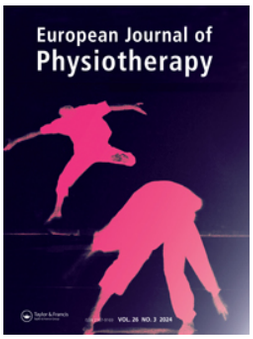

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Physiotherapy and planetary health: a scoping review

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ABSTRACT

Introduction: Planetary health is deteriorating rapidly and climate change is one of the core boundaries for planetary health. Climate change is associated with worsening human health and physiotherapists are involved in managing its downstream effects on patients. Meanwhile, health care is a significant contributor to global carbon emissions.

Objectives: Identify and map the existing literature that explores the relationship between physiotherapy and planetary health.

Methods: Four databases and grey literature were systematically searched. Material was eligible if it explored physiotherapy theory or practice related to a change in the environment. Two independent reviewers screened article title and abstracts, then assessed the full-text for eligibility for inclusion. Characteristics and nature of the literature were extracted and synthesised descriptively.

Results: Thirty-four of 4510 outputs met the inclusion criteria. Twenty were journal publications and fourteen were available on websites. A common theme related to the concept of physiotherapy as an environmentally friendly healthcare practice ($n=8$) which may be through promoting interventions that are environmentally friendly ($n=7$) and encouraging sustainable practice as a profession ($n=6$).

Conclusion: There is a strong global call for the physiotherapy profession to advocate for environmentally sustainable practice at individual and organisational realms. More empirical research on the relationship between physiotherapy and planetary health is now needed to strengthen knowledge of accessible and effective interventions to address this health crisis.

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Climate change; environment; planetary health; physiotherapy; sustainable

Introduction

Planetary health, defined as 'the health of human civilisation and the state of the natural systems on which it depends' [1], is deteriorating rapidly [2]. While human health has improved in recent years due to improved access to health care and control of diseases, this has been at the expense of the health of the environment [1]. Rapid human population growth has threatened environmental conditions through overconsumption and exploitation of natural resources [3,4]. The consumption of natural resources as a result of economic growth and industrialism has increased in an exponential pattern over past decades with negative impact on natural systems such as loss of biodiversity and increased carbon dioxide concentrations [5,6]. In addition to affecting ecosystems that humans depend on for food, fresh water and air, biodiversity loss also increases the risk of emerging infectious diseases and chronic inflammatory diseases [7]. Steffen et al. [8] proposed the concept of planetary boundaries for a safe operating space for humans on Earth and identified climate change and biosphere integrity as two core boundaries that, if crossed, may lead to irreversible change and harm to human health and the Earth [8].

The current status of planetary health is widely portrayed in contemporary media, with 'climate change' describing long-term shifts in temperatures and weather patterns [9]. A recently published meta-review of 94 systematic reviews concluded that climate change is associated with worse human health, such as the negative association between wildfire exposure and respiratory outcomes [10]. Increasingly frequent climate events can also impact the functioning of health care systems and services [11]. The sustainable development goals (SDGs) of the 2030 Agenda for Sustainable Development [12] provide targets for the health and development of people and our planet over the coming years. The SDG to 'take urgent action to combat climate change and impacts' [12] calls health professionals globally to equip themselves to meet this challenge.

Physiotherapists are an integral part of the health care system through their practice to prevent or improve many health conditions that affect people's function and quality of life. Therefore, it is important to reflect on their response to climate change. 'Environmental physiotherapy' is an emerging area of importance in the profession [13]. It recognises that both physiotherapists and clients of physiotherapy are experiencing negative health effects of climate change, and that physiotherapists have a role to intervene to prevent and improve health [13,14]. It also considers the role of physiotherapists in a health care sector that is an important

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contributor to carbon emission [15]. Compared to professions with more resource-intensive techniques such as imaging or surgery [13], physiotherapy has been proposed as an environmentally-friendly profession with a greater emphasis on hands-on or exercise-based assessment and interventions with environmental benefits such as active transport [16].

With growing interest and action in the area of environmental physiotherapy since the first 'call to arms' for the profession over 15 years ago [14], it is timely to review the published literature, so far, on this topic. Such a review can help to evaluate the physiotherapy profession's response to this global health issue and inform future directions for the profession's efforts. The scoping review method adopted by the authors of this paper, is a common approach to map broad topics and to check the extent of evidence of scholarly work on emerging topics [17]. The aim of this scoping review was to identify and map the existing literature on the relationship between physiotherapy practice and theory, and a change in planetary health in terms of the extent, range and nature of published literature. The findings of this review were aimed to provide further insight into how physiotherapy can positively influence the environment.

Table 1. Example of search strategy (MEDLINE).

1	exp physiotherapy/
2	exp physiotherapist/
3	physical therap*.tw.
4	physiotherap*.tw.
5	1 or 2 or 3 or 4
6	environment/
7	exp ecosystem/
8	environmental sustainability/
9	exp carbon footprint/
10	exp environmental protection/
11	exp climate change/
12	exp air pollution/
13	exp bicycle/
14	(environmental or planet* or greenspace* or green space* or greenhouse or natural environment* or ecosystem* or ecolog* or environmental sustainab* or resource sustainab* or carbon footprint or carbon emission* or climate change or pollut* or extreme heat or temperature change* or global temperature or extreme temperature or conservation or biodivers* or heatwave* or heat wave* or bushfire* or bush fire* or wildfire* or Ecohealth or Geohealth or active transport* or active travel*).tw.
15	6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14
16	5 and 15
17	limit 16 to yr='2009 -Current'

Methods

The scoping review protocol was published on the Open Science Framework (OSF Registration DOI: https://doi.org/10.17605/OSF.IO/YQ2A6). The review report is guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping reviews (PRISMA – ScR) [18].

Information sources/search

Four databases including Cumulative Index to Nursing & Allied Health Literature CINAHL (Ovid), Emcare (Ovid), Medline (Ovid) and Scopus were systematically searched for relevant literature from January 2009 to January 2022. A search strategy using keywords, Medical Subject Headings (MeSH) and Boolean operators that included the concepts of 'environment' and 'physiotherapy' was developed in Medline under the guidance of an academic librarian and translated across to other databases. Table 1 has a sample of the systematic search strategy. The search was adapted in Google Scholar for the same time period. See Supplementary Material for search strategy for all databases and Google Scholar. Grey literature including the Environmental Physiotherapy Association website resource lists (http://environmentalphysio.com/), Physiopedia courses (https://members.physio-pedia.com/learn/) and World Physiotherapy Website (https://world.physio/) were also reviewed for literature eligible for inclusion. A subject matter expert on the topic of environmental physiotherapy (Dr Filip Maric [FM]) reviewed the list of included literature on 22 September 2022, and provided a list of further records for screening against the eligibility criteria of this review.

Eligibility criteria

Literature that described theory or practice of the physiotherapy profession, and explicitly related physiotherapy to a change in natural environment and/or planetary health was eligible for inclusion. Both peer-reviewed literature and grey literature (for example, blogs and websites) were included. The search start date was set to include material from 2009. To our knowledge Jones [14] was the first published paper to specifically address the physiotherapy profession's response to climate change. Articles published in English or Chinese language were included.

Selection of literature for inclusion

All search references were uploaded to Endnote20™ for data sorting and then imported to Covidence™ for duplicate removal and screening. The first 50 records (titles and abstract) were reviewed by all members of the research team independently (LC, CF, RB and KL) against the eligibility criteria for screening calibration. Any discrepancy between reviewers during the calibration process was discussed until a consensus was reached. Subsequently, all titles and abstracts were screened by two independent reviewers. Records that received 'yes' or 'maybe' votes at the first screen phase progressed to the full text review phase and were independently reviewed by two reviewers. Any conflicts that could not be resolved through discussion were then reviewed by a third reviewer. Where more than one published output from the same authors had used the same or overlapping data to discuss or investigate the same topic, they were combined into a single record where the most detailed written information was available. For example, an article on prescribing active transport as a planetary health intervention [19] was made into an online course [20] and blog post [21], these were included in this review combined as a single record based on the article.

Data charting process

A customised data charting template was piloted on 5% of the literatures by two independent reviewers. Researchers met to compare and discuss the data extracted prior to finalising the template. Data charting was then completed by one reviewer and checked by a second reviewer independently. A third reviewer was consulted to resolve any conflict.

Characteristics of the literature were charted, this included: authors and their affiliations, year first published online, location of literature, literature types and for empirical research evidence including research aim/question, study design, methodology, intervention type and comparator, sample size, population and outcomes. Further, the field of physiotherapy and the identified relationship between physiotherapy and planetary health, and any actions/issues recommended for physiotherapy in relation to climate change were charted.

Collating and reporting of results

The umbrella term 'output(s)' was used in this scoping review to describe all published material. The authors felt this was more appropriate than using the term 'study' for example as many of the included outputs were commentary rather than scientific studies. Data on the characteristics of the outputs were summarised descriptively. The countries reported in author affiliations were categorised into the five geographic regions described by World Physiotherapy [22]. Where there were multiple authors in an output, all authors' affiliations were reported under the output. For this review, journal publications that were not labelled as an editorial or letter to the editor and did not describe methodologies of an empirical nature were categorised as a commentary. Only articles that described a search strategy were classified as a review. The field of physiotherapy to which the literature pertained was classified into the categories of clinical practice, advocacy, education or research, based on the aim of the output. The relationship between physiotherapy (practice and theory) and planetary health across the outputs was collated and synthesised descriptively.

Results

A total of 4,483 outputs were identified through the searches and 26 additional outputs were included for screening following a review by the content expert (FM). 138 full texts were reviewed, and 34 outputs met the study inclusion criteria (Figure 1).

Characteristics of included output

Table 2 summarises the main characteristics of included outputs. There was an increase in published outputs relating physiotherapy to change in the natural environment and/or planetary health from the year 2016 onwards (Figure 2). Thirty-four outputs were published by authors from 23 different countries across the globe representing all five World Physiotherapy regions (Figure 3). Of the 27 outputs that had more than one author, 78% ($n=21$) represented international collaborations. One author (FM) from Norway had the highest number of outputs ($n=15$).

The included outputs were published in scientific journals (59%, $n=20$) and on websites (41%, $n=14$). Of those published in scientific journals, most of them ($n=15$) were published in physiotherapy journals (Figure 4). Of the included outputs published in scientific journals, half were commentaries [5,13,19,26,29,30,32,33,36,50]. Other types of outputs included editorials [14,24,25], letter to the editor [23,27,51], and conference abstract [28]. Three outputs were empirical studies [31,34,35].

Apart from two podcasts on the topic area [37,52] and one video to promote a symposium session in a World Physiotherapy congress [53], all other outputs were in a written form. The written literature published on websites included commentaries [39–43], congress session summary [45], webinar advertisement [54], forum blog post [55], interview [38] and The Environmental Physiotherapy agenda [16].

Nature of the output

The aim of the outputs mostly focused on advocacy (65% $n=22$), ranging from general advocacy raising the profession's awareness and considering the relationship between physiotherapy and the environment [5,13,14,19,25,27,33,36,37,39,41,42,45,52,54,55], to advocacy on the impact of climate on the health of specific patient groups and communities [23,34,44,51]. Two outputs focused on advocacy related to the health system itself [32,38].

Five outputs related to clinical practice with four of these addressing specific fields of physiotherapy [28,31,40,43] and one pertaining to all areas of clinical practice [29]. Four outputs were related to education and training of physiotherapy students and graduate physiotherapists [16,24,35,53], and three outputs focused on the need for further research on physiotherapy and planetary health [26,30,50].

Relationship between physiotherapy and planetary health

Two outputs highlighted the close relationship between physiotherapy and the environment [37,52]. Physiotherapists' involvement in the management of people affected by a change in environmental conditions such as extreme weather events were described in six outputs [23,31,33,39,44,51].

Eight outputs presented and discussed strategies that the physiotherapy profession and individual physiotherapists can take to promote sustainable use of natural resources in clinical practice [14,26,29,30,38,40,53]. Seven outputs presented interventions of environmental benefit and planetary health that physiotherapists can utilise including active transport, green and blue space exposure [19,24,33,36,41]. The idea that physiotherapy is an environmentally friendly profession with low-carbon management alternatives compared to use of pharmaceuticals and can reduce patient length of stay in hospital which, in turn, reduces the carbon footprint of health care was discussed in six outputs [13,16,32,36,43,50].

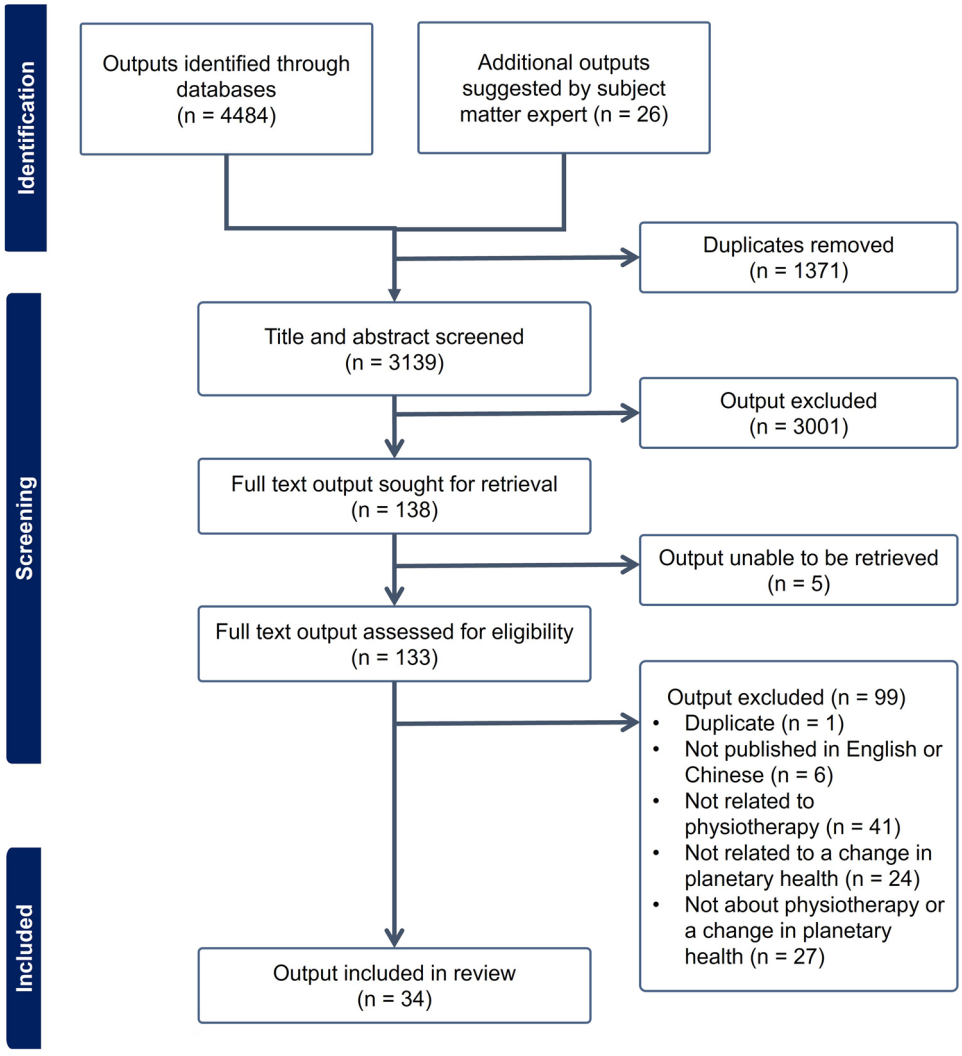

Figure 1. PRISMA flow chart.

There were only four empirical studies (three articles and one conference abstract) that investigated the relationship between physiotherapy and climate change. These included a cross-sectional survey of physiotherapists' attitudes and knowledge about the topic [34], a qualitative study that found severe weather events impact access to rehabilitation services in people with tropic spastic paraparesy [31], a sequence analysis of documents leading to implementation of ecological bodies and relational anatomies into physiotherapy education [35], and a quantitative study that assessed the effectiveness of a remote monitoring intervention to reduce the carbon footprint of a long term ventilation service [28]. Several outputs discussed how physiotherapists can contribute to the United Nation's sustainable development goals [24,27,30,42] and others discussed possibilities of inclusion of environmental physiotherapy into the education of students training to become physiotherapists [16,35,53].

Discussion

This is the first scoping review, to our knowledge, aimed at identifying and mapping the literature reporting on the relationship between physiotherapy (practice and theory) and planetary health. Findings of this review suggest that the response of the physiotherapy profession to climate change is an area that is gaining global interest with increasing momentum in recent years. A total of 34 outputs were included in this review, covering a broad range and different types of literature relating to how the physiotherapy profession responds to and influences change in planetary health at an individual practitioner level, physiotherapy profession level and broader society level.

The trajectory of a steady growth in peer-reviewed and grey literature on physiotherapy and planetary health observed in this review was similar to the pattern reported for the nursing profession and climate change documentation that started almost a decade earlier [56]. The observed drop in the number of outputs in 2022 in this review was likely related to the timing of the Covid-19 outbreak. Physiotherapists from all five World Physiotherapy geographical regions contributed to the literature included in this review indicating widespread interest in this topic to match the global impact of climate change. The high number of international collaborations between authors show that this

Table 2. Characteristics of included literature.

Output published in journals						
First author (year first published)	Title	Country of authors	Name of journal	Type of output	Field of physiotherapy practise	Relation between physiotherapy and planetary health
Foo [51]	The role of physiotherapy in climate change mitigation	Australia	Physiotherapy	Letter to editor	Advocacy	How physiotherapy respond to change in planetary health
Hartwich [23]	No title - (letter to the editor)	Australia	Physiotherapy	Letter to editor	Advocacy	Both how physiotherapy can influence change in planetary health and respond to change in planetary health
Jones [14]	Physiotherapy and the Earth's global climate: a need for cultural change	Australia	Physiotherapy Research International	Editorial	Advocacy	How physiotherapy can influence change in planetary health
Maric et al. [24]	A progress report on planetary health, environmental and sustainability education in physiotherapy–Editorial	Norway, USA, New Zealand, Switzerland, Pakistan, Germany, Australia, Greece, Brazil, UK, Sweden	European Journal of Physiotherapy	Editorial	Education	How physiotherapy can influence change in planetary health
Maric et al. [25]	Advancing Environmental Stewardship in Physical Therapy: Connect, Learn, Act	Norway, USA	Cardiopulmonary Physical Therapy Journal	Editorial	Advocacy	How physiotherapy respond to change in planetary health
Maric et al. [26]	Essentials for sustainable physiotherapy: introducing environmental reasoning into physiotherapy clinical decision-making.	Norway, India	Fysioterapeuten	Commentary	Research	How physiotherapy can influence change in planetary health
Maric and Nicholls [13][a]	A call for a new environmental physiotherapy - An editorial	New Zealand	Physiotherapy Theory and Practice	Commentary	Advocacy	How physiotherapy can influence change in planetary health
Maric and Nicholls [27]	Paradigm shifts are hard to come by: looking ahead of COVID-19 with the social and environmental determinants of health and the UN SDGs	New Zealand, Norway	European Journal of Physiotherapy	Letter to the editor	Advocacy	How physiotherapy can influence change in planetary health
Maric and Nicholls [5]	Environmental physiotherapy and the case of multispecies justice in planetary care	New Zealand, Norway	Physiotherapy Theory and Practice	Commentary	Advocacy	How physiotherapy can influence change in planetary health
Moses et al. [28]	Reducing the carbon footprint in a regional long term ventilation service with the use of remote monitoring	UK	Physiotherapy	Conference abstract	Clinical practise	How physiotherapy can influence change in planetary health
Padhy [29]	Environmental physiotherapy and global issues	India	International Journal of Innovative Science and Research Technology	Commentary	Clinical practise	How physiotherapy can influence change in planetary health
Palstam et al. [30]	A Call to Include a Perspective of Sustainable Development in Physical Therapy Research	Sweden	Physical Therapy	Commentary	Research	How physiotherapy can influence change in planetary health
Reis et al. [31]	Impact of accessibility on adherence to physiotherapeutic treatment of people living with tropical spastic paraparesy: qualitative study	Brazil	Revista Pesquisa em Fisioterapia	Empirical study	Clinical practise	How physiotherapy respond to change in planetary health
Banerjee and Maric [50]	Mitigating the environmental impact of NSAIDs - physiotherapy as a contribution to one health and the SDGs	India, Norway	European Journal of Physiotherapy	Commentary	Research	How physiotherapy can influence change in planetary health
Sinclair [32]	Environmental cost of pain management: pharmaceuticals vs physical therapies	USA	Integrative Medicine	Commentary	Advocacy	How physiotherapy can influence change in planetary health

(*Continued*)

Table 2. Continued.

Output published in journals						
First author (year first published)	Title	Country of authors	Name of journal	Type of output	Field of physiotherapy practise	Relation between physiotherapy and planetary health
Stanhope et al. [33]	Physiotherapy and ecosystem services: improving the health of our patients, the population and the environment	Australia, Norway	Physiotherapy Theory and Practice	Commentary	Advocacy	Both how physiotherapy can influence change in planetary health and respond to change in planetary health
Toner et al. [19][b]	Prescribing active transport as a planetary health intervention - benefits, challenges and recommendations	Ireland, USA, UK, Australia, Norway	Physical therapy reviews	Commentary	Advocacy	How physiotherapy can influence change in planetary health
Lister et al. [34]	South African Healthcare Professionals' Knowledge, Attitudes, and Practices Regarding Environmental Sustainability in Healthcare: A Mixed-Methods Study	South Africa, Norway	International Journal of Environmental Research and Public Health	Empirical study	Advocacy	How physiotherapy can influence change in planetary health
Richter and Maric [35]	Ecological bodies and relationship anatomies: towards a transversal foundation for planetary health education	Germany, Norway	Challenges	Empirical study	Education	How physiotherapy can influence change in planetary health
Palstam et al. [36]	Sustainability in physiotherapy and rehabilitation	Sweden, UK	Orthopaedics and Trauma	Commentary	Advocacy	How physiotherapy can influence change in planetary health

Outputs not published in journals						
First author (year)	Title	Country where authors are located	Magazine name or website domain	Type of output	Field of physiotherapy practise	Relation between physiotherapy and planetary health
Christe [55]	Why Should Pain Researchers Consider Climate Change?	Switzerland	www.painresearchforum.org/	Virtual correspondent blog	Advocacy	How physiotherapy can influence change in planetary health
Cleaver and Simard [54]	Climate change: A contemporary challenge to public health. Will physiotherapists sit on the sidelines or take action? [Paper presentation] Canadian Physiotherapy Association Congress, Ottawa, Canada	Canada	cpa.embodiaacademy.com	Promote virtual summit	Advocacy	How physiotherapy can influence change in planetary health
Maric et al. [16]	#19: Environmental Physiotherapy Education (Unconference 2020)	Norway, Canada, Ireland, Brazil, New Zealand, South Africa	http://inbetaphysio.com/	Podcast	Advocacy	How physiotherapy respond to change in planetary health
Maric et al. [16]	The environmental physiotherapy agenda 2023	Norway, New Zealand, South Africa, UK, Netherlands,	http://environmentalphysio.com/	Technical report	Education	How physiotherapy can influence change in planetary health
Maric and Ellis [37]	Environmental Healthcare Unconference Podcast #1	Norway, UK	http://inbetaphysio.com/	Podcast	Advocacy	How physiotherapy respond to change in planetary health
Maric et al. [25]	Implementing planetary health, environment and sustainability in international physiotherapy education	Norway, India, South Africa, USA, Suriname	wp2023.world.physio/	Video to promote upcoming congress symposium	Education	How physiotherapy can influence change in planetary health
O'Connor [38]	Talking sustainable healthcare tech with Rachael Moses, Lancashire Teaching Hospitals	UK	https://blog.warp-it.co.uk/	Interview	Advocacy	How physiotherapy can influence change in planetary health
Physiotherapy contributors [39]	Global Challenges Relating to the Refugee Experience	Australia, Saint Lucia & UK, Ireland, France	https://www.physio-pedia.com/	Commentary	Advocacy	How physiotherapy respond to change in planetary health
Physiotherapy contributors [40]	Waste Reduction in Acupuncture	Saint Lucia & UK, Canada	https://www.physio-pedia.com/	Commentary	Clinical practice	How physiotherapy can influence change in planetary health

(*Continued*)

Table 2. Continued.

Output published in journals						
First author (year first published)	Title	Country of authors	Name of journal	Type of output	Field of physiotherapy practise	Relation between physiotherapy and planetary health
Physiotherapy contributors [41][c]	Biodiversity and Physiotherapy	USA, South Africa; Australia; Saint Lucia & UK, US, New Zealand, Nigeria, Haiti	https://www.physio-pedia.com/	Commentary	Advocacy	How physiotherapy can influence change in planetary health
Physiotherapy contributors [42]	Sustainable Development Goals	UK, Ireland, India, Saint Lucia, Nigeria, Germany, Hungary	https://www.physio-pedia.com/	Commentary	Advocacy	How physiotherapy can influence change in planetary health
Physiotherapy contributors [43][d]	Sustainable Healthcare and Environmental Physiotherapy	USA, Saint Lucia & UK, South Africa, Australia, India	https://www.physio-pedia.com/	Commentary	Clinical practice	How physiotherapy can influence change in planetary health
Starr [44]	Making waves for change	UK	Frontline (The Chartered Society of Physio magazine)	interview article	Advocacy	How physiotherapy respond to change in planetary health
Sturm et al. [45]	Challenging physiotherapy's comfort zones: Ethics, inequity & climate change	Austria, Australia, St Lucia, Norway, Ireland, New Zealand	congress.physio/	Congress discussion session	Advocacy	Both how physiotherapy can influence change in planetary health and respond to change in planetary health

UK: United Kingdom; USA: United States of America.
[a]This was a combined record where the journal article was also made into an online course [46] and webpage [47].
[b]This was a combined record where the journal article was also made into an online course [20] and blog post [21].
[c]This was a combined record where the journal article was also made into an online course [48].
[d]This was a combined record where the commentary was based on an online course [49].

topic is of interest beyond the boundaries of any one country and is possibly fostered by the increasing availability of reliable electronic communication in all regions and professional social media networks. The international membership of the 'Environmental Physiotherapy Association (EPA)', an active branch of physiotherapists interested in the environment and climate change has also provided networking opportunity between international members [57]. The EPA has demonstrated leadership in this new topic area of physiotherapy and it is not surprising that many of the papers published and e-material available for interested physiotherapists is authored by EPA members [57].

Broad categories of recommendation are aimed at the individual practitioner (micro) level, physiotherapy community (meso) level and broader society (macro) level [58]. The micro level of literature relates to what a physiotherapist might do in relation to themselves, their patients and their practices. For example, Moss et al. [28] investigated how the use of remote monitoring of patients on long term ventilator can reduce the carbon footprint of the community service, or the recommendation by Toner et al. [19] for physiotherapists to prescribe active transport as an intervention. Maric et al. [25] suggested physiotherapists to consider planetary health as a socio-ecological factor that can influence one's health. The meso level of literature makes suggestions for action by the physiotherapy profession and health care organisations. For example, Maric and Nicholls [13] promoted physiotherapy as a sustainable health care practice compared to more resource-intensive medical procedures, while others raised awareness of how some physiotherapy interventions are less harmful to the environment compared to pharmaceuticals [32,55]. The incorporation of environmental physiotherapy in the profession's training curriculum is pivotal for promoting sustainable physiotherapy practice as a profession [16,35,53]. At the macro level, recommendations were aimed at a national or international level audience (for example by the United Nations, National government, World Physiotherapy) such as symposium sessions at the World Physiotherapy congress [45,53].

Commentary style, rather than research per se, was the most frequent category of output, raising awareness about the importance of the environment and climate change in relation to physiotherapy. This may be a form of discursive consciousness [59] where actors (physiotherapists) share their knowledge and discuss topics of interest (environment and climate change) and subsequently consider information in relation to their own context (reflectivity about practice and culture). It is expected that physiotherapists would seek to have peer discussion about a topic preceding the initial conduct of empirical research. A similar finding was reported in a scoping review on this topic conducted in the nursing profession [56] where 'Professional Communication' was a frequent category of information located. In the case of climate change this is mirroring what is happening in the broader general community as people seek to raise societal awareness and political groups debate the issue. To support the many calls in the literature for action by physiotherapists, now there is a need for empirical research of interventions to be conducted and shared to provide physiotherapists with the means and

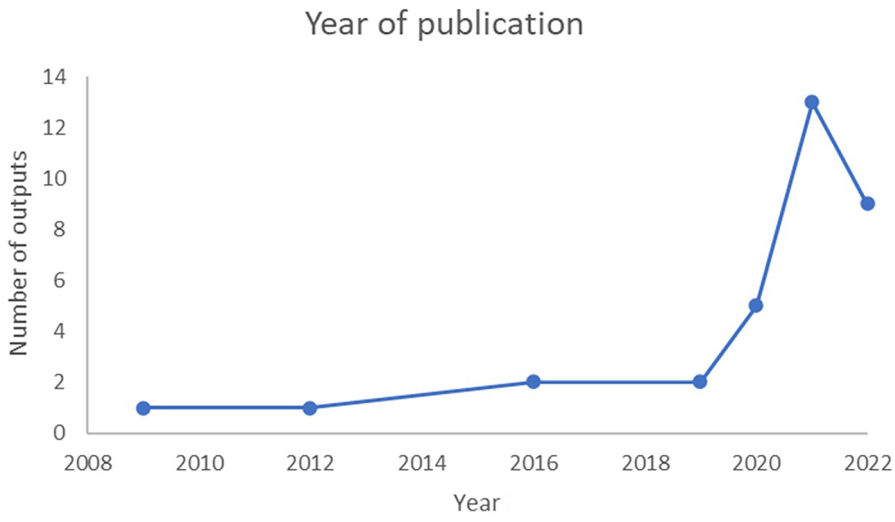

Figure 2. Year of publication of the included outputs.

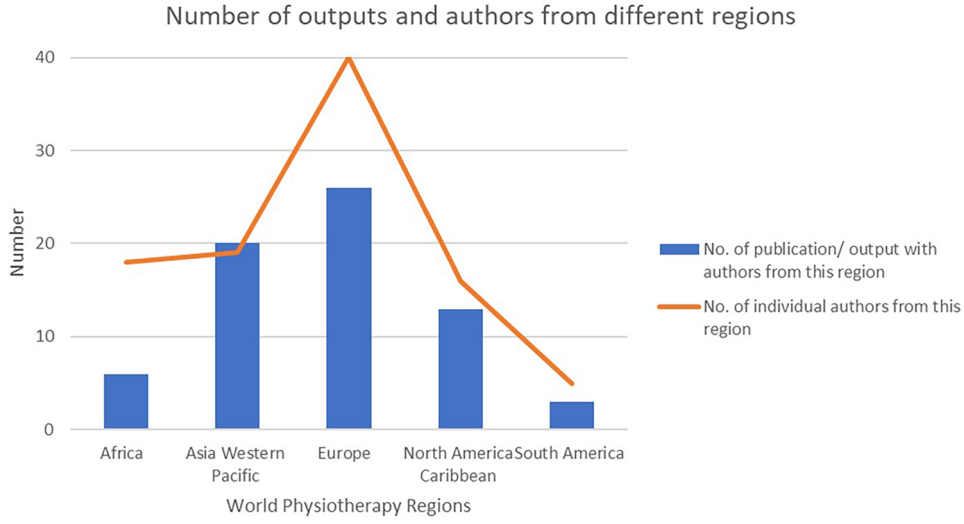

Figure 3. Summary of literatures and regions of the authors.

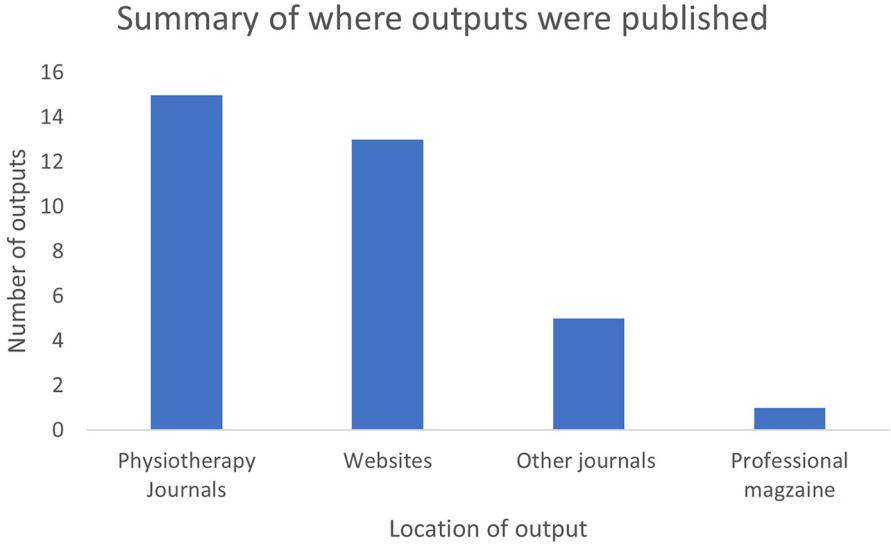

Figure 4. Summary of where the outputs were published.

trust that they can act on this issue. Such research could find the most effective and accessible ways to intervene to address the health effects of climate change on patients, promote environmentally sustainable actions by patients and colleagues, reduce the environmental impact of physiotherapy clinic practice, or how physiotherapists can effectively and safely adapt their interventions during extreme weather events. This is a nascent area of professional knowledge and there is much more to be known to inform practice.

Calls to professional associations to have clear strategies to direct action and provide knowledge to the physiotherapy profession [24,30] were observed in this review. Professional bodies can have an influential role in engagement with important societal issues and drive momentum to facilitate awareness and action nationally and internationally. For instance, after a push by the American Nurses Association to raise nurses' awareness of climate change, there was an increase in publications in the field of nursing [56]. For physiotherapy, internationally the EPA is fostering growing interest in this field. World Physiotherapy has recently approved a policy statement on climate change and health [60] and may consider including environmental physiotherapy as a subgroup within World Physiotherapy.

Limitations

There are several limitations to acknowledge in this scoping review. The search was limited to outputs published in the English or Chinese language from 2009 onwards, so literature prior to this date or that was published in other languages was missed which may have changed the pattern of material observed. The search strategy was unable to capture outputs such as conference presentation that are not indexed. There was a potential for missed outputs as forward citation search and a review of reference list of the included outputs was not conducted. Data charting was not completed by two independent researchers, it was conducted by a researcher and checked by a second researcher. The standard practice of scoping review does not involve quality appraisal, thus the quality of the included literature was not critically appraised; however, only three outputs reported empirical methodology for appraisal and the conduct of appraisal would not have influenced this paper's aim to identify and map the existing literature.

Conclusion

Deteriorating planetary health is a contemporary health crisis for humans and our planet. Health care is contributing to some of the concerns about planetary health such as climate change, so health professionals including physiotherapists are both contributors to the problem and an integral part of the solution. The mapping of the existing literature shows the physiotherapy profession has growing interest and engagement in addressing climate change and its effects on health. There is a strong global call for the physiotherapy profession to take action to advocate for sustainable practice at individual and organisational realms. What is needed now is for physiotherapists to be supported in taking positive actions for planetary health that are already available, and to conduct and share research knowledge to guide innovative and effective practice in this area.

Ethical statement

Ethics approval was not required for this study as this scoping review retrieved and synthesised data from published literature.

Author contributions

LS Katrina Li, Caroline E Fryer, Linya Chi and Rose Boucaut contributed to the development of ideas, review of articles, writing and provided feedback on the manuscript.

Disclosure statement

LS Katrina Li, Caroline E Fryer and Rose Boucaut declare they are members of the not-for-profit Environmental Physiotherapy Association. LS Katrina Li, Caroline E Fryer and Rose Boucaut receive no financial benefit from the Association. The Association has no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. LC declares no conflict of interest.

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