

# What are green prescriptions? A scoping review

Jessica Stanhope<sup>A,B,C,\*</sup>  and Philip Weinstein<sup>A,C,D,E</sup> 

For full list of author affiliations and declarations see end of paper

## \*Correspondence to:

Jessica Stanhope  
School of Allied Health Science and  
Practice, The University of Adelaide, North  
Terrace, Adelaide, South Australia 5005,  
Australia  
Email: [jessica.stanhope@adelaide.edu.au](mailto:jessica.stanhope@adelaide.edu.au)

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## ABSTRACT

**Introduction.** Clear terminology is critical to allow accurate communication between practitioners, policy makers and the public. **Aim.** We investigated how the term ‘green prescription’ has been used in the peer-reviewed literature. **Methods.** We conducted a scoping review of the peer-reviewed literature that used the term ‘green prescription(s)’ and determined how this term was used. We then investigated how the term has been used over time, in different geographic locations and in different academic disciplines. **Results.** We included 268 articles that used the term ‘green prescription(s)’. We found that the phrase ‘green prescription(s)’ has been used since 1997 to mean a written prescription for a lifestyle change, most commonly physical activity, provided by a health practitioner. However, more recently (since 2014) the term has also been used to mean exposure to nature. Despite the emergence of this new meaning, ‘green prescription’ remains, in the health and medical science literature across all continents, most commonly used to describe a prescription for physical activity. **Conclusion.** The use of the term ‘green prescriptions’ is inconsistent and has led to misuse of the research evidence regarding written prescriptions for exercise/diet being used to justify nature exposure to improve human health. We recommend that the term ‘green prescriptions’ continues to be used only as per its original definition, to refer to written prescriptions for physical activity and/or diet. For prescriptions to spend time in nature, we suggest use of the more appropriate term ‘nature prescriptions’.

**Keywords:** exercise, green prescription, health, lifestyle, nature, nature-based intervention, physical activity, review.

## Introduction

Consistent and clear terminology is critical to the execution, communication, comprehension and synthesis of research and policy. Despite this need, terminology in health is often inconsistent, in terms of both exposures<sup>1</sup> and outcomes,<sup>2,3</sup> leading to challenges in establishing and interpreting the evidence base. Discrepancies may occur with different geographic locations or disciplines adopting different terminology; for example, different definitions for ‘green spaces’ are adopted by different disciplines.<sup>1</sup> Such discrepancies become problematic when multidisciplinary studies are conducted, or where the research is being used by those in other disciplines. In this review we investigate how the term ‘green prescriptions’ is used in the peer-reviewed literature, to improve the consistency and clarity with which the term is used.

‘Green prescriptions’ were developed in New Zealand in the late 1990s, to describe written prescriptions by health professionals to support lifestyle changes to improve health, typically related to physical activity<sup>4,5</sup> and/or improved nutrition.<sup>5</sup> The programme in New Zealand has since been expanded to include follow-up support telephone calls, face-to-face meetings or community support groups,<sup>5</sup> and may also involve subsidised access to exercise facilities. The key element of the ‘green prescription’ is that it is a written prescription for a lifestyle intervention.

## WHAT GAP THIS FILLS

**What is already known:** The term ‘green prescriptions’ has been used since the late 1990s to refer to written prescriptions for physical activity and/or diet; however, recently the term has been used to describe nature-based interventions. The multiple meanings have led to the misappropriation of research evidence, so we investigated the use of the term across time, geographic location and disciplines to provide guidance on its future use.

**What this study adds:** We provide evidence that the term ‘green prescriptions’ is still predominantly used to describe written prescriptions for physical activity, and this is consistent across geographic continents. This use of the term also dominates in the health and medical literature, and is therefore most relevant to those who make such prescriptions.

However, the term ‘green prescriptions’ is now also used to describe nature-based prescriptions.<sup>6</sup> The varied use of the term ‘green prescriptions’ has already led to confusion surrounding its meaning. For example, several papers refer to nature-based prescriptions when instead citing papers regarding written prescriptions for physical activity,<sup>7–9</sup> and several authors have used research on ‘green prescriptions’ (lifestyle changes) to inappropriately support the effectiveness of nature-based activities.<sup>7</sup> This misappropriation of evidence is potentially problematic as it may lead to inappropriate policies and prescriptions being made, which may be ineffective, or at worst harmful.

In this review, we ask what does the term ‘green prescriptions’ refer to in the English-language, peer-reviewed literature? We also explore the temporal, geographic and disciplinary patterns in the meaning of ‘green prescriptions’ from the included articles.

## Methods

We conducted a scoping review to answer our research question. While systematic reviews are generally considered the highest level of evidence,<sup>10</sup> these reviews involve the synthesis of research evidence,<sup>11</sup> which was not the intention of our review. One of the indications for conducting a scoping review is to investigate definitions in the literature;<sup>11</sup> hence a scoping review was deemed appropriate. Like systematic reviews, scoping reviews involve conducting a systematic search and the extraction and synthesis of data in a transparent manner, however, the findings of the included studies are not necessarily required, depending on the research question (eg definition, methods used).<sup>11</sup> While scoping reviews of research findings (eg effectiveness of an intervention) might not be appropriate to use for

drawing recommendations about clinical practice and policy,<sup>11,12</sup> scoping reviews of other types of research questions may lead to recommendations for other purposes, for example, recommendations for future research questions,<sup>13–15</sup> methods<sup>2,13,15,16</sup> and terminology.<sup>2,15,16</sup> Our review protocol was not registered *a priori*, but has been outlined below.

A systematic search was conducted in January 2022, in Embase (Ovid), Medline (Ovid), Emcare (Ovid), PsychInfo (Ovid), Cochrane Database, Cumulative Index to the Nursing and Allied Health Literature (EbscoHost), ProQuest eLibrary, ProQuest Central, Scopus and Web of Science Core Collection. The terms ‘green prescription’ OR ‘green prescriptions’ were searched in all fields, and the only limits applied were in ProQuest eLibrary and ProQuest Central where the search was limited to ‘scholarly journals’.

Identified articles were exported into Endnote X9 for management. Duplicates were manually removed, and the full texts of the unique articles were screened for inclusion. To be eligible for inclusion, articles had to use the term ‘green prescription(s)’, relate to human health, be published in academic, peer-reviewed journals and in the English language. We excluded non-academic articles (eg book reviews, news articles) and conference abstracts.

Data were manually extracted from each of the included articles. Extracted data were: the date of publication, the country of the author’s affiliations, the journal name, what the prescription was for, whether the prescription was written and whether further support was provided (eg follow-up calls, counselling). Where the type of prescription was not explicitly stated, the context was used to categorise the article. For example, if a paper regarded spending time in nature, the article was classified as ‘nature’.

The journal discipline(s) was determined using Scimago Journal and Country Rank (<https://www.scimagojr.com>), and disciplines were then grouped as: medical and health sciences (medicine, nursing, psychology, health professions, neuroscience, immunology and microbiology, biochemistry, genetic and molecular biology, and pharmacology, toxicology and pharmaceuticals); environmental sciences (agriculture and biological sciences, earth and planetary sciences, and environmental science); humanities (arts and humanities, and social sciences); and other (veterinary, computer sciences, business, management and accounting, energy, and physics and astronomy). Journals classified as multi-disciplinary in Scimago were classified into these four categories, and journals not listed in Scimago Journal and Country Rank (<https://www.scimagojr.com>) were categorised according to the journal title and description. The manually categorised journals were *Journal of Romanian Sports Medicine Society* (medical and health science), *Journal of Physical Therapy Education* (medical and health science), *Journal of Psychiatry and Neurological Sciences* (medical and health science), *Zeszyty Naukowe Ochrony Zdrowia* (medical and health science), *AAACN Viewpoint* (medical and health science), *Sustainable Earth*

(environmental science), *New Zealand Physical Educator* (other), *Veterinary Dermatology* (other) and *Challenges* (medical and health science, environmental science, humanities and other).

The findings were reported descriptively.

Results

A total of 770 unique articles were identified in the database search, 268 of which were included (see Fig. 1 for the flow-chart of article inclusion/exclusion, and the Supplementary Material for characteristics of the included articles). Of these 268 articles, 178 (66%) used the term ‘green prescription’ to describe prescriptions for physical activity alone, with a further nine studies (3%) using the term for physical activity and diet and four (1%) indicating that the term refers to physical activity and has been expanded to include exposure to nature (Supplementary Material S1). A further five studies (2%) used the term to describe prescriptions for lifestyle interventions in general, and one study for diet alone. Only 48 studies (18%; excluding those that also referred to physical activity) used the term ‘green prescription’ to refer to nature-based prescriptions. The remaining studies referred to pharmaceutical prescriptions (*n* = 11), radiation therapy prescriptions (*n* = 2) and a further ten articles did not provide sufficient information or context to classify the type of prescription, and were classified as ‘unclear’ (Supplementary Material S1). A total of 63 (24%) articles referred to the prescriptions being in written form, and 73 (27%) as having further support provided to patients/clients (predominantly in articles where green prescriptions

referred to prescriptions for physical activity or diet; Table 1).

The term ‘green prescriptions’ was first used in the health literature in 1997, and referred to a written prescription for a physical activity intervention.<sup>4</sup> It was not until 2014 that the first paper appeared using the term to refer to exposure to nature.<sup>17</sup> While the use of the term ‘green prescriptions’ to refer to nature-based prescriptions has increased, the use of the term to describe prescriptions for physical activity still dominates (Fig. 2).

Regarding the geographic patterns in the use of the term ‘green prescriptions’, we grouped articles by the first authors’ (first listed) affiliation continent. Across all continents, the most common use of the term ‘green prescription’ was to refer to physical activity or diet prescriptions (54–100%; Table 2). The use of the term ‘green prescriptions’ to mean exposure to

Table 1. Written prescriptions and support as part of the ‘green prescription’.

	Written prescription	Support	Total
Lifestyle (generally)	1 (20%)	1 (20%)	5
Physical activity/diet	60 (31%)	72 (38%)	192
Nature	2 (4%)	0	52
Pharmaceuticals/ radiotherapy	0	0	13
Unclear	0	0	10

Note: the four studies that refer to ‘green prescriptions’ as referring to physical activity, and having been expanded to nature exposure, have been categorised as both physical activity and nature.

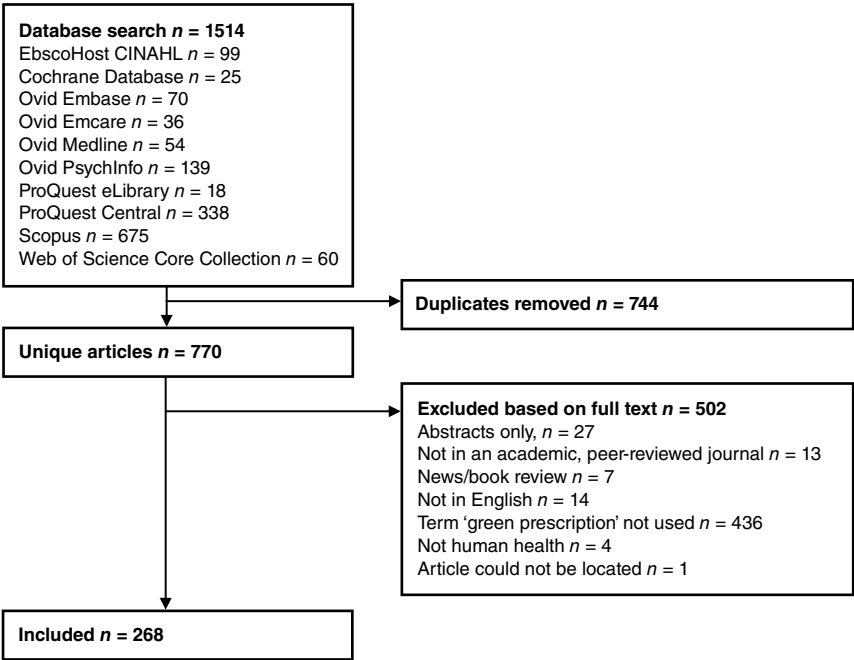
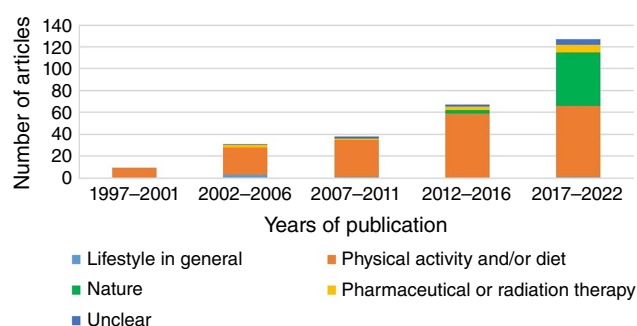


Fig. 1. Flow chart of study inclusion/exclusion. Note: CINAHL: Cumulative Index to the Nursing and Allied Health Literature. One article could not be located, and the journal confirmed it was not part of their collection.

nature was most common in Europe (38%). Most (83%) of the articles where the type of prescription could not be determined were from New Zealand, suggesting that it may be likely these papers also used the term consistently with its original definition from that country.

In the medical and health science journals, 'green prescriptions' most often referred to prescriptions for physical activity/diet (76%) and only 15% of studies referred to nature prescriptions. However, in the majority of papers in environmental science journals (71%), humanities (53%) and 'other' journals (71%), 'green prescriptions' referred to nature-based interventions, although physical activity/diet prescriptions were also common in these journal categories (34, 41 and 29%, respectively; Table 3).



**Fig. 2.** Type of 'green prescriptions' in articles published over time. Note: the four studies that refer to 'green prescriptions' as referring to physical activity, and having been expanded to nature exposure, have been categorised as both physical activity and nature.

## Discussion

Advice regarding lifestyle changes is commonly given by health professionals to prevent and manage a wide range of health conditions, and may include increases in physical activity, improvements to diet and increased exposure to nature or elements of nature. 'Green prescriptions' were initially intended to increase physical activity by providing this recommendation as a written prescription to the patient.<sup>4,5</sup> The prescriptions could also include additional support for this lifestyle change (eg follow-up telephone calls<sup>18</sup>) and/or prescriptions for dietary changes (from 2007<sup>19</sup>). From 2014, however, the term has also been used to prescribe nature-based exposures such as spending time in parks,<sup>17</sup> with some authors describing this as an expansion of green prescriptions for physical activity<sup>20-23</sup> – yet only two such articles referred to a written prescription.<sup>17,24</sup> Despite the recent emergence of the term 'green prescriptions' to refer to nature exposures, the majority of articles use the term to refer to prescriptions for physical activity and/or dietary changes (66%), both over time (Fig. 2) and across the continents of the first author affiliations (Table 1). While we also noted the term 'green prescription' was used in the context of pharmaceutical or radiation therapy prescriptions, these refer to prescriptions in very specific contexts that are unlikely to be confused with lifestyle changes (ie physical activity or nature exposures).

Our results suggest that there are differences in the use of the term 'green prescriptions' by discipline. In the medical and health science literature, 76% of articles used the term 'green prescriptions' to refer to prescriptions for physical

**Table 2.** Type of 'green prescription' by continent of the first authors' affiliation.

Continent	Lifestyle (generally)	Physical activity/diet	Nature	Pharmaceuticals/radiation therapy	Unclear	Total
Asia	0	6 (55%)	1 (9%)	4 (36%)	0	11
Europe	1 (1%)	45 (54%)	32 (38%)	8 (10%)	2 (2%)	84
North America	1 (2%)	32 (76%)	8 (19%)	1 (2%)	0	42
Oceania	3 (2%)	106 (83%)	11 (9%)	0	8 (6%)	128
South America	0	3 (100%)	0	0	0	3

Note: the four studies that refer to 'green prescriptions' as referring to physical activity, and having been expanded to nature exposure, have been categorised as both physical activity and nature.

**Table 3.** Type of 'green prescription' by disciplinary area of the journal.

Discipline	Lifestyle generally	Physical activity/diet	Nature	Pharmaceuticals/radiation	Unclear	Total
Medical and health sciences	5 (2%)	189 (76%)	37 (15%)	13 (5%)	10 (4%)	250
Environmental sciences	0	13 (34%)	27 (71%)	0	0	38
Humanities	1 (3%)	13 (41%)	17 (53%)	2 (6%)	1 (3%)	32
Other	0	5 (29%)	12 (71%)	1 (6%)	0	17

Note: articles could be classified into more than one discipline category, and the four studies that refer to 'green prescriptions' as referring to physical activity, and having been expanded to nature exposure, have been categorised as both physical activity and nature.

activity and/or diet, while only 15% of articles used the term 'green prescriptions' to refer to nature exposures. However, the majority of studies in the environmental sciences (71%), humanities (53%) and 'other' categories (71%) use the term 'green prescriptions' to mean nature exposures. While it is acknowledged that different disciplines use terms in different ways, in the case of 'green prescriptions' we must attribute priority of use to the disciplines that *make* such prescriptions – health professionals. As such, communication with target audiences would be clearer if the health professions maintained and used the term 'green prescriptions' in its original sense, and all disciplines (eg health, ecologists, sociologists) used a different term to refer to nature exposure rather than misusing what has been defined as 'written instructions for physical activity and/or diet changes'.

With regards to the articles using the term 'green prescription' to describe nature-based exposures, none of the articles investigated such prescriptions. Indeed, most articles did not define the term, but rather the context indicated that the authors were referring to prescriptions for nature-based exposures. Only two articles were primary research studies that investigated nature-based 'green prescriptions' specifically. Robinson *et al.*<sup>23</sup> used the terms 'green prescriptions' and the prescription of 'nature-based interventions' interchangeably. They investigated the views of general practitioners and nature-based organisations related to green prescribing, as well as factors associated with these views (eg green spaces, geography, services and deprivation). Prescriptions for nature-based interventions were made by 25% of general practitioners, however, there was no additional information provided about these prescriptions (eg the particular activities prescribed). Thomson *et al.*<sup>25</sup> investigated the impact of a 10-week 'creative green prescription' program involving activities both in green space (eg planting) and indoors (eg nature themed print making), on mood for adults engaging with mental health services. They also documented the views of facilitators and participants in the program. Referrals to the program were made by community mental health nurses or a day centre supporting adults who were disadvantaged and vulnerable. Statistically significant improvements in mood were reported.

Additionally, Shanahan *et al.*<sup>8</sup> investigated what nature-based interventions were, and used the terms green, nature, park and garden prescriptions interchangeably to refer to the prescription of outdoor activities for patients or clients made by health professionals. Nature-based interventions intended for patients/clients to engage with (as distinct from the provision and optimisation of natural spaces eg hospital gardens), included care farming, horticulture, animal-assisted therapy, residential retreats, wilderness therapy, ecotherapy, forest bathing, green or blue exercise, environmental volunteering, nature or wild play, forest schools, kitchen gardens, and outdoor education activities.<sup>8</sup>

Nature prescriptions are therefore a broad category of prescriptions that can be made by health professionals for any patients or clients to engage with nature.

The importance of exposure to nature for human health is being increasingly understood. The last decade has seen a rapid growth in the number of papers investigating green space exposure and health<sup>26</sup> and nature-based therapies,<sup>27–29</sup> with implications to increase exposure to nature to improve both public health and clinical practice outcomes. We support such changing practice, but with changing practice comes new terminology. The inconsistent use of terminology and/or varied descriptions for specific terms has led to significant challenges in comparing and synthesising health research, particularly because of inconsistent definitions of exposures and outcomes.<sup>2,3</sup> As such, consistent terminology should be encouraged. In the context of 'green prescriptions' we have identified several articles that have used references to support their statements that do not match the meaning of 'green prescriptions' in their article.<sup>7–9,30–39</sup> To provide one example, McDonald *et al.*<sup>7</sup> state that nature exposure is beneficial to health based on a reference that deals with 'green prescription' for physical activity. They make specific statements regarding reduced all-cause mortality, long-term effectiveness and cost-effectiveness of 'green prescriptions', but the supporting evidence is regarding physical activity (which was not necessarily outdoors),<sup>40–42</sup> not nature exposures, as the authors have implied. Such statements are misleading and represent a misappropriation of the evidence base regarding green prescriptions for physical activity. As a result, situations could arise that are detrimental to public and/or individual health. For example, a 'green prescription' to increase physical activity to combat obesity may be hazardous to an asthmatic patient if interpreted as a 'nature prescription' that would expose the individual to nature-based allergens. While good practice is to check all cited articles to ensure they support what is being stated, having consistent terminology would facilitate that process and reduce the chances of errors of misinterpretation or misrepresentation. Furthermore, it is critical that authors clearly state the definitions of terms used to avoid such problems. In the context of 'green prescriptions', it was unclear exactly what interventions were being prescribed (eg physical activity, nature) in ten of the included articles. In addition, the manner in which the prescription was made was unclear in many articles: while 63 articles stated that written prescriptions were provided, it is unclear in the remaining 205 articles whether they did or did not do so. Clear, consistent terminology and definitions are critical to the interpretation and synthesis of evidence, and to the policies and recommendations based thereupon.

The evidence regarding 'green prescriptions' is growing, but use of the term is largely inconsistent. Most articles use the term to refer to physical activity and/or diet prescriptions, yet a growing proportion of articles use the term to



refer to nature exposures. Several articles have used evidence regarding 'green prescriptions' for physical activity to support their statements regarding nature-based prescriptions. Such misappropriation of evidence introduces the possibility of wasteful and ineffective, or at worst harmful, recommendations being made and policies developed. Given the original and dominant use of the term 'green prescriptions' to refer to prescriptions for physical activity and/or diet, it is recommended that prescriptions for nature exposure use the term nature-based prescriptions or similar, to ensure clarity (and safety) of use of the evidence base.

## Supplementary material

Supplementary material is available [online](#).

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**Data availability.** All data extracted are reported in the manuscript.

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#### Author affiliations

<sup>A</sup>School of Biological Sciences, The University of Adelaide, North Terrace, Adelaide, South Australia 5005, Australia.

<sup>B</sup>School of Allied Health Science and Practice, The University of Adelaide, North Terrace, Adelaide, South Australia 5005, Australia.

<sup>C</sup>Environment Institute, The University of Adelaide, North Terrace, Adelaide, South Australia 5005, Australia.

<sup>D</sup>School of Public Health, The University of Adelaide, North Terrace, Adelaide, South Australia 5005, Australia.

<sup>E</sup>South Australian Museum, North Terrace, Adelaide, South Australia 5000, Australia.