Measuring adult health and well-being outcomes associated with nature contact in parks and other forms of protected areas: a scoping review protocol

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Abstract

Background: Growing evidence shows various health and well-being benefits from nature contact in parks and other forms of protected areas. Methods to measure these outcomes lack systematic identification, critical appraisal, and synthesis.

Objective: This scoping protocol details the methodology for a scoping review of the instruments that measure health and well-being linked to nature contact in protected areas, including their psychometric properties.

Methods: A multidisciplinary team will conduct the review following PRISMA-ScR guidelines. Eight databases will be searched for peer-reviewed literature measuring the mental health and well-being outcomes associated with direct nature contact in protected areas among adults over 18 years of age. All retrieved sources will be screened using clearly identified inclusion/exclusion criteria. Psychometric properties of instruments used in included studies will be analyzed.

Results: The scoping review will provide an organized summary of quantitative and qualitative instruments for measuring mental health and well-being outcomes, offering a starting point from which to critically examine the validity and consistency of such methods, helping researchers choose the best tool to assess outcomes.

Conclusions: Findings will aid in identifying the strengths and weaknesses of current measurement approaches to mental health and well-being outcomes of nature contact and may be used to guide future research on this topic. Clinical Trial: n/a

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Original Manuscript

Review

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Keywords: mental health; nature contact; protected areas; protocol; well-being

Introduction

There is a growing body of research investigating the role of nature in human health and well-being, with numerous studies reporting improvements to physical, psychological, emotional, cognitive, social, and spiritual well-being from time spent in nature. [1–4] Within this context, parks and other forms of protected areas offer unique opportunities to connect with nature, and considerable research has highlighted the increasingly recognized health benefits afforded by these settings. [5–8]

Globally, there are over 295,000 protected areas covering 16.1% of the Earth's terrestrial/freshwater area and 8.2% of its marine area. [9] There is also a highly ambitious global initiative to protect 30% of Earth's land/freshwater and marine area by 2030, as per the United Nations (UN) *Convention on Biological Diversity* (CBD) *Kunming-Montreal Global Biodiversity Framework.* [10] If this goal is achieved, the designation of parks and other forms of protected areas would represent the fastest and largest land/freshwater and ocean allocation in the history of the modern conservation movement. Protected areas differ from most urban greenspace and local-regional parks in that they have legislated management objectives to conserve nature and provide opportunities for human enjoyment. The International Union for the Conservation of Nature (IUCN) defines a protected area as *"a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values."* [11]

Protected areas can include national and sub-national protected area designations, such as national parks, state/provincial parks, and a variety of other designations that fit within the IUCN definition. It is estimated that such areas receive over 8 billion visits annually [12], underscoring their significance as an essential ecosystem service. It is also estimated that parks and protected areas provide health services valued at US$6 trillion annually worldwide [representing 8% of global Gross National Product (GNP)]. [13] Evidence establishing the significance of protected areas to human health and well-being continues to grow at the same time that many nations are committing to significantly expand protected areas networks by 2030. Given these joint trends, this proposed review offers a timely stock take that will help direct the current state of knowledge toward a stronger evidence-informed practice related to the use of parks and protected areas as a nature-based mental health service.

In addition to being timely, the proposed review will provide an important new tool for researchers who face numerous challenges investigating the impact of nature on human health and well-being. Previous research has examined the impact of nature on human health, demonstrating that mental health and well-being outcomes are the most frequently studied. [2] Despite a growing wealth of research, steps to critically evaluate and provide decision support to researchers and practitioners at the level of instrumentation are lacking. The dearth of current decision support presents a critical gap as well-being is a wide-ranging concept, with still wider ranging options related to measurement. Well-being can capture relatively transitory emotion and mood states, more stable aspects of positive identity like self-acceptance and self-esteem, broad global evaluations like subjective life satisfaction, as well as improvement in clinical conditions such as anxiety and depression.

The need for this review is underscored by a past systematic review conducted by Cooke et al. [14] While not specific to nature-based interventions, Cooke et al. [14] identified over 40 different instruments for measuring well-being that varied widely in length, psychometric properties (i.e., validity), and use cases. Linton et al. [15] argue that such variability may in part be due to a lack of

agreed upon criteria of what an instrument should contain. As noted, despite the current variety, ongoing creation of new instruments, and proliferation of their use in nature-based contexts, there has been no systematic or critical examination of the methods used to measure health and well-being outcomes associated with nature contact in parks and other forms of protected areas. This is a critical knowledge gap that the proposed scoping review will address.

Researchers working in this area would benefit from a clear framework identifying the features to consider in measurement selection as well as a summary of the measures that have been used and their validity. A framework of this type would provide a clearer picture of aspects of well-being that have and have not been investigated or replicated, and limits to the generalizability of the research to date. To support further research and decision-making related to outcome-based management in parks and other forms of protected areas, the proposed scoping review seeks to address two objectives:

(1) To identify the instruments used to measure mental health and well-being outcomes of adults associated with direct nature contact in parks and other forms of protected areas.

(2) To evaluate the psychometric properties associated with validity of the instruments used to measure mental health and well-being outcomes associated with direct nature contact.

Existing Reviews

The current protocol was informed by an initial review of the literature to identify potentially comparable knowledge syntheses. To capture the current state of research related to mental health and well-being outcomes from nature contact, we gathered and documented scoping reviews published within the past decade that focused on an adult population. Table 1 outlines details of seven relevant knowledge syntheses. All identified studies focused on constructs related to mental health and well-being. While six of the identified studies were specific to health and well-being outcomes related to nature contact, by contrast, none were specific to the unique context of parks and protected areas.

Cooke et al. [14] reviewed 42 different instruments used to measure aspects of psychological well-being, psychosocial well-being, and psycho-physical well-being. The study categorizes these instruments according to four well-being categories (hedonic, eudaimonic, quality of life, wellness) and a fifth category of composite measures. Evidence of reliability and validity of each instrument is tracked and reported, and authors report a substantial degree of variability in the reporting of evidence related to validity. Results do not report on patterns in the use of instruments according to intervention types or environmental contexts.

In two recent reviews, authors documented nature-based interventions and associated health and well-being outcomes. Wilkie and Davidson [16] examined 52 studies including a categorization of environmental settings, exposure times, and theoretical frameworks. They also report on targeted behaviours and outcomes, which includes mental health and well-being in 79% of studies reviewed and physiological health outcomes in 63% of studies. Results track specific outcomes (e.g., self-esteem) that were measured, but no details around measurement instruments. Nejade et al. [2] similarly reviewed 39 articles that provided evidence of mental and physical health outcomes from nature-based health interventions. The forms of natural outdoor environments included green spaces, blue spaces, and mixed green-blue spaces, ranging from urban parks to wetlands, to national parks or reserves (n=2). The study provides a categorization of nature-based health interventions and

activities, reports the mental and physical effects of engagement with natural outdoor environments, and discusses barriers and enablers of such engagement. Instruments used to assess health and well-being outcomes are not assessed.

Table 1. Summary of comparable existing knowledge syntheses.

Citation	Title	Objective	Review of Measurement Instruments	Specific to Outcomes from Nature Contact	Specific to Parks and Protected Areas
Cooke et al. (2016)	Measuring well-being: A review of instruments.	Identify and critically evaluate the psychometric properties of instruments measuring well-being and related constructs	Y	N	N
Wendelboe-Nelson et al. (2019)	A Scoping Review Mapping Research on Green Space and Associated Mental Health Benefits	Identify the variations across existing literature in the associations between greenspace and health benefits	Y	Y	N
Christiana et al. (2021)	A Scoping Review of the Health Benefits of Nature-Based Physical Activity	Summarize existing literature on the positive association between nature exposure, physical activity, and health outcomes	N	Y	N
Wilkie & Davidson (2021)	Prevalence and effectiveness of nature-based interventions to impact adult health-related behaviours and outcomes: A scoping review	Document the use of nature-based interventions as a strategy to change adult health-related behaviours and outcomes	N	Y	N
Charles-Rodriguez et al. (2022)	The Relationship Between Nature and Immigrant's Integration, Wellbeing and	Summarize existing research related to nature exposure, immigrant well-	N	Y	N

	Physical Activity: A Scoping Review	being, and physical activity			
Nejade et al. (2022)	What is the impact of nature on human health? A scoping review of the literature	Summarize evidence relating nature-based interventions to health outcomes and examine enablers of nature contact	N	Y	N
Overbury et al. (2023)	Swimming in nature: A scoping review of the mental health and wellbeing benefits of open water swimming	Summarize existing evidence relating to mental health and well-being benefits of open water swimming	N	Y	N

Despite the proliferation of studies revealing the health and well-being benefits associated with nature contact, there is a clear need to identify and understand the specific instruments being used to assess these benefits. This is especially true in the context of nature contact in parks and other forms of protected areas, where rapid growth in visits to such areas is occurring alongside unprecedented national commitments to protect land/freshwater and marine area the world-over. Research is needed to identify the most effective tools for assessing health and well-being outcomes *vis-a-vis* diverse research contexts (e.g., types of environments, activities, and socio-demographic considerations) so that evidence-based policies and guidelines, as well as program outcomes, can be assessed consistently and effectively.

Methods

Research Design and Guiding Frameworks

This scoping review has been registered with the Open Science Framework (OSF) (https://osf.io/uxjmq), and developed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines. [21]

Scoping reviews are broader in nature than systematic reviews, allowing researchers to examine the extent, range, and nature of research activity in a chosen area as opposed to finding the best evidence possible to a tightly defined research question. [22] A scoping review was considered the most appropriate method to address the research objectives due to the capacity to answer broad questions and summarize findings to identify gaps in the literature. [2,23] The scoping review will apply Arksey and O'Malley's(24) five stage process by: 1) identifying the research question(s), 2) identifying relevant studies, 3) selecting for studies in the final review, 4) charting the data, and 5) collating, summarizing, and reporting the results. Levac et al. [25] expands on this framework to include a sixth optional consulting stage, which the research team deemed unnecessary for the purpose of this study.

Each stage of the scoping review will be guided by the Population, Concept, and Context (PCC)

framework to establish cohesion between the research question(s), search strategy, and inclusion criteria (Table 2). The PCC framework is recommended for scoping reviews as a less restrictive alternative to the PICO (Population, Intervention, Comparator, and Outcome) framework typically applied to systematic reviews. [26] Throughout this process, the purpose of the scoping review will be referred to, and critically discussed by the research team, to ensure all decisions align with the research objectives and, ultimately, inform both research and practice.

Table 2. Developing a scoping review protocol with PCC.

P	Adults (18 years of age+)
C^1	Mental health, subjective well-being, emotional health, psychological health, restoration, coping, attention, mood, Indigenous well-being (including spirituality)
C^2	Direct contact with parks and protected areas (spatial scope)
P, population; C^1, concept; C^2, context	

Search Strategy

A comprehensive search strategy was developed by a multidisciplinary team of six researchers in collaboration with an experienced university librarian. Following the recommendations of the Joanna Briggs Institute [27] for developing a search strategy, a limited preliminary search was conducted using Google Scholar to identify literature relevant to the review topic. Keywords related to the research objectives used in the preliminary search included the following: “mental health”, “mental well-being", and “protected areas”. Through this process, 22 peer-reviewed articles were retrieved for preliminary review. This preliminary review involved analysis of article titles and abstracts, along with the index terms used to describe each article, in order to identify a robust set of key search terms.[1] The terminology used in the literature search for protected areas reflects the internationally recognized IUCN definition of protected areas and protected area categories, including specialized applications (i.e., marine protected areas). Additionally, to inform the development of the search strategy, a search in the American Psychological Association (APA) Dictionary of Psychology identified relevant terms related to mental health, well-being, and subjective well-being.

Searches will be conducted in eight scholarly databases (PubMed, Web of Science, PsychINFO (via ProQuest), ERIC (via EBSCOHost), CINAHL (via EBSCOHost), GreenFILE (via EBSCOHost), OVID, and GEOBASE) known to contain journals focusing on human health and the natural environment. The search hedge contains terms related to domains of protected areas, nature engagement or exposure, and human mental health and well-being (see Table 3). The search terms will be grouped by the Boolean operator “OR” to enhance the accuracy and relevance of results, and then combined using the Boolean operator “AND” to ensure only relevant literature which contains all listed search concepts will be generated. The proximity operator “NEAR/20” will be used to identify terms within 20 words of each other, regardless of their order. To promote transparency and replicability in future research, the full search strategy for each of the eight databases is available in Multimedia Appendix 1 (Section B).

Table 3. Primary search hedge subsequently adapted by scholarly database.

[1] The full literature index used to develop the search terms for this scoping review can be found in Section A of Multimedia Appendix 1.

Concept	Search Terms
Protected Area Classification	"protected area*" **OR** "national park*" **OR** "conserv* area*" **OR** "provincial park*" **OR** "state park*" **OR** "wildlife area*" **OR** "wildlife sanctuar*" **OR** "tribal park*" **OR** "nature reserve*" **OR** "marine reserve*" **OR** "marine sanctuar*" **OR** "conserv* territor*" **OR** "protected landscape*" **OR** "protected seascape*" **OR** "habitat management area*" **OR** "species management area*" **OR** "natural area*" **OR** "wilderness" **NEAR/20**
Nature Engagement	exposure **OR** access* **OR** time **OR** engag* **OR** visit* **OR** being **OR** activity **OR** exercis* **OR** experience* **AND**
Mental Health and Well-being	"well-being*" **OR** "psychological restoration" **OR** "psychological health" **OR** "restorative*" **OR** "life satisfaction" **OR** coping **OR** "stress hormone" **OR** cortisol **OR** "mental health" **OR** "subjective well*" **OR** cognit* **OR** stress* **OR** emotion* **OR** anxiety* **OR** anxious* **OR** depress* **OR** mood* **OR** "state of mind" **OR** "frame of mind" **OR** brain* **OR** mind* **OR** "self-esteem"

All database searches will be conducted in 2023, with the search updated to retrieve the most current literature prior to publication. To limit the scope of the searches, the selected databases will be filtered to only include peer-reviewed journal articles published in English. No date filters will be used to limit results to ensure that all relevant studies are included. By excluding a date limiter, the search strategy is more likely to identify trends over time, for instance when certain instruments were first used to measure mental health and well-being in a parks and protected areas context.

Study Selection Process

All studies identified by our search strategy will be uploaded into the reference manager software Zotero (https://www.zotero.org/). Study details will then be imported into the scoping review software Covidence (https://www.covidence.org/) where duplicates will be removed. The screening (and data extraction process) will be piloted by two independent reviewers. These reviewers will screen a random sample of 20 sources to ensure relative consistency and understanding of the proposed inclusion/exclusion criteria.

All studies will be screened by the two independent reviewers at two levels. At the first level the title, keywords, and abstracts of each source will be assessed against the following criteria listed in Table 4. Where both reviewers agree based on explicit content that a criterion was not met, the study will be removed. Where there is disagreement or a lack of explicit content to make a judgement, the study will move to level two for full text review using the same inclusion/exclusion criteria.

Table 4. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Relevant to the research question(s)	Not relevant to the research question(s)
Measures mental health and well-being	Only measures other forms of health and well-being (physical, social, etc.)

Protected area context	Non-protected area context
Focuses on direct contact (being physically present) with protected areas	Focuses on non-direct forms of contact with protected areas (virtual reality, photograph viewing, etc.)
Peer-reviewed articles (accessible for retrieval)	Books, book chapters/reviews, conference proceedings, dissertations, theses, systematic/scoping reviews, grey literature, news articles, social media content, opinion papers, inaccessible peer-reviewed articles
Focuses on adults (18 years of age or older)	Includes children (younger than 18 years of age)
Available in English	Not available in English

At the level of full text screening, the research team will attempt to retrieve the full text files of all potentially relevant studies through available university library services. If unable to retrieve the full text through the library services, a member of the research team will contact the corresponding authors to obtain a full text file. Sources that remain unavailable will be removed from the review. Once again, two independent reviewers will screen the full text files applying the same inclusion/exclusion criteria that were used at level one. Disagreements between reviewers at each stage of the selection process will be addressed through discussion, involving a third reviewer to resolve conflicts as necessary. In adherence with PRISMA-ScR guidelines, a flow diagram (see Multimedia Appendix 1, Section C) outlining the process will be presented in the final scoping review manuscript. [28]

Data Extraction and Analysis

Data will be extracted using Covidence by two independent reviewers and compared for quality assurance to reduce bias. Any discrepancies that arise will be discussed, and conflicts will be resolved by a third reviewer. The proposed data extraction form (Table 5) will be used to identify and extract relevant variables that best address the research objectives. Extracted data from each article will include descriptive information (e.g., author name(s), title, year of publication), and study methodology (e.g., location, study design, sample, measurement instrument, timing). Data pertaining to any quantitative or qualitative instruments used to measure mental health and well-being outcomes will also be extracted (e.g., dimensions of well-being measured, instrument name, number of items, response scale, end-user engagement). Where a study includes more than one instrument of interest, each instrument will be recorded separately.

Table 5. Proposed data extraction template, indicating fields for which researchers will extract data with sample outputs.

Domains	Data Extraction Fields	Sample Outputs
Characteristics of the study	• Reference • Study location • Protected area designation • Study design • Measurement form • Timing of measurement • Time spent in nature	• Full citation of listed study • Canada • National Park • Mixed methods, etc. • Questionnaire, interview, etc. • While in protected area

		• Two days, one week, etc.
Details of quantitative instruments used in included studies	• Dimension of well-being • Instrument name • Source • Number of items • Scale size • Substantive validity • Structural validity • External validity	• Affect • Positive and Negative Affect Schedule (PANAS) • Author, year • 20 items • 5-point scale • n = 1 (100%) • n = 1 (100%) • n = 0 (0%)
Details of qualitative instruments used in included studies	• Dimension of well-being • Instrument name • Source • “End user” engagement • Multiple researchers involved in theming process • Member checks	• Affect • Semi-structured interview • Author, year • n = 1 (100%) • n = 0 (0%) • n = 0 (0%)

Drawing on validity criteria from Simms [29], quantitative measurement instruments will be assessed for three aspects of construct validity – substantive validity, structural validity, and external validity. Substantive validity considers whether a measure is theoretically linked to the construct being studied. Structural validity describes the degree to which the scores of a scale are an adequate indication of what the items measure, while external validity considers whether the study findings can be generalized to other contexts. [29,30] Each of the validity criteria adapted from Simms [29] will be scored as yes (1) or no (0) based on whether studies provide evidence that consideration has been given to an instrument’s psychometric properties.

A quality appraisal will also be conducted on qualitative measurement instruments employed in reviewed studies. This appraisal indicates whether multiple reviewers were involved in the theming process, and checks were performed. Similar to the quantitative instruments, each criterion will be scored as a yes (1) or no (0) based on whether studies provide evidence that these activities were incorporated into the methodology.

Discussion

To the authors’ knowledge, this will be the first scoping review undertaken on measures used to assess mental health and well-being outcomes related to nature contact in a parks and protected areas context. This review will identify, evaluate, and compare measures to provide a comprehensive overview of the quantitative and qualitative methodological instruments and tools used in research to date. The review is limited, in that it does not include grey and white literature, as well as studies that are not available in English. Given this, some relevant sources may be missed. Peer-reviewed articles not indexed in the searched databases may also be missed, but this limitation was deemed acceptable given the need to manage the scope of the project. Additionally, the extent to which the psychometric properties of an instrument can be evaluated is limited to the information provided within the included studies, which may be lacking descriptions of scale development. A deeper investigation

would require looking elsewhere for additional resources, which is beyond the scope of this review. Nevertheless, this review will provide a strong evidence base on which to build future research.

Findings will aid in identifying the strengths and weaknesses of current measurement approaches to mental health and well-being outcomes of nature contact and may be used to guide future research on this topic. For example, nature prescriptions – a healthcare program comprising written directives by health professionals for visits to natural settings (either individually or in groups) relying heavily on parks and other forms of protected areas – now exist in at least six countries. [31] Canada has over 12,000 healthcare professionals prescribing nature in parks, and China's national health strategy includes a commitment to build more than 1,000 forest therapy facilities nationwide. [32]

Given the unprecedented interest and growth in nature-based healthcare commitments, it will be necessary to identify and use methods that effectively consider contextual factors. Relevant factors can include demographics (age, gender, ethnicity) and activities, durations, and environments prescribed. All of these factors must be documented to best ensure reliability and validity when evaluating the outcomes (or benefits) and efficacy of nature prescription programs. This proposed review is also very timely given the projected growth in the global estate of protected areas as per the UN CBD's *Kunming-Montreal Global Biodiversity Framework* (detailed in the introduction).

Adherence to the PRISMA-ScR guidelines will ensure the findings of this scoping review are high quality and replicable. Furthermore, by providing insights into the validity of the measurement instruments used, we provide an opportunity to strengthen the methodological quality of future studies. The outlined scoping review will have significant implications for researchers, policymakers, and practitioners working at the nature conservation and human health interface. This review will provide a means to both understand previous research and undertake innovative research initiatives related to mental health and well-being outcomes associated with nature contact in parks and protected areas.

Conflicts of Interest

None declared.

Abbreviations

JMIR: Journal of Medical Internet Research
RCT: randomized controlled trial

Multimedia Appendix 1

See Multimedia Appendix 1.

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Supplementary Files

Multimedia Appendixes

Untitled.
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