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Nursing students' and educators' perspectives on sustainability and climate change: An integrative review

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Abstract

Aim: To identify and synthesize research on the awareness, attitudes and action related to sustainability and climate change from the perspective of nursing students and educators globally.

Design: Integrative review.

Methods: The review was guided by Whitemore and Knafel. Included studies were appraised using the Mixed Methods Appraisal Tool. A deductive content analysis based on Elo and Kyngäs' methodology was employed.

Data Sources: CINAHL, MEDLINE, EMBASE, Web of Science, British Education Index, GreenFILE and Scopus were searched up to the 8th November 2022.

Results: Thirty-two studies were included in the review. Two studies included nursing educators in their samples, the rest focused solely on students. Findings suggest that whilst some students were aware of sustainability issues and felt that nurses have a responsibility to mitigate climate change, others showed limited awareness and believed that nurses have more important priorities. A global interest was seen among students for increased curricular content related to sustainability and climate change. Waste management and education of others were suggested actions students can take; however, barriers included lack of confidence and limited power.

Conclusion: There is a need for sustainability education within nursing curricula, accompanied by student support.

Implications for the Profession: The review acts as a starting point to make sustainable healthcare and climate change mitigation integral aspects of nursing.

Impact: Sustainability education within nursing curricula can positively impact on sustainable healthcare and climate change mitigation. More research is needed on the perspectives of nursing educators.

Reporting Method: The review is reported according to the PRISMA guidelines.

Patient or Public Contribution: No Patient or Public Contribution.

KEYWORDS

climate change, environment, higher education, nursing, sustainability, sustainable development goals

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1 | INTRODUCTION

Recent years have seen increasingly frequent and severe impacts of climate change on the ecosystem and human health globally, representing a climate crisis threatening current and future generations (Romanello et al., 2022). Risks to health include air pollution, forced migration and changing patterns of infectious disease, compromising physical health and mental wellbeing; effects that are more likely to impact on vulnerable populations (Watts et al., 2018), thus exacerbating health inequalities. Such health inequalities are compounded by the fact that those more affected by adverse health and wellbeing outcomes—such as lower socio-economic groups—are the same people who are least likely to contribute to climate change, thus reinforcing the injustice (Agyeman et al., 2002). In their work to promote health and wellbeing for populations, nurses are at the forefront of the climate justice agenda (Evans-Agnew et al., 2023). This is particularly relevant to public health nurses, who have an established understanding of the importance of the environment in health outcomes, as well as nurses working in interdisciplinary collaborations wherein complex interventions need to happen at systems levels (Polivka & Chaudry, 2018). Yet nursing is part of a healthcare system that contributes to the climate crisis by releasing greenhouse gases, using toxic material and producing significant amounts of waste (Griggs et al., 2017; Richardson et al., 2016). Therefore, nurses have a moral responsibility to take steps to mitigate such negative impacts (Shaw et al., 2021).

Sustainable development has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987, p. 41). The first global environmental conference, held in Stockholm in 1972, pioneered the idea that environmental issues caused by human activity are a major global concern that needs to be acted upon urgently (Handl, 2012). Twenty years later, in 1992, the second global environmental conference was held in Rio de Janeiro and resulted in the Rio Declaration which built on the work in Stockholm but with a stronger focus on sustainable development. Subsequently, the United Nations member states adopted the eight Millennium Development Goals in 2000, targeted to reduce extreme poverty by 2015. However, in 2015 the goals were not met; therefore, 17 new, more ambitious goals were agreed upon by the United Nations' member states: the Sustainable Development Goals (United Nations, 2015). These are 17 interconnected goals which aim to end poverty, reduce inequalities, build peaceful societies, protect human rights, promote gender equality and protect the planet and its natural resources (United Nations, 2023). Whilst Goal 3 (Good health and wellbeing for all) is clearly linked to nursing, all 17 goals are relevant to the nursing profession since acting on any of them (for example, ending poverty or mitigating climate change) contributes towards health and wellbeing (Lilienfeld et al., 2018). Anåker and Elf (2014) define sustainability in nursing as being based on ecological, global and holistic knowledge, and considering the environment at all

levels to maintain a healthy environment for present and future generations. However, concepts such as sustainability and climate change are still relatively new to the nursing profession. Literature reviews exploring nursing research related to climate change, the United Nations Sustainable Development Goals, environmental health and environmental justice provide a useful starting point for understanding these concepts in nursing (LeClair et al., 2021; Lilienfeld et al., 2018; Polivka & Chaudry, 2018). However, no literature review has been found that explores the perception of such concepts from the perspective of nursing students and educators. The present paper thus contributes to existing knowledge by specifically focusing on nursing education globally.

Education has an essential role in achieving the Sustainable Development Goals and mitigating climate change (Shaw et al., 2021). Since nurses comprise the largest segment of the global healthcare workforce (The World Health Organization, 2022), nursing education must prepare students with the knowledge and skills needed to practice sustainably and address the health and wellbeing consequences of climate change (International Council of Nurses, 2018). This requires a shift from the traditional aim of nursing education to develop clinical skills and competencies towards a curriculum that includes sustainable development issues (Goodman & East, 2014). In some countries, for example in Sweden and the United Kingdom (UK), governmental requirements mandate higher education institutions to promote sustainable development (The Quality Assurance Agency for Higher Education & Advance HE, 2021; The Swedish Higher Education Act, 1992), thus aligning with an overarching commitment to integrate sustainability education in all curricula within higher education (UNESCO, 2017). Examples of where content about climate change and sustainability is embedded in nursing programs include the NurSus project (nursus.eu) and the Nursing School Commitment (Health Care Without Harm, 2022). Yet this does not translate into mandatory requirements of what to include in nursing education, which is set out nationally by nursing professional bodies. A systematic review on environmental competencies required for nursing students, and pedagogical approaches that are useful when embedding sustainability in nursing education, highlights the urgency for nurses to have the knowledge, skills and competencies to respond to a rapidly changing environment where resources are finite (Lopez-Medina et al., 2019). A starting point for developing adequate education is the experiences of educators and students (Shaw et al., 2021; Tun et al., 2020); thus there is a need to explore the perspectives of nursing students and educators on sustainability and climate change. Ample research has been undertaken in this area, but to date, there is a lack of a systematic review of these studies.

2 | THE REVIEW

This systematic integrative review explores sustainability and climate change from the perspective of nursing students and

educators. To structure the review, Lozano's (2008) theoretical framework was used (Figure 1). Lozano (2008) argues that there needs to be congruence between three components for an individual to internalize sustainability: informational attitudes (the awareness, beliefs and information that the person has about something), emotional attitudes (how they feel about something) and behavioural attitudes (the actions that they take). In this integrative review, these components are identified as awareness, attitudes and action (Figure 1), and applied to nursing practice as well as private life.

3 | AIM

This review aims to identify and synthesize research on the awareness, attitudes and action related to sustainability and climate change from the perspective of nursing students and educators.

4 | METHODS

4.1 | Design

A systematic integrative review, which included studies using various research designs such as qualitative, quantitative and mixed methods studies, was employed (Whittemore & Knafl, 2005). The review followed the five stages outlined by Whittemore and Knafl (2005): problem identification, literature search, data evaluation, data analysis and presentation, and is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021, see Table S1). The review protocol has been published (Aronsson, Nichols, et al., 2022).

4.2 | Search methods

The SPIDER (Sample, Phenomenon of Interest, Design, Evaluation and Research type) framework (Cooke et al., 2012) guided the selection of search terms for an effective literature search. Search terms

were agreed upon by all authors and included subject headings and free-text keywords (Table 1). No year or language limitations were applied to avoid excluding relevant studies.

Seven databases (CINAHL, MEDLINE, EMBASE, Web of Science, British Education Index, GreenFILE and Scopus) were selected with the help of an Information Specialist to include a broad range of literature on healthcare, social sciences, higher education and climate change. The initial search was conducted between 12th and 17th April 2021, and an updated search was undertaken on the 8th November 2022. In addition, relevant studies were identified by screening reference lists of included studies and professional networks.

4.3 | Inclusion and exclusion criteria

The SPIDER framework was used to support the inclusion and exclusion of studies (Cooke et al., 2012) (Table 2).

4.4 | Search outcome

The PRISMA flowchart (Figure 2) outlines the database search, which initially yielded 1104 papers. After removing duplicates

TABLE 1 Search terms.

Sample AND phenomenon of interest AND evaluation		
"student nurse*"	sustainab*	awareness
OR	OR	OR
"nursing student*"	"climat* change"	knowledge
OR	OR	OR
"nurs* educator*"	"global warming"	understanding
OR	OR	OR
"nurs* lecturer*"	"greenhouse effect"	cognition
OR	OR	OR
"nurs* mentor*"	"climate crisis"	attitude*
OR	OR	OR
"nurs* teacher*"	"climate emergency"	view*
OR	OR	OR
"nurs* tutor*"	"climate action"	opinion*
OR	OR	OR
"practice assessor"	"environmental change"	perception*
OR	OR	OR
"practice supervisor"	"energy resilience"	perspective*
	OR	OR
	"carbon footprint"	feeling*
	OR	OR
	"carbon reduction"	value*
	OR	OR
	"carbon removal"	belief*
	OR	OR
	"zero carbon"	thought*
	OR	OR
	"planetary health"	*action
		OR
		"behavio*r
		change"
		OR
		response

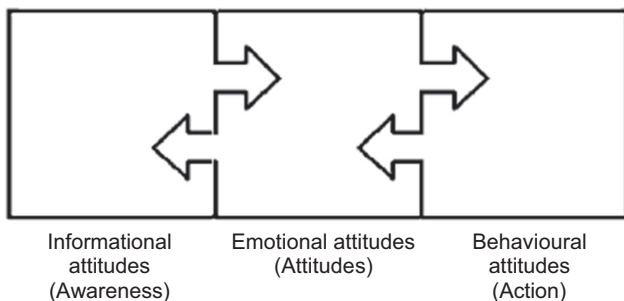


FIGURE 1 Individual internalization of sustainability (adapted from Lozano, 2008).

TABLE 2 Inclusion and exclusion criteria.

	Inclusion	Exclusion
Sample	<ul style="list-style-type: none"> • Student nurses, at any point in their education • Academic and/or clinical nurse educators, regardless of the profession of the clinical nurse educator • Any country worldwide 	<ul style="list-style-type: none"> • Healthcare professionals not involved in nursing education
Phenomenon of interest	<ul style="list-style-type: none"> • Sustainability and/or climate change, or any search terms related to these 	<ul style="list-style-type: none"> • 'Sustainability' does not align with the definition used in this review: "The concept of sustainability in nursing can be defined from a core of knowledge in which ecology, global and holistic comprise the foundation. The use of the concept of sustainability includes environmental considerations at all levels. The implementation of sustainability will contribute to a development that maintains an environment that does not harm current and future generation's opportunities for good health." (Anåker & Elf, 2014, p. 387)
Design	<ul style="list-style-type: none"> • Empirical research using any research design • Published articles reporting on completed studies 	<ul style="list-style-type: none"> • Theoretical/conceptual studies • Protocols and grey literature • Secondary research
Evaluation	<ul style="list-style-type: none"> • Target sample's awareness, attitudes and actions regarding the phenomena of interest considering their professional/student role or their role as private persons/global citizens 	
Research type	<ul style="list-style-type: none"> • Primary research using qualitative, quantitative or a mixed methods 	<ul style="list-style-type: none"> • Secondary research

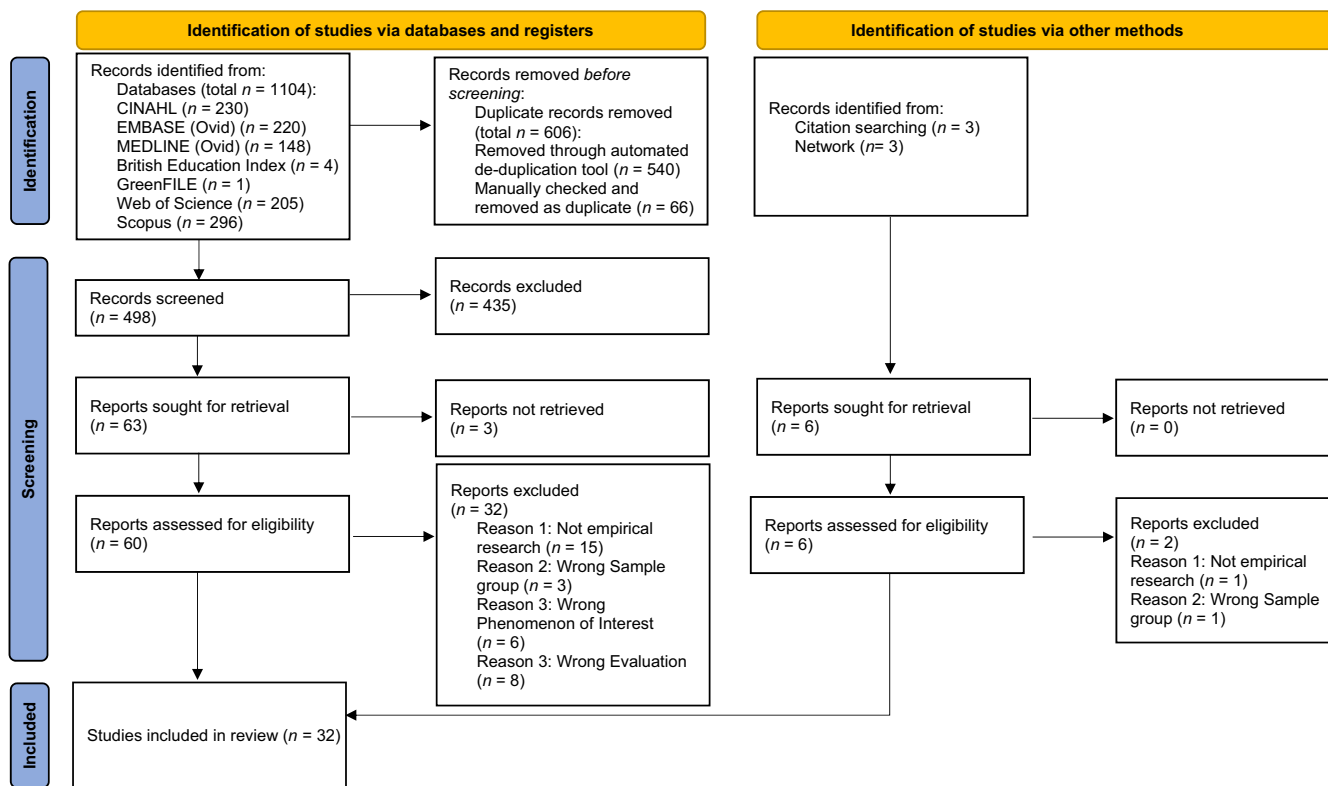


FIGURE 2 PRISMA flowchart (developed from Page et al., 2021).

(n=606), 498 records were screened on title and abstract. Three authors independently screened 10% of abstracts and reached 86% agreement, which resulted in clarification of inclusion and exclusion

criteria. Two authors subsequently screened another 10% of studies independently, and at this point, there was 100% agreement. The rest of the studies were screened by the first author, and any

uncertainties were discussed with the research team. This process was used to ensure interrater reliability, thus establishing an unbiased and consistent data collection strategy (Polit & Beck, 2018). As a result of this screening process, 63 papers were chosen for inclusion.

Out of the 63 papers selected for inclusion, three could not be found despite extensive efforts, leaving a total of 60 articles screened at the full-text phase. Ten percent of the retrieved papers were screened independently by three authors to ensure interrater reliability. Following 100% agreement, the rest of the articles were split among the same authors, resulting in 32 articles being included in the final systematic integrative review.

4.5 | Quality appraisal

Included studies were appraised using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018), which allows for appraisal of studies of different research types. Initially, four articles were independently appraised by three members of the team, who subsequently met to discuss and compare views on the quality of studies. Following this initial stage, the remainder of the studies were appraised by two team members, again with regular meetings to discuss and resolve uncertainties. The result of the critical appraisal is presented in Table S2. All studies met the screening criteria in the MMAT and were included.

4.6 | Data abstraction

Based on Cochrane's framework, a data extraction sheet was developed collaboratively within the research team (Cochrane Collaboration, 2013).

Data about the awareness, attitudes and/or action related to sustainability and climate change were extracted from each included study, together with relevant study characteristics. This work was shared by three members of the team. A summary of this is provided in Table S3.

4.7 | Synthesis

A deductive content analysis based on Elo and Kyngäs' (2008) methodology was used for a narrative synthesis of the results. This starts with a preparation phase, wherein units of analysis are selected from the data and subsequently organized into a categorization matrix (Elo & Kyngäs, 2008). To develop this matrix, the adapted framework by Lozano (2008) was used, and data were coded according to the main categories Awareness, Attitudes or Action. The units of analysis were grouped under sub-categories within these main categories. Elo and Kyngäs (2008) explain that the sub-categories describe the content of the main categories, and that the credibility of research findings is established through the link between the results and the

data, which is transparent through the units of analysis within each sub-category.

5 | RESULTS

In this study, data related to the main category of Awareness often included definitions of concepts (e.g. sustainability) or beliefs about climate change and its impact on human health. Data related to Attitudes included feelings about sustainability and climate change in the context of nursing education; for example, whether these concepts are seen as important or should be included in nursing education. Data related to the main category of Action considered what actions students can take to be more sustainable, as well as the barriers and requirements needed to enable sustainable practices.

The narrative synthesis presented here discusses study characteristics and results related to the sub-categories and the three main categories: Awareness, Attitudes and Action (Table 3).

5.1 | Study characteristics

A total of 32 articles were included in this review: 20 were quantitative descriptive based on surveys, four were quantitative comparative based on either pretest/posttest design or case control design, three were mixed methods and five were qualitative. Most of the papers reported research on nursing students ($n=30$), with only two studies including nursing educators in their sample. The articles were published between 2014 and 2022 in English from various countries: Australia, Brazil, Canada, China, Egypt, Ethiopia, Germany, Iraq, Palestinian Territory, Saudi Arabia, Spain, Sweden, Switzerland, Taiwan, Turkey, the United Kingdom (UK) and the United States of America (US). The participants in the included studies were nursing students from a variety of years of study, and sometimes a variety of fields of study (e.g. adult health, child health and mental health). The geographic distribution and characteristics of participants are outlined in Table 4.

5.2 | Awareness

5.2.1 | The state of the planet is affecting human health and wellbeing

Studies showed mixed results regarding nursing students' awareness of the consequences of climate change to human health. Felicilda-Reynaldo et al. (2018) found that only half of their participants in four Arab countries thought climate change was something negative, whilst Moselhy et al. (2022) found a lack of awareness about the concept of carbon footprint in two thirds of their Egypt student participants. Similar findings by Örs (2022) suggest that the vast majority of students at a Turkish university (92.8%) did not

TABLE 3 Summary of main categories, sub-categories and meaning units according to Lozano's framework.

Main category	Sub-category	Units of analysis
Awareness	The state of the planet is affecting human health and wellbeing	Climate change has negative consequences to human health There are environmental risk factors to children's health Climate change can exacerbate socioeconomic inequalities Human activity contribute towards climate change Sustainability education can improve awareness
	Sustainability is an ethical imperative	Sustainability encompasses environmental, economic and social aspects Sustainability is a human right Sustainability is a shared societal responsibility Anthropocentrism overshadows sustainability as an ethical imperative
Attitudes	Consideration of sustainability and climate change being within the scope of nursing	Sustainability and climate change are important issues for nursing Nurses have a responsibility to prevent pollution and conserve resources Nurses' work can contribute to a sustainable healthcare system Nurses can inspire others to work towards sustainability Nurses are researchers, leaders and educators in preventing climate change Climate change and sustainability are not part of nurses' responsibility
	Sustainability and climate change should be included in nursing education	Content about sustainability and climate change should be included in nursing education Student nurses need to learn about pollution, climate change and the effects of climate change on health Sustainability education should be embedded throughout modules in the nursing curriculum Environmental education provides an opportunity to rethink nursing education
Action	Students can act sustainably to mitigate climate change	Healthcare services need to learn to sort waste A supportive work environment is needed to prioritize sustainability in practice It is challenging for students to incorporate sustainability in practice Students can model sustainable behaviour to raise awareness Students can educate others about sustainability principles Individuals have a personal accountability in using natural resources in a preventative manner and reduce their carbon footprint Sustainability education session are effective in making students practice more sustainable
	There are barriers to sustainable praxis	Lack of confidence Students are at the bottom of an informal hierarchy There is a resistance to change in practice There is a lack of time or facilities to enable sustainable practice

have adequate environmental knowledge when assessed based on how many right answers they gave to questions on environmental matters. Some studies focused on environmental risk factors (e.g. ultraviolet radiation and air pollutants) to children's health and found insufficient knowledge among nursing students (Álvarez-García et al., 2018, 2020; Álvarez-García, Álvarez-Nieto, Sanz-Martos, et al., 2019).

Conversely, some studies found good knowledge of climate change's health impacts among nursing students in Ethiopia and China (Nigatu et al., 2014; Yang et al., 2018). Turkish studies found good awareness and concern about the effects of climate change

on health, but nursing students felt inadequately equipped through their education to prevent or manage it (Ergin et al., 2021; Sayan & Kaya, 2016; Tuna et al., 2022).

Findings from focus groups in the study by Ergin et al. (2021) suggest that nursing students were concerned about the future effect of global warming on health; for example, they expressed a worry about hunger, drought and respiratory system disorders. One student said:

"I think we will not be able to breathe in air without a mask as a result of the climate change brought about

TABLE 4 Geographic distribution and characteristics of participants.

Reference	Country	Participants (number, student (year)/educator)
Álvarez-García et al. (2018)	Spain	308 nursing students in one university in their first year ($n=113$), third year ($n=102$) and fourth year ($n=83$)
Álvarez-García, Álvarez-Nieto, Kelsey, et al. (2019)	Spain and the UK	267 nursing students in one Spanish university ($n=110$) and one UK university ($n=157$) Spain: Second year ($n=106$), third year ($n=4$) UK: First year ($n=43$), Second year ($n=63$), third year ($n=51$)
Álvarez-García, Álvarez-Nieto, Sanz-Martos, et al. (2019)	Spain	2462 nursing students from eight different universities in their first year ($n=745$), second year ($n=645$), third year ($n=611$) and fourth year ($n=429$)
Álvarez-García et al. (2020)	UK	232 child health nursing students in one university in their first year ($n=75$), second year ($n=92$) and third year ($n=65$)
Álvarez-Nieto et al. (2021)	UK, Spain, Germany and Australia	846 nursing students in their first year, in two different UK universities ($n=421$), two different Spanish universities ($n=232$), one German university ($n=48$), one Swedish university ($n=38$) and one Australian university ($n=107$)
Álvarez-Nieto et al. (2022)	Spain	96 students in one university. Data was collected at three points: - in their first year, before any sustainability education - in their second year, after sustainability session - in their third year, after two sustainability sessions
Anåker et al. (2021)	Sweden	12 nursing students at one university
Aronsson et al. (2020)	UK	310 students in their second year ($n=200$) and third year ($n=110$)
Aronsson, Anaker, et al. (2022)	UK and Sweden	147 nursing students in their third year, in one UK university ($n=121$) and one Swedish university ($n=26$)
Chen and Price (2020)	China and UK	101 nursing students in their first year, in one Chinese university ($n=69$) and one UK university ($n=32$)
Cruz, Alshammari, et al. (2018)	Saudi Arabia	280 nursing students in their second year (33.2%), third year (32.9%) and fourth year (33.9%) in one university
Cruz, Felicilda-Reynaldo, et al. (2018)	Egypt, Iraq, Palestinian Territories and Saudi Arabia	1059 nursing students in their second year ($n=235$), third year ($n=415$) and fourth year ($n=409$), from Egypt ($n=302$), Iraq ($n=200$), the Palestinian Territories ($n=277$) and Saudi Arabia ($n=280$)
Ergin et al. (2021)	Turkey	154 public health nursing students in their senior year at one university
Felicilda-Reynaldo et al. (2018)	Egypt, Iraq, Palestinian Territories and Saudi Arabia	1059 nursing students in their second year ($n=235$), third year ($n=415$) and fourth year ($n=409$), from Egypt ($n=302$), Iraq ($n=200$), the Palestinian Territories ($n=277$) and Saudi Arabia ($n=280$)
Grose and Richardson (2016)	UK	292 nursing students in one university Child health nursing students: second year ($n=12$) Adult health nursing students: second year ($n=167$) and third year ($n=113$)
Gürgeç Şimşek and Erkin (2022)	Turkey	199 nursing students in first year ($n=81$), second year ($n=64$) and third year ($n=54$) in one university
Hanley and Jakubec (2019)	Canada	40 participants: 32 nurses in education and practice from the Canadian provinces of Quebec, Alberta and British Columbia 8 Quebec-based nursing students
Lee et al. (2019)	Taiwan	1147 nursing students in their third year, across 13 different nursing colleges
Linton et al. (2020)	US	89 final year students in one university
Moselhy et al. (2022)	Egypt	279 nursing students in their first year ($n=80$), second year ($n=75$), third year ($n=63$) and fourth year ($n=61$) in one university
Nigatu et al. (2014)	Ethiopia	68 nursing students in general nursing ($n=55$) and psychiatric nursing ($n=13$)
Peres et al. (2015)	Brazil	17 nursing educators with more than 1 year's experience in undergraduate nursing education across 5 different nursing institutions
Richardson et al. (2015)	UK	57 nursing students in one university Child health nursing ($n=29$) who participated in a sustainability education session Adult health nursing ($n=28$) who did not participate in the session

(Continues)

TABLE 4 (Continued)

Reference	Country	Participants (number, student (year)/educator)
Richardson et al. (2016)	UK, Spain, Switzerland and Germany	916 nursing students in their first year, from UK ($n=450$), Spain ($n=124$), Switzerland ($n=146$) and Germany ($n=196$)
Richardson et al. (2017)	UK	676 adult and child health nursing students in their second year in one university
Richardson et al. (2019)	UK	145 nursing students in year 1, 2 and 3 in one university
Richardson et al. (2021)	UK	301 nursing students in one university studying adult health ($n=172$), child health ($n=51$), mental health ($n=46$) and combined programme of more than one field ($n=32$)
Ryan et al. (2020)	US	53 nursing students in one university
Sayan and Kaya (2016)	Istanbul, Turkey	778 nursing students in one university
Tuna et al. (2022)	Turkey	148 nursing students in their first year ($n=38$), second year ($n=57$), third year ($n=41$) and fourth year ($n=12$) in one university
Yang et al. (2018)	China	313 nursing students in their third and final year from five different universities
Örs (2022)	Turkey	278 nursing students from their first year, second year, third year and fourth year, evenly distributed, in one university

by global warming I think there will be wars for water.”

(Ergin et al., 2021, p. 4)

Swedish and US students were aware of negative consequences of climate change, whilst the healthcare sector's contribution was not widely recognized (Anåker et al., 2021; Ryan et al., 2020). Some students recognized human activity as the main cause of climate change (Yang et al., 2018), whilst others did not (Felicilda-Reynaldo et al., 2018; Lee et al., 2019).

5.2.2 | Sustainability is an ethical imperative

Studies suggest that the definition of sustainability varies. Turkish students defined sustainability as encompassing environmental, economic and social aspects (Gürgeç Şimşek & Erkin, 2022), whereas Swedish students viewed sustainability as a human right for a good life on equal terms, as well as a shared societal responsibility to look after the planet so that future generations will not be affected negatively (Anåker et al., 2021). The latter perspective is reflected by Brazilian nursing educators who opined that society is responsible for preserving the ecosystem and rebuilding moral values, such as appreciation of others, solidarity, sharing and interdependence, to overcome the environmental crisis (Peres et al., 2015). Similarly, Örs (2022) found that Turkish students had a pro-ecological worldview whereby humanity must live in harmony with nature to survive.

A different viewpoint, based on anthropocentrism—the belief that nature exists for human use—was seen in students in the Middle East. Cruz, Alshammari, et al. (2018) found that the vast majority (98.9%) of Saudi nursing students thought that humans have the right to modify the natural environment to suit their needs, and more than half of the participating students from four Arab countries shared this view (Felicilda-Reynaldo et al., 2018).

5.3 | Attitudes

5.3.1 | Consideration of sustainability and climate change being within the scope of nursing

Twelve studies suggested that students thought that sustainability and climate change are important issues for nursing (Álvarez-García, Álvarez-Nieto, Kelsey, et al., 2019; Álvarez-Nieto et al., 2021; Chen & Price, 2020; Cruz, Alshammari, et al., 2018; Cruz, Felicilda-Reynaldo, et al., 2018; Linton et al., 2020; Richardson et al., 2015, 2016, 2017, 2021; Sayan & Kaya, 2016). Álvarez-Nieto et al. (2022) found this view to be stronger in later years of studies. Congruently, US students expressed an interest in the carbon footprint of resources used in practice, with a view that nurses have a responsibility to prevent pollution and conserve resources (Ryan et al., 2020).

The positive attitudes seen in these quantitative studies were reflected in qualitative research, wherein students suggested that nurses' work can contribute to a sustainable healthcare system through research, leadership and education (Anåker et al., 2021; Ergin et al., 2021). Congruently, Hanley and Jakubec (2019) found that Canadian students and educators advocated for planetary health promotion. Conversely, some studies found that students felt that sustainability and climate change were not a nurse's responsibility (Felicilda-Reynaldo et al., 2018; Nigatu et al., 2014; Ryan et al., 2020). Students voiced that the main priority for them in placement is learning, and the main objective for nurses is to work with health and ultimately save lives (Anåker et al., 2021; Aronsson et al., 2020).

5.3.2 | Sustainability and climate change should be included in nursing education

All nursing students and educators who were asked whether content about sustainability and climate change should be included in nursing

curricula answered positively (Chen & Price, 2020; Cruz, Alshammari, et al., 2018; Cruz, Felicilda-Reynaldo, et al., 2018; Linton et al., 2020; Richardson et al., 2015, 2016, 2017, 2019, 2021). Ideas of content included pollution, climate change and the effects of climate change on health (Ergin et al., 2021; Ryan et al., 2020; Tuna et al., 2022). Sustainability education sessions were found to improve knowledge levels in areas related to waste disposal, natural resources and the relevance of sustainability to nursing (Álvarez-García, Álvarez-Nieto, Kelsey, et al., 2019; Grose & Richardson, 2016; Richardson et al., 2015, 2017).

Students and educators expressed a need for more frequent and in-depth sustainability education, embedded throughout the nursing curriculum so that the relevance to nursing would be explicit (Anåker et al., 2021; Chen & Price, 2020; Hanley & Jakubec, 2019). Peres et al. (2015) found that Brazilian nursing educators viewed environmental education as an opportunity to rethink nursing education, but felt that there was not enough time or opportunity to reflect and discuss this approach with other educators.

5.4 | Action

5.4.1 | Students can act sustainably to mitigate climate change

Few studies focused on sustainable behaviour from the perspective of nursing students. Swedish students were conscious about waste management in clinical practice, such as choosing the right bin for each item; however, this might depend on a supportive environment (Anåker et al., 2021; Aronsson, Anaker, et al., 2022). Other ways of incorporating sustainability into clinical practice included recycling and reusing products, and educating colleagues by raising awareness of environmental issues and sustainability principles (Aronsson, Anaker, et al., 2022; Hanley & Jakubec, 2019). Some studies explored what nursing students did to mitigate climate change in their personal lives, and found a range of activities such as forestation, limiting the use of cars, reducing unnecessary water and energy use, recycling, using natural resources in a preventive manner and the use of environmentally-friendly products and public transportation (Ergin et al., 2021; Lee et al., 2019; Örs, 2022).

Research suggested that sustainability education sessions are effective in making nursing students practice more sustainably (Linton et al., 2020; Richardson et al., 2015, 2017). Richardson et al. (2016) found that students from different countries had varying levels of application of sustainability principles in practice, with Spanish students scoring the highest. Furthermore, Richardson et al. (2019) found that students in year 3 were more able to practice sustainable than students in year 2, and felt more confident to challenge unsustainable practice during clinical placement.

5.4.2 | There are barriers to sustainable praxis

Students in the UK, Sweden and US expressed that they felt unable to challenge unsustainable practice when in clinical placement

(Aronsson et al., 2020; Aronsson, Anaker, et al., 2022; Linton et al., 2020). Reasons for this included a lack of confidence, whereby students felt that they were at the bottom of an informal hierarchy and should not question or challenge those higher up, as well as a general resistance to change in practice, or lacking time or facilities to practice sustainably (Aronsson et al., 2020; Aronsson, Anaker, et al., 2022; Ryan et al., 2020).

6 | DISCUSSION

This integrative review explored nursing students' and educators' awareness of and attitudes towards sustainability and climate change, as well as any action they engage in to be more sustainable. Given that there was no time limit set on the database search, it is worth noting that the first paper found reporting on this topic is from 2014 (Nigatu et al., 2014), and the vast majority (25 out of 32 articles) were published after 2017. The year with most publications (six papers) was 2022, even though the database search was completed on the 8th November 2022, thus any studies published after that would not have been included. The increasing number of publications on this topic since 2014 suggests a growing global interest in this area, especially considering the representation of 17 countries across six continents. The country which was most represented in the body of literature was the UK, with other countries making strong contributions, particularly Turkey and Spain. This highlights the opportunity for international collaborations within the field.

Most papers focused on students, with only two papers including nursing educators in their samples (Hanley & Jakubec, 2019; Peres et al., 2015). Educators' perspectives are of interest as the integration of sustainability into nursing starts with an educator who sees the importance and has some knowledge of the topic (Parry & Metzger, 2023). The limited findings from this integrative review indicate that nursing educators did recognize the importance of these concepts in nursing, but faced barriers such as lack of time and opportunity to discuss and reflect together with other educators. However, there is a clear gap in the literature pertaining to nursing educators' perspectives.

Findings about awareness are contradictory, with some studies indicating that nursing students have a good understanding of the health impacts of climate change, whilst others report a need for more awareness, including the healthcare sector's contribution to climate change. The study conducted by Felicilda-Raynaldo et al. (2018) discovered that 16% of students expressed a positive view towards climate change, while 33% were neutral. The researchers suggested that these controversial responses could be attributed to the absence of climate change and sustainability education in the nursing curriculum of the region. This observation is consistent with the findings of this review, which indicate that sustainability education can enhance student awareness and knowledge. However, with the media coverage having grown and become more accurate over time (IPCC, 2022), it is surprising to find opinions to suggest

that climate change could be beneficial. Nevertheless, what reaches an individual through news websites and social media is not always scientific evidence but could include ambiguous and unclear information about climate change, or even expressions of climate change denial (Al-Rawi et al., 2021). This reinforces the need for a curriculum that is underpinned by research-based knowledge (Elken & Wollscheid, 2016).

The direct impact of climate change on health and wellbeing and the indirect impact due to wider determinants of health being affected are well anchored in research (IPCC, 2022; UN, 2022), and there is evidence on what topics are relevant for inclusion in nursing education, such as use of resources, food, health promotion, globalism, disease management and the environmental impact of delivering healthcare (Lopez-Medina et al., 2019). Nursing practice is linked to several of the UN Sustainable Development Goals (Sensor et al., 2021), yet there is a risk of becoming complacent in nursing education, since Sustainable Development Goal 3 pertains to health and wellbeing for all, which implicitly is the whole focus of nursing. Similarly, most of the topic areas set out by Lopez-Medina et al. (2019) are integrated within the nursing curriculum without a link to climate change or sustainability. Therefore, there is a need for explicit sustainability education within nursing education. There is scope to build on existing initiatives such as the NurSus project (nursus.eu) and the Nursing School Commitment (Health Care Without Harm, 2022) to ensure a universal commitment to sustainability education in nursing.

Findings about attitudes also varied, from much evidence suggesting that nurses have a responsibility to work sustainably and mitigate climate change, to a conflicting viewpoint wherein it was felt that nurses' priorities such as infection control and saving lives overshadow sustainability issues. There was, however, a unanimously positive attitude towards including sustainability education within the nursing curriculum. This indicates that whilst students note that sustainability aspects are not always prioritized in today's nursing practice (Anåker et al., 2015), they feel a need to know more about these topics to prepare them for their future role. This aligns with what Goodman and East (2014) call a 'sustainability lens' in nursing education, that is required to prepare future nurses for their work in an increasingly complex, globalized world with significant health and wellbeing effects of climate change. Adult learning theory, andragogy, suggests that adult learners are motivated by being able to see the relevance in what they learn to their future professional role (El-Amin, 2020). Congruently, Lopez-Medina et al. (2019) found that sustainability principles needed to be included across modules to enable students to see the relevance of this to different aspects of their future profession.

Actions that nursing students can take to be more sustainable and mitigate climate change were highlighted in a few studies, with examples including waste management and education of others in clinical practice, as well as being mindful of environmentally friendly behaviour in private life. However, students identified barriers to this, such as lack of confidence. This relates to Bandura's theory of self-efficacy (1997), which stipulates that a person's belief in their ability to succeed affects

whether they do. Kollmuss and Agyeman (2002) note that a common barrier to pro-environmental behaviour is having an external locus of control, wherein individuals feel that only powerful others can make change happen – their actions are insignificant. Power (2016) argues that an important aspect of nursing education is facilitating the development of change agency within students. This has the potential to enable students in becoming change leaders and practice innovators in environmentally conscious and sustainable healthcare (Nichols et al., 2022). However, it is important to acknowledge that another barrier to implementing practice changes was related to organizational structure, wherein students perceived themselves at the bottom of an informal hierarchy. Therefore, training focused solely on the individual's self-efficacy without addressing structural and organizational factors is not only insufficient but might perpetuate a blame culture wherein the inability to cope is seen as a personal failure (Taylor, 2019). This highlights the importance of top-down leadership to address factors in the clinical environment that undermine nurse resilience (Virkestis et al., 2018).

6.1 | Limitations

Despite careful consideration of multiple search terms, discussed and agreed by all authors to attempt to capture the breadth of research available, it is likely that some relevant search terms were missed. For example, we did not include search terms related to climate justice, climate adaptation or mitigation, environmental health, or environmental degradation or crisis. However, we feel reasonably confident that our search was comprehensive due to the breadth of search terms used and the initial high number of retrieved articles ($n = 1104$).

Whilst including research from different designs is a strength of integrative reviews (Whittemore & Knafel, 2005), in this review it resulted in a high degree of heterogeneity in data, making it complex to analyse. Therefore, a deductive content analysis was employed, as it was helpful in structuring the analysis and ensuring that findings from all studies were synthesized within the categorization matrix. However, using a deductive approach poses a risk of missing information that does not fit within the framework (Elo & Kyngäs, 2008). Nevertheless, the framework used (Lozano, 2008) is specific to internalization of sustainability at an individual level, and was chosen based on a familiarity within the research team of the different aspects of nursing students' (in particular) perspectives of sustainability and climate change. No data was found that could not be coded under one of the main categories.

The majority of studies in this review were quantitative, and employed a data collection process based on a tool or questionnaire to measure awareness of and/or attitudes towards sustainability and climate change concepts. A range of different tools were utilized within the studies, making it difficult to compare and contrast findings. Again, the deductive content analysis was helpful in overcoming this problem, since data from different studies could be mapped to the different main categories regardless of the tool used.

7 | CONCLUSION

This integrative review set out to explore nursing students' and educators' awareness, attitudes and action related to sustainability and climate change globally. Ample research was identified related to nursing students, with findings pointing towards global interest among nursing students for increased curricular content related to sustainability and climate change. Additionally, an implicit need for student support and empowerment was noted but not explored in any depth within the literature. Only two studies were found that included nursing educators in their sample; thus the review was less able to answer this aspect of the research question, although the limited findings suggest an interest from educators to include sustainability aspects within their teaching.

7.1 | Implications for practice, policy and future research

The synthesis of knowledge gained from this integrative review can be used to develop nursing curricula that incorporate sustainability and climate change concepts and practices. Additionally, the review is a starting point to inform decision-makers such as nursing regulatory bodies of the need to make sustainable healthcare and climate change mitigation integral aspects of the nursing professional role, much like what has happened in other healthcare areas (General Medical Council, 2018; Nursing and Midwifery Council, 2019).

Future research is needed to explore the perspective of nursing educators on concepts related to sustainability and climate change. Additionally, there was limited qualitative research done in relation to nursing students; thus there is scope to build on this, with a focus on self-efficacy related to sustainability praxis in the clinical environment.

The review highlighted existing expertise across countries, which offers opportunities for international collaboration between experts and pioneers in this relatively new field of nursing. Some of the included papers were based on such collaboration; this is something to build on within future research and educational practice.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

PEER REVIEW

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DATA AVAILABILITY STATEMENT

Data sharing not applicable—no new data generated, or the article describes entirely theoretical research.

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