the inclusion/exclusion criteria, the two PRs will conduct a screening of title and abstract. Second, the full texts will be assessed against the inclusion criteria by the two PRs and two additional researchers. Reasons for excluded studies at this stage will be recorded and reported in the scoping review. Results, uncertainties or disagreements regarding inclusion that arise at each stage will be resolved by discussion and consensus with the research team.

The search and selection process for relevant literature will be described in a PRISMA flow diagram (Moher et al., 2009; Tricco et al., 2018).

Data extraction

First, a draft of a data extraction table will be piloted on a subset of sources to be included in the review to test its feasibility for the review (Peters et al., 2022). Next, a summary of all retained studies will be provided, including author, year of publication, study type (review, intervention study), type of institution, type of NBI, study

population, use of evidence or theoretical frameworks and outcomes of the NBI. Modifications will be mentioned in the resulting scoping review.

Data analysis and presentation

The data will then be analyzed by the two PRs and two other researchers using a descriptive qualitative content analysis. The data of each study will be categorized according to the topics of biodiversity, human health or intervention processes, with their respective quality criteria. A second analysis will be performed according to the requirements of developing a set of NBI quality indicators, defined *per* level (institutional, professionals, patients), if applicable, which will be detailed in the scoping review.

Formulating conclusions, proposal prototype framework and future research directions

Based on the review findings and conclusions, we will develop a set of NBI quality indicators. Ultimately, the review findings will lead to a prototype NBI quality assessment framework that will be presented to the project steering group and a multi-stakeholder assembly of, for example, healthcare or ecology professionals, managers and policymakers, with the aim of gathering and implementing feedback. The framework will be further refined and tested in a set of Flemish NBI cases. Other research directions emerging from the scoping review will be proposed as well.

Acknowledgments

The authors express gratitude to the project steering group consisting of representatives of the Agency for Nature and Forests of the Flemish Government (Myriam De Bie, Jeroen Panis) and Sarah Feys of Vlaams Infrastructuurfonds voor Persoonsgebonden Aangelegenheden, department of the government Well-being, Public Health and Family, for their contributions to the design of the scoping review protocol. We also would like to thank Barbara Lejeune, librarian at the Library of the University of Antwerp, for her technical advice in crafting the sets of the search terms and strings.

Data availability statement. Data sharing is not applicable – no new data is generated.

Author contributions. The protocol for the scoping review was conceptualized by AS, with support of BD. IS, GDB, RR and HK gave input concerning the search terms. HK and RR supervised AS and BD on maintaining rigor in the execution of the review. Several drafts of this paper were composed by AS and reviewed by BD, HK, IS and RR. All authors have read and approved the final version of the manuscript.

Funding statement. The Agency for Nature and Forests of the Flemish Government funded this study (grant number ANB-AB-2022–210), as part of a larger funded project intending to create an NBI quality assessment framework. IS was supported by a grant from the Research Foundation – Flanders (Fonds Wetenschappelijk Onderzoek (FWO)) (postdoctoral grant 1277222N).

Competing interests. The work of AS and BD was funded by The Agency for Nature and Forests of the Flemish Government, Belgium. However, all authors declare that designing and writing this study protocol was conducted in the absence of any commercial or financial relationship that could be construed as a potential conflict of interest.

Ethical statement. Ethical approval for this protocol and planned scoping review were not required.

Connections references

Keune, H. (2023) How can we operationalize the promotion and evaluation of nature-related “green” health care within a One Health perspective? *Research Directions: One Health*, 1, E7. <https://doi.org/10.1017/one.2022.8>.

References

- Arksey H and O'Malley L** (2005) Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology* 8, 1, 19–32. <https://doi.org/10.1080/1364557032000119616>.
- Barton J and Pretty J** (2010) What is the best dose of nature and green exercise for improving mental health? A multi-study analysis. *Environmental Science & Technology* 44, 10, 3947–3955. <https://doi.org/10.1021/es903183r>.
- Bartholomew Eldredge LK, Markham CM, Ruiter RAC, Fernández ME, Kok G and Parcel GS** (2016) *Planning Health Promotion Programs: an Intervention Mapping Approach*, 4th Edn. San Francisco: Jossey-Bass Inc.
- Frumkin H, Bratman G N, Breslow S J, Cochran B, Kahn Jr 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. *Environmental Health Perspectives* 125, 7, 1–18. <https://doi.org/10.1289/EHP1663>.
- Gritzka S, MacIntyre TE, Dörfel D, Baker-Blanc JL and Calogiuri G** (2020) The effects of workplace nature-based interventions on the mental health and well-being of employees: a systematic review. *Front Psychiatry* 11, 323. <https://doi.org/10.3389/fpsy.2020.00323>.
- Hartig T, Mitchell R, de Vries S and Frumkin H** (2014) nature and health. *Nature and Health. Annual Review of Public Health* 35, 1, 207–228. <https://doi.org/10.1146/annurev-publhealth-032013-182443>.
- Jones R, Tarter R and Ross AM** (2021) Greenspace interventions, stress and cortisol: a scoping review. *International Journal of Environmental Research and Public Health* 18, 6, 2802. <https://doi.org/10.3390/ijerph18062802>.
- Kaplan S** (1995) The restorative benefits of nature: toward an integrative framework. *Journal of Environmental Psychology* 15, 3, 169–182. [https://doi.org/10.1016/0272-4944\(95\)90001-2](https://doi.org/10.1016/0272-4944(95)90001-2).
- Lauwers L, Bastiaens H, Remmen R and Keune H** (2020) Nature's contributions to human health: a missing link to primary health care? A scoping review of international overview reports and scientific evidence. *Frontiers in Public Health* 8, 52. <https://doi.org/10.3389/fpubh.2020.00052>.
- Lindley SJ, Cook PA, Dennis M and Gilchrist A** (2019) Biodiversity, physical health and climate change: a synthesis of recent evidence. In Marselle MR, Stadler J, Korn H, Irvine KN and Bonn A (eds.), *Biodiversity and Health in the Face of Climate Change*. Cham: Springer International Publishing, pp. 17–46.
- Marselle MR, Hartig T, Cox DTC, de Bell S, Knapp S, Lindley S and Bonn A** (2021) Pathways linking biodiversity to human health: a conceptual framework. *Environment International* 150, 106420. <https://doi.org/10.1016/j.envint.2021.106420>.
- Martin L, White MP, Hunt A, Richardson M, Pahl S and Burt J** (2020) Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours. *Journal of Environmental Psychology* 68, 101389. <https://doi.org/10.1016/j.jenvp.2020.101389>.
- Moeller C, King N, Burr V, Gibbs GR and Gomersall T** (2018) Nature-based interventions in institutional and organisational settings: a scoping review. *International Journal of Environmental Health Research* 28, 3, 293–305. <https://doi.org/10.1080/09603123.2018.1468425>.
- Moher D, Liberati A, Tetzlaff J, Altman DG and Group P** (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine* 151, 4, 264–269. <https://doi.org/10.7326/0003-4819-151-4-200908180-00135>.
- Munn Z, Pollock D, Khalil H, Alexander L, McInerney P, Godfrey CM and Tricco AC** (2022) What are scoping reviews? Providing a formal definition of scoping reviews as a type of evidence synthesis. *JBI Evidence Synthesis* 20, 4, 950–952. <https://doi.org/10.11124/jbies-21-00483>.
- Peters MDJ, Godfrey C, McInerney P, Khalil H, Larsen P, Marnie C and Munn Z** (2022) Best practice guidance and reporting items for the development of scoping review protocols. *JBI Evidence Synthesis* 20, 4, 953–968. <https://doi.org/10.11124/jbies-21-00242>.
- Peters MDJ, Marnie C, Tricco AC, Pollock D, Munn Z, Alexander L and Khalil H** (2020) Updated methodological guidance for the conduct of scoping reviews. *JBI Evidence Synthesis* 18, 10, 2119–2126. <https://doi.org/10.11124/jbies-20-00167>.
- Rüegg SR, Häslér B and Zinsstag J** (2018) *Integrated Approaches to Health: A Handbook for the Evaluation of One. Health*: Wageningen Academic Publishers.
- Seymour V** (2016) The human-nature relationship and its impact on health: a critical review. *Front Public Health* 4, 260. <https://doi.org/10.3389/fpubh.2016.00260>.
- Shanahan DF, Astell-Burt T, Barber EA, Brymer E, Cox DTC, Dean J and Gaston KJ** (2019) Nature-based interventions for improving health and wellbeing: the purpose, the people and the outcomes. *Sports (Basel, Switzerland)* 7, 6, 141. <https://doi.org/10.3390/sports7060141>.
- Skivington K, Matthews L, Simpson SA, Craig P, Baird J, Blazeby JM and Moore L** (2021) A new framework for developing and evaluating complex interventions: update of medical research council guidance. *BMJ* 374, n2061. <https://doi.org/10.1136/bmj.n2061>.
- Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D and Weeks L** (2018) PRISMA extension for scoping reviews (PRISMA-scR): checklist and explanation. *Annals of Internal Medicine* 169, 7, 467–473. <https://doi.org/10.7326/M18-0850>.
- Ulrich RS, Simons RF, Losito BD, Fiorito E, Miles MA and Zelson M** (1991) Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology* 11, 3, 201–230. [https://doi.org/10.1016/S0272-4944\(05\)80184-7](https://doi.org/10.1016/S0272-4944(05)80184-7).