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## REVIEW

# Rapid review: Guides and frameworks to inform planetary health education for health professions

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## Abstract

**Issue Addressed:** Human actions have led to a range of global environmental changes. Health professionals must be prepared to deliver systemic changes to mitigate and adapt to the ecological crisis. This rapid review aimed to describe exemplar frameworks that inform planetary health education across health professions.

**Methods:** The rapid review methodology was informed by a scoping review process. A targeted search strategy was conducted using one representative database and additional strategies such as expert consultation and citation searching were used. Results are described narratively.

**Results:** Of the 11 637 articles, 17 were eligible for inclusion. The frameworks differed, with many recently developed for health professions broadly using a range of methodologies, including qualitative research, opinion/consensus data, literature reviews, and adaptation of previous models. Models such as metric-based scoring indicators and Sustainable Quality Improvement were featured in the frameworks, as were the application of First Nations Natural Laws.

**Conclusion:** This rapid review identifies and showcases accessible, interdisciplinary frameworks to inform the integration of planetary health in curricula, highlighting a rapidly evolving field through which interdisciplinary collaborations in healthcare are important to inform its pedagogy and application. Health education is an important component of health promotion; and thus this rapid review offers a range of approaches that health professionals, health promotion practitioners, and educators can use to inform the integration of planetary health, including sustainable healthcare, into curricula.

**So What?** Educational frameworks are informed by research and practice and provide key guidance to practitioners and educators; summarising key available planetary health education frameworks consolidates and guides effective education and builds on the existing body of knowledge to support urgent pro-environmental change.

## KEYWORDS

education, environment, health care sector, planetary health, sustainability

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## 1 | INTRODUCTION

Human actions have led to a range of global environmental changes, including deforestation, biodiversity loss, ocean acidification, air, water and soil pollution, and climate change.<sup>1</sup> Our planetary boundaries are being exceeded,<sup>2</sup> and urgent, transformative change is required to address the ecological crisis.<sup>2-4</sup> Health systems, defined as all organisations, institutions, or resources that are committed to and have the primary purpose of improving health,<sup>5</sup> are significant contributors to the climate crisis.<sup>6</sup> Globally, our health systems are responsible for 5.2% of global net emissions and, if it was a country, it would be the fifth largest greenhouse gas emitter.<sup>6</sup>

As human health and the health of the planet are intimately connected, several health bodies have not only declared a climate emergency (including the Australian Medical Association and World Health Organisation), but also a Code Red for the planet and its inhabitants.<sup>7,8</sup> The juxtaposition of the health sector's commitment to improving population health alongside its significant contribution to the climate crisis warrants an immediate response to prepare health professionals to deliver systemic changes. This is needed to not only mitigate the impact of their actions and adapt to the ecological crisis at both a workforce and a tertiary education level but also to contribute to the restoration of our natural environment.<sup>6,9,10</sup>

Despite this urgency, health professionals have generally reported a lack of knowledge, confidence and hence readiness to act.<sup>11-13</sup> Education for health professions must therefore encompass the health effects attributable to climate change as well as sustainable healthcare to adequately prepare health professionals to address these challenges.<sup>9,14</sup> The term 'planetary health education' has been used in the current review to encompass all forms of sustainability education (including climate change education, education for sustainable healthcare (ESH), One Health, and Ecohealth). Considering long-held Indigenous conceptions of environmental stewardship and spiritual and cultural connection to the land, this lens has been included.<sup>15,16</sup> Several networks support planetary health education such as the Centre for Sustainable Healthcare, the Global Consortium on Climate Education, Climateworks Centre, the Planetary Health Alliance, and the Nordic Centre for Sustainable Healthcare. In addition, there is increasing scholarly literature with exemplars designed to support different aspects of planetary health education, including example curriculum,<sup>13,17</sup> learning outcomes,<sup>9,10,18-22</sup> competencies,<sup>19,23,24</sup> and case studies.<sup>10,25-28</sup> Furthermore, frameworks or guides have been developed to support effective planetary health education.<sup>9,29-31</sup>

Given the importance of the health sector to respond collectively to the climate and ecological crisis and prepare its workforce to tackle these challenges, the aim of this rapid review is to describe frameworks and guides that inform planetary health education across health profession disciplines, that is, medical, nursing and allied health professionals which also have relevance to health promotion practitioners. It is intended that this review will showcase accessible, interdisciplinary frameworks to inform the education of health professionals.

## 2 | MATERIALS AND METHODS

A rapid evidence assessment (rapid review) was conducted with methodological controls to minimise bias, brevity, or other potential limitations.<sup>32,33</sup> The rapid review methodology was informed by a scoping review process,<sup>34,35</sup> with several concessions. For instance, a targeted search strategy was conducted using one representative database pertinent to the field (File S1). Additionally, consultation was undertaken with industry experts and communities of practice to provide exemplar tools. Hand-searching and forward and backward citation searching on identified tools were also emphasised to identify additional tools and frameworks.

### 2.1 | Search strategy

To identify potentially relevant studies for inclusion, the Medline database was searched from inception until 7 February 2022. The search strategy was developed using the PICO tool (P—health care settings, I—climate change, sustainable health care, and planetary health programs, education or interventions, C—n/a, and O—methodology, tools, or frameworks to support education for health professions). The full search strategy can be found in File S1.

### 2.2 | Eligibility criteria

This review aimed to be broad in scope and include tools and frameworks for planetary health education. It is limited to exemplars specifically designed for healthcare education, and thus has not been designed to capture all available evidence on the topic. The inclusion and exclusion criteria are outlined below (Table 1). No date or language limitations was applied. Although all article types were eligible for inclusion, due to the nature of the search strategy, grey literature was less likely to be included.

For the purpose of this review, while the authors recognise the 2030 United Nations Sustainable Development Goals (SDGs) as a critical framework that can inform health professions education (HPE), due to the SDGs not specifically being developed for HPE, this framework has not been included unless it has been specifically adapted for use in HPE.

**TABLE 1** Inclusion and exclusion criteria.

Inclusion	Exclusion
<ul style="list-style-type: none"> <li>All empirical evidence</li> <li>Focus on education for sustainable healthcare, climate change, planetary health</li> <li>Healthcare settings/workforce (i.e., allied health, medical, nursing, etc.)</li> <li>Describes a framework, method, or tool to guide an educational intervention or education</li> </ul>	<ul style="list-style-type: none"> <li>Non-healthcare related sectors</li> <li>Does not describe a framework/method/tool</li> <li>Non-peer-reviewed reports</li> </ul>

## 2.3 | Selection of studies

One author was primarily responsible for conducting the search (G. Zadow) and another (K. MacKenzie-Shalders) was primarily responsible for the data extraction and narrative synthesis. Due to restrictions for exportation by the Medline database, only the first 10 000 search results were exported into a single EndNote 20 library and deduplicated. A selected portion of the results were found through searching keywords 'sustainability' and 'education' simultaneously. These papers were screened by title and abstract by two reviewers (G. Zadow and K. Hensley-Hackett). Conflicts were resolved either through consensus or discussion with other reviewers. The included studies from this process were retrieved for further independent full-text screening. Additionally, one reviewer conducted a snowball search of selected article reference lists for potentially relevant studies. A PRISMA diagram is featured in Figure 1 outlining the process for searching and retrieval of studies.

## 2.4 | Data extraction

As it was not the aim of the rapid review to explore the quality of identified articles, a critical appraisal of included papers was not undertaken. Data were extracted to descriptively summarise key characteristics of included papers such as location, population/discipline, the title of the model or framework, as well as a description and summary of the methodology used to inform the development of each.

## 3 | RESULTS

### 3.1 | Study characteristics

The initial search strategy yielded 11 413 results on 7 February 2022. After exportation and deduplication to endnote, 9981 results were included for this review (Figure 1). Of the 254 articles screened for eligibility based on their title and abstracts, seven were included for

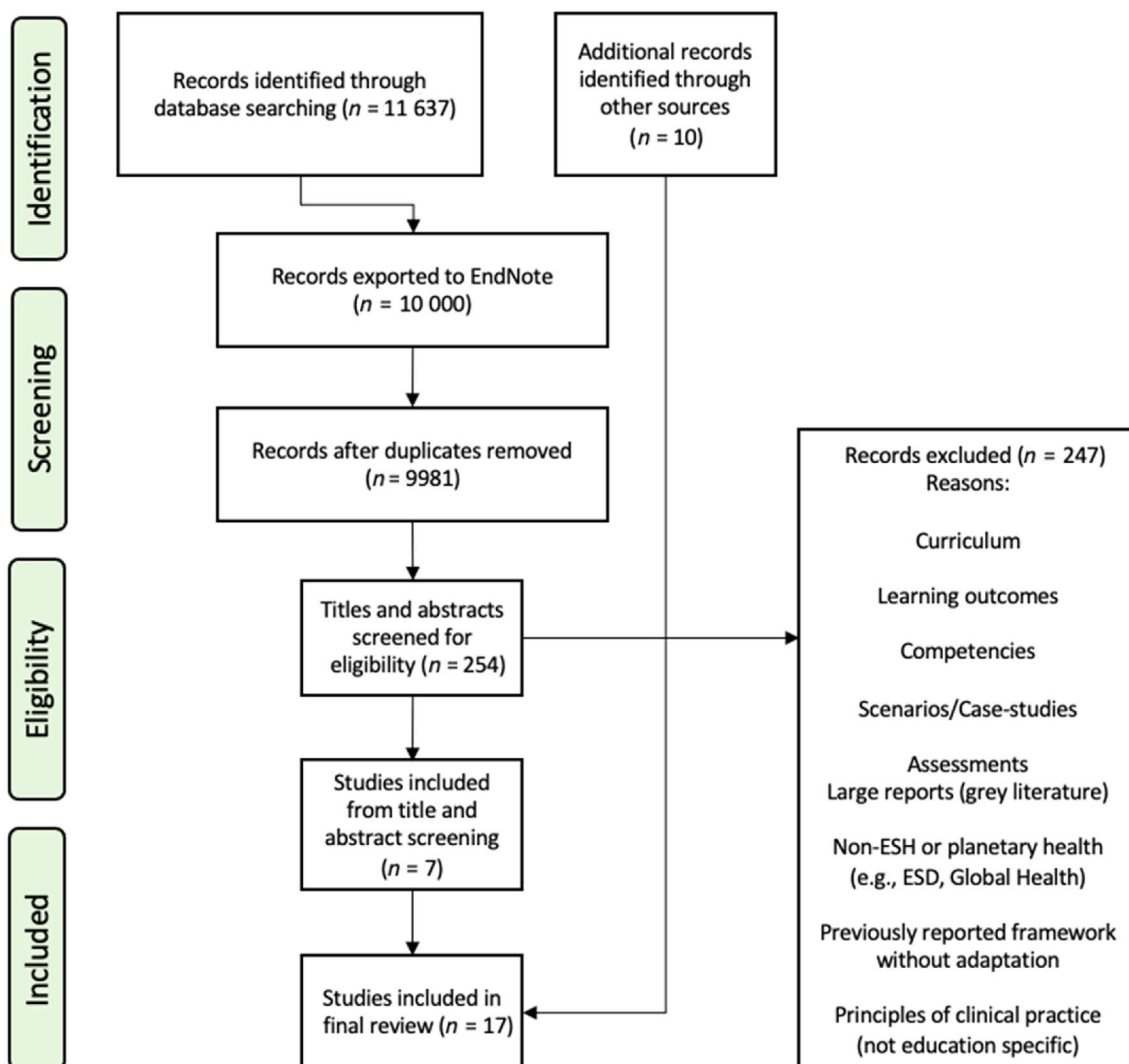


FIGURE 1 PRISMA diagram outlining identification, screening, eligibility, and included studies.

full-text screening. Articles were excluded for the following reasons: (1) reported on sustainability scenarios, curricula, learning outcomes or competencies exclusively without a specific framework (2) were book chapters or large reports, (3) were global health, rather than planetary health education or similar (4), referenced a previously developed framework that had not been adapted, and (5) reported principles of clinical practice, that is, were not education-specific. An additional 10 papers were found through snowball searching, resulting in 17 included articles in the final review. Expert consultation did not result in additional frameworks that were not captured within the search strategy.

The 17 articles included were primarily international in focus, including a cross-disciplinary consensus statement.<sup>9</sup> One was written specifically for the United Kingdom<sup>36</sup> and one for the United States.<sup>37</sup> Several frameworks were developed for health professions more broadly<sup>30,31,38,39</sup> while one was developed specifically for both health professionals and doctors,<sup>40</sup> two were for doctors,<sup>36,41</sup> and several for nursing.<sup>22,37,42–44</sup>

One model featured First Nations/Indigenous knowledge and its application to ESH which included planetary health.<sup>30</sup> Several model or framework types were featured including metric-based scoring such as the Planetary Health Report Card (PHRC),<sup>41</sup> SDGs using the SDG Indicator Framework<sup>29</sup> and Sustainability in Quality improvement (SusQI) adapted for health care.<sup>45</sup>

In terms of designs, models included several embedded concentric circles<sup>9,30,37,39,44</sup> including planetary health education domains,<sup>39</sup> key strategies,<sup>44</sup> Natural Laws and interconnected levels of existence on which human health depends,<sup>30</sup> key curriculum areas and competencies,<sup>37</sup> and types/definitions of education in Planetary Health and ESH.<sup>9</sup> Tabular designs included antecedents, attributes, and consequences,<sup>42</sup> model of knowledge areas<sup>22</sup> featured SDGs,<sup>29</sup> tips,<sup>31</sup> core message 'principles',<sup>46</sup> flowcharts of SusQI interventions specific for healthcare,<sup>45</sup> literacy and competency framework,<sup>28</sup> and modified driving principles.<sup>36</sup> Frameworks also included a conceptual map of key concepts,<sup>40</sup> a metric-based initiative,<sup>41</sup> figure based on triple-bottom line,<sup>38</sup> and a quadrant framework.<sup>43</sup>

One model was developed via a consensus statement process<sup>9</sup> and expert panel of thought leaders,<sup>39</sup> several models were based on a narrative review,<sup>22,31,37,40</sup> several were adapted from previous models or models from non-healthcare settings<sup>28,30,36–38,43,44</sup> and through qualitative/thematic or focus group processes,<sup>40,45,46</sup> concept analyses<sup>42</sup> and opinion.<sup>41</sup>

The data extraction table is featured in Table 2.

## 4 | DISCUSSION

This rapid review aimed to specifically describe exemplar frameworks or guides that inform aspects of planetary health education across health profession disciplines; which are also relevant to the field of health promotion. Within the health promotion field; education is recognised as empowering behaviour, social, and political change.<sup>48</sup> This rapid review showcased accessible, inter-disciplinary

frameworks to inform the effective development of planetary health education.

Frameworks (and similarly tools and guides) are useful to inform planetary health education. They can provide an evidence-based or practice-informed pathway for practitioners and educators to consider and apply. While there are a range of useful exemplar tools that were identified via this rapid review, interestingly they were very different and addressed different components of the practice problem.

Planetary health education is a rapidly evolving field, and it is noted while many of the frameworks and guides have been developed very recently, some were developed more than 5 years ago. While this does not undermine their value and applicability to the field, this should be considered in their use and application. Many tools that were identified were either updates of previous versions or were adapted from non-healthcare-specific fields (e.g., SusQI and Education for Sustainable Development) demonstrating the evolving nature of planetary health education. One framework was directly related to the applicability of First Nations Natural Laws to planetary health education.<sup>30</sup> Surprisingly, conceptually First Nations Natural Laws were not featured directly in many of the frameworks with the exception of the AMEE Consensus Statement<sup>9</sup> and the PHRC<sup>42</sup> despite the critical role First Nations ways of knowing, doing, and being, as well as the application of Natural Laws, which are central to planetary health education.<sup>15,30</sup>

Most frameworks, with the exception of some in nursing, were applicable across all health professions. This is a positive indication that there is recognition that siloed approaches are not beneficial and that planetary health education components transcend disciplines. The environmental footprint of our health system is major, releasing the equivalence of the annual greenhouse gas emissions of 514 coal-fired power plants.<sup>6</sup> This extensive contribution to the climate crisis largely stems from the health sector's fossil fuel consumption, comprising over half of its climate footprint followed by agriculture, pharmaceuticals, and waste treatment.<sup>6</sup> The actions of all people and sectors of our health system and health promotion fields are essential to address this problem with the scale and urgency that is required. Of course, some disciplines may have specific considerations that may not be as central across other disciplines—for example, dietetics and actions relevant to the food system—but a united dialogue and mutual understanding of the roles all disciplines and individuals, at all levels of the health system can play, is important. The AMEE Consensus Statement featured in the review is a strong indication that a united, trans-disciplinary voice and collective consensus is beneficial to guide practice. In addition, the inclusion of metrics such as the PHRC that can be applied readily to 'score' disciplines have merit. While the PHRC was developed specifically for the medical profession, the authorship team is aware that it has since been adapted and applied across health professions.

Frameworks are beneficial as they support the basic structure about which something is formulated or built, and therefore specificities such as example curriculum, learning outcomes, and competencies were not included within this review and are not the

TABLE 2 Data extraction for all included studies ( $n = 17$ ).

Author	Article	Location/ authorship	Profession	Model name	Model description	Framework development method
Anåker and Eijf <sup>42</sup>	Sustainability in nursing: a concept analysis	International, Swedish authorship	Nursing	Concept analysis of sustainability: Several concepts including antecedents, attributes, and consequences	Tabular model including antecedents, attributes, and consequences. Six defining attributes: ecology, environment, future, globalism, holism, and maintenance. Antecedents of sustainability require climate change, environmental impact and awareness, confidence in the future, responsibility and a willingness to change. Consequences of sustainability in nursing include education in the areas of ecology, environment, and sustainable development	Concept analysis of data derived from dictionaries, international healthcare organisations, and literature searches
Barna et al. <sup>22</sup>	The health impacts of climate change. What does the nurse need to know?	International, UK authorship	Nursing	'Five to survive' model	Tabular 'Five to survive' model includes understand the basic facts, move and communicate better, eat and drink better, buy, procure, commission, and use better and develop better models of care	Narrative review
Chase et al. <sup>41</sup>	Improving the medical curriculum on planetary health and sustainable healthcare	International, UK/US authorship	Medicine, the co-authorship team note expansion to Pharmacy and Physiotherapy	Planetary Health Report Card	The PHRC is a metric-based initiative which assesses medical schools in five areas: Curriculum, research, community outreach and advocacy, support for student-led initiatives, and campus sustainability	Opinion; self-assessment tool
Clery et al. <sup>38</sup>	Sustainability in quality improvement (SusQI): a case study in undergraduate medical education	International, UK authorship	Health professionals	Sustainable Value in Healthcare Model	Figure sustainability model based on triple bottom line	Re-created from Mortimer, Ishenwood and Wilkinson, 2018 <sup>47</sup>
Gandhi et al. <sup>36</sup>	Integrating sustainability into postgraduate medical education	United Kingdom	Medical/ physician	Modified Driver Program	Flowchart modified driver program has six principles, two effects, and one outcome relating to carbon and health	Adapted from Mortimer F. The sustainable physician. <i>Clin Med</i> 2010;10:110-11
Goodman and East <sup>43</sup>	The 'sustainability lens': a framework for nurse education that is 'fit for the future'	International, UK authorship	Nursing	Sustainability Lens' Framework	Quadrant framework conceptualises sustainability and health, and four approaches to health care delivery, along two continua of individual-society and illness-wellbeing	Adapted from previous developments in Education for Sustainable Development

(Continues)

TABLE 2 (Continued)

Author	Article	Location/ authorship	Profession	Model name	Model description	Framework development method
Guzmán et al. <sup>39</sup>	A framework to guide planetary health education	International	Health professionals	Planetary health education framework	Embedded concentric model with five planetary health education domains represented in an intertwined figure, similar to the threads of a rope. Although the model separates each domain, the reality of planetary health demands us to understand the interdependent and interconnected nature of each domain	A taskforce of thought leaders in planetary health and education was convened by the Planetary Health Alliance to create the Planetary Health Education Framework
Huss et al. <sup>28</sup>	Education for sustainable health care: From learning to professional practice	International	Health professionals	NurSusTOOLKIT: Sustainability Literacy and Competency (SLC) Framework	Diagrammatic model with flowchart including The Health and Environment Adaptive Response Taskforce (HEART) platform, the NurSusTOOLKIT, a multi-disciplinary collaboration offering free adaptable educational resources for educators and the Greener Anaesthesia and Sustainability Project (GASP), an example of bridging the transition to clinical practice	Design inspired by the 'work ability model' of the Finnish School of Occupational Health, 2010, output of NurSus project <a href="http://nursus.eu/uk/">http://nursus.eu/uk/</a>
Leffers et al. <sup>44</sup>	Mandate for the nursing profession to address climate change through nursing education	International, US authorship	Nursing	Ecological Planetary Health Model	Embedded concentric circles with key strategies and arrows. The model highlights the interrelationship and multiple levels of influence that nurses have on behaviours and actions to address the health of our planet. Each climate strategy is depicted as a coloured cord on an integrated trajectory demonstrating that each climate strategy occurs in concert with the other, and the climate strategies influence the interventions between all levels of the model. The arrows outside the circles represent the political, social, cultural, economic, and environmental influences on human health and the health of the planet	Adapted from the ecological model (Sallis and Owen, 2016)



TABLE 2 (Continued)

Author	Article	Location/ authorship	Profession	Model name	Model description	Framework development method
Madden et al. <sup>29</sup>	Why use indicators to measure and monitor the inclusion of climate change and environmental sustainability in health professions' education?	International, Australian authorship	Health professionals	Sustainable development goals (SDGs) indicator framework	Tabular model including three SDGs, 4 (Quality Education), 12 (Responsible Production and Consumption), and 13 (Climate Action), that include education targets and the indicator for reporting these	A review of the literature on the use of indicators in medical education for climate change and health, however, yielded no publications. The framework of targets and indicators developed for implementation of the SDGs by 2030 and the UNESCO initiative of the Education for Sustainable Development provides a guide for the development of indicators for HPE
Marsden et al. <sup>45</sup>	Sustainability in Quality Improvement (SusQI): challenges and strategies for translating undergraduate learning into clinical practice	International, UK authorship	Health professionals	Several frameworks featured	Several frameworks including flowcharts translating SusQI education into practice and Conceptual model for achieving the necessary conditions for action	Several frameworks based on a qualitative analysis of focus groups involving third year medical students at Bristol Medical School who had undertaken SusQI training
Redvers, Schultz, et al. <sup>30</sup>	Indigenous perspectives on education for sustainable healthcare	International	Health professionals	Nested levels of [Indigenous] knowledge and applications that surround healthy communities and ecosystems	Embedded concentric circles demonstrating nested and interconnected levels of existence through which human health depends, describing natural rhythms of laws that have been storied by various cultures around the globe for countless generations	Adapted from Redvers et al. (2020)
Schenk <sup>37</sup>	Environmental Stewardship in Nursing: Introducing the "WE ACT-PLEASE" Framework	United States of America	Nursing	"WE ACT-PLEASE" Framework for Environmental Stewardship in nursing	Embedded concentric circles including arrows which split the key areas—Waste, Energy/water, Agriculture/food, Chemicals, Transportation, (WE ACT) as well as PLEASE Professional obligation, leadership, education, accountability, science, and engagement	Narrative and literature review bringing WE ACT and PLEASE frameworks together
Schwerdtle et al. <sup>31</sup>	12 tips for teaching environmental sustainability to health professionals	International, Australian authorship	Health professionals	12 Tips for teaching environmental sustainability to health professionals	Tabular 12 Tips for teaching environmental sustainability to health professionals grouped by 'why,' 'what' and 'how'	The authors reviewed the literature relating to climate change, environmental sustainability and health, and health professional education. By combining findings from this search with reflections on their own experience in clinical and

(Continues)



TABLE 2 (Continued)

Author	Article	Location/ authorship	Profession	Model name	Model description	Framework development method
Shaw et al. <sup>9</sup>	AMEE Consensus Statement: Planetary health and education for sustainable healthcare	International	Health professionals	The relationship between planetary health, Indigenous perspectives and the knowledge, values and practices, which are incorporated into education for sustainable healthcare	Embedded concentric circles including broader planetary health encompassing education for sustainable healthcare, inclusive of values, knowledge, practice principles, and transferable skills and skills for planetary health	public health teaching across nursing and midwifery, paramedicine, medicine, and public health, the authors developed recommendations for integrating environmental sustainability into health professional education Consensus statement under auspice of An International Association for Medical Education (AMEE)
Stone et al. <sup>46</sup>	Cross-cutting principles for planetary health education	International, US authorship	Health professionals	12 cross-cutting principles	Tabular set of core messages for teaching planetary health which act as overarching and wide-ranging guiding themes for any educational setting	The cross-cutting principles were established through a series of five interactive sessions with the 137 members of the Planetary Health Education Brainstorm Group who are from all over the world and involved in education efforts at the intersection of health and environmental change
Walpole et al. <sup>40</sup>	What do tomorrow's doctors need to learn about ecosystems? A BEME systematic review	International, UK authorship	Doctors	Conceptual map	Conceptual map covering key concepts, environment–health interactions and environmental impacts of health services for health professional/doctors education	Narrative systematic review and thematic analysis

sole foci for health promotion. The authors are aware of numerous resources that support the development of learning outcomes,<sup>9,10,18-22</sup> competencies,<sup>19,23,24</sup> and curriculum<sup>13,17</sup> (some of which were identified through the search strategy) and direct educators to these resources where required.<sup>19,23</sup> The review, through the search strategy that was used, mostly captured scholarly literature, and it is acknowledged that there is a multitude of useful guides that sit outside the scholarship literature, such as the World Federation of Occupational Therapists Sustainability Guide,<sup>49</sup> and guides outside of healthcare disciplines such as Agenda 2030: The SDGs, which includes SDG no. 3 Good Health and well-being, and those through bodies and organisations that support the sharing of information that support planetary health education.

Another limitation of this review is that it did not assess the quality of the included articles; however, it did note that there were a range of methodologies that informed the frameworks from expert opinion through to consensus and qualitative methodologies. Quality assessment of either the article or resulting framework was not an aim of this rapid review; instead, this rapid review compiled a central list of exemplar frameworks for practitioners and educators to assess and review for their own purposes and benefit. A rapid review itself undertakes considered methodological shortcuts to gain quick access to information that can inform practice.<sup>32,33</sup> Despite this, it is an acknowledged methodology, which meets a specific, targeted purpose. While it provided a quick overview of exemplar frameworks for planetary health education, due to a relatively small and cohesive body of knowledge associated with planetary health education, the authorship team are confident due to a robust forward-backward citation searching process that the majority of frameworks that met the inclusion criteria are included. It is recognised that broader than health professions, there are bodies of work such as Global Health and Education for Sustainable Development that can inform planetary health education in a health setting, but this was outside of the scope of this rapid review. We acknowledge that further work which reports how these frameworks can be applied and their impact would be beneficial.

Effective planetary health education for health professionals is required to achieve an environmentally sustainable health system which supports the urgent mitigation, adaptation, and regeneration of our natural environment.<sup>50</sup> This rapid review aimed to specifically describe exemplar frameworks or guides that inform planetary health education across health profession disciplines, which are applicable to the field of health promotion. This rapid review showcased accessible, interdisciplinary frameworks to inform the effective development of planetary health education. This process has identified a rapidly evolving field, through which interdisciplinary collaborations in healthcare are important to inform its pedagogy and application and can be interpreted by educators to inform best-practice health education. Education is recognised as empowering behaviour, social, and political change<sup>48</sup> and thus rapid use and application of these frameworks

in education and practice will support urgent pro-environmental change.

## AUTHOR CONTRIBUTIONS

All authors made substantial contributions to the design, analysis, or interpretation of data, and critical revision of the work. K. MacKenzie-Shalders contributed to study conception, study design, data analysis, critical revision, and supervision. G. Zadow contributed to literature searching, data analysis, original draft preparation, and critical revision. K. Hensley-Hackett contributed to literature searching and critical revision. S. Marko contributed to data interpretation and critical revision. M. McLean contributed to data analysis, critical revision, and supervision.

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The authors declare that they have no known competing financial interests, which may have appeared to influence the work reported in this article.

## DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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