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Interventions for eco-anxiety: A systematic review of design, implementation and effectiveness

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Review

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Abstract

Eco-anxiety, characterised by persistent or intense anxiety about environmental crises, is a growing global mental health concern. Yet, the design, effectiveness and implementation of interventions specifically targeting eco-anxiety lack a comprehensive synthesis. This systematic review examined peer-reviewed studies published between 2010 and 2025 that reported on interventions designed to prevent, manage or reduce eco-anxiety or closely related climate-related psychological distress, defined as sustained emotional, cognitive or functional impairment linked to environmental change. Searches were conducted across CINAHL, PsycINFO, MEDLINE, Scopus, ProQuest Environmental Science Collection and the Cochrane Central Register of Controlled Trials. Twenty-two studies met the inclusion criteria from an initial 1,259 records. Most were published between 2017 and 2025, primarily in high-income Western countries, and encompassed a broad range of interventions including educational programmes, messaging strategies, cognitive-behavioural and mindfulness-based therapies, group resilience training, nature-based approaches and community participation initiatives. Cognitive-behavioural and mindfulness-based interventions showed the most consistent positive findings within the current evidence base, including repeated reports of reductions in eco-anxiety or climate-related distress and, in some studies, maintenance of improvements at short-term follow-up. Educational and community-focused interventions were more likely to be associated with emotional engagement, agency and peer support rather than solely increasing knowledge, with some approaches increasing concern or emotional engagement without reducing distress. However, substantial heterogeneity in outcome measures, short intervention durations and limited follow-up periods constrained comparison across studies and assessment of longer-term impact. Implementation challenges included issues of scalability, cultural relevance and the predominance of researcher-led, time-bound interventions. Within the limited literature to date, interventions integrating emotional resilience training with group or community engagement appeared to show promising findings. Further research using standardised outcome measures, longer follow-up periods and more culturally diverse and participatory designs is required to strengthen the evidence base and inform scalable, context-sensitive responses to eco-anxiety.

Impact statement

This systematic review is the first to comprehensively map and critically appraise interventions that target eco-anxiety across therapeutic, educational, community and nature-based settings. By synthesising evidence from 22 studies conducted in diverse contexts, it identifies which approaches have shown the most promising findings to date and where existing responses remain limited. For practitioners, policymakers and educators, this review offers a practical overview of intervention types, target groups and outcome measures that can guide the design of more effective, ethically responsible responses to climate-related distress. It highlights recurring components across diverse interventions, including emotional resilience skills, structured opportunities for collective action and community-based delivery. It pinpoints critical gaps, including the lack of culturally diverse evidence, limited community involvement in co-design and the near-absence of system-level or policy-linked initiatives. By framing eco-anxiety as both a mental health concern and a potentially adaptive response to real climate threats, this work supports the development of interventions that protect well-being while enabling constructive engagement with climate action. The review provides a foundation for developing standardised outcome measures, scaling up effective programmes beyond researcher-led pilots and prioritising investment in climate–mental health strategies in low- and middle-income settings. In doing so, it offers timely guidance for health systems, schools and community organisations seeking to respond to the mental health dimensions of the climate crisis in a coordinated and evidence-informed way.

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Introduction

Addressing eco-anxiety is a mental health imperative and a critical component of achieving the United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being) and SDG 13 (Climate Action) (United Nations, 2024). Climate change threatens physical and mental health worldwide, and eco-anxiety, defined as a persistent worry and distress about environmental degradation, reflects the psychological dimension of this crisis (Pihkala, 2020; Coffey et al., 2021). As the SDGs emphasise integrated approaches to health, education and environmental sustainability, addressing eco-anxiety aligns with global commitments to promote resilience and adaptive capacity in the face of climate-related risks. Recent evidence shows that eco-anxiety is widespread, especially among youth and environmentally engaged populations, and disproportionately affects vulnerable communities, reinforcing the need for equity-focused interventions (Niedzwiedz and Katikireddi, 2023; Gallè et al., 2025; Magruder and Chipman, 2025). International agencies, including the World Health Organization (WHO) and the Intergovernmental Panel on Climate Change, have identified mental health as a priority in climate adaptation strategies, underscoring the urgency of developing effective interventions (World Health Organization, 2022; Intergovernmental Panel on Climate Change, 2023).

To support conceptual clarity, this review adopts a working definition of eco-anxiety as climate-related psychological distress that may range from normative, contextually rational concern to more persistent and/or intense worry associated with emotional, cognitive or functional impairment. This framing distinguishes adaptive climate concern, which may motivate engagement and problem-solving, from maladaptive eco-anxiety characterised by sustained distress, rumination or impairment that warrants targeted support (Pihkala, 2020; Coffey et al., 2021). This distinction is important for interpreting intervention outcomes, because some approaches may increase emotional activation or concern while simultaneously strengthening agency, coping or engagement; such patterns may reflect heightened salience, adaptive activation or measurement nuance rather than harm (Baudon and Jachens, 2021; Becht et al., 2024). Accordingly, we interpret interventions through three complementary pathways emphasised across the eco-anxiety and climate-mental health literature: (1) emotion regulation and resilience-building (e.g., strengthening distress tolerance and adaptive coping), (2) meaning-making and acceptance-oriented processes (e.g., supporting integration of climate emotions and realistic hope) and (3) agency- and connection-building (e.g., strengthening self-efficacy, collective efficacy and social support to enable constructive engagement) (Pihkala, 2020; Baudon and Jachens, 2021).

Despite this growing recognition of eco-anxiety, intervention research remains limited and difficult to translate into practice. Previous reviews indicate that the majority of research has concentrated on defining eco-anxiety and exploring its psychosocial effects (Baudon and Jachens, 2021; Coffey et al., 2021; Boluda-Verdú et al., 2022), while there has been far less emphasis on systematically analysing evaluated interventions, specifically, detailing what has been implemented, how these interventions are structured and delivered, and the outcomes they produce. For example, Baudon and Jachens (2021) mapped therapeutic and supportive approaches and identified recurring themes (e.g., fostering inner resilience, group support, action-oriented coping, practitioner training and nature connection), but also highlighted that the underpinning evidence was largely conceptual with very few empirical evaluations of intervention effectiveness. Similarly, broader syntheses of climate-related distress interventions report limited methodological rigour and substantial heterogeneity in outcome assessment, restricting comparison across studies and hindering cumulative learning (Xue et al., 2024). Measurement challenges further constrain progress: while several eco-anxiety and climate-distress scales exist, they are inconsistently applied and often lack robust psychometric validation across diverse cultural contexts, limiting confidence in observed intervention effects (Kırımer-Aydınlı et al., 2025; Ramsay et al., 2025).

Taken together, these limitations point to the need for a synthesis that moves beyond cataloguing intervention types to systematically examine how interventions are designed, evaluated and implemented, as well as the tools used to assess change. In particular, the roles of key interest-holders, such as educators, clinicians, community leaders and policymakers, in shaping and delivering eco-anxiety interventions remain insufficiently examined, limiting understanding of feasibility, scalability and contextual fit. Addressing these gaps is essential for informing more effective and context-sensitive responses. Accordingly, this systematic review synthesises evidence on the design, effectiveness and implementation of interventions aimed at addressing eco-anxiety across diverse populations and settings guided by the following research questions:

- What interventions or strategies have been implemented or proposed to address eco-anxiety?
- What measurement tools are used to assess the outcomes of interventions aimed at addressing eco-anxiety, and what are their psychometric strengths and limitations?
- How effective are these interventions in addressing eco-anxiety, and what aspects of exposure and outcomes do they target?
- What barriers and facilitators influence the implementation of intervention delivery and outcomes related to eco-anxiety?

Methodology

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement (PRISMA) (Page et al., 2021). The PRISMA checklist is provided in Supplementary Table S1. Methods were pre-specified and documented in advance in a protocol that was published on the PROSPERO database for systematic reviews (Registration no.: CRD420251138000).

Search strategy

A comprehensive search of three EBSCOhost databases (Cumulative Index of Nursing and Allied Health Literature [CINAHL] plus, Literature Analysis and Retrieval System Online [MEDLINE] complete databases and PsycINFO), ProQuest Environmental Science Index, Scopus and the Cochrane Central Register of Controlled Trials (CENTRAL). The strategy was developed between the authors and a research librarian trained in conducting systematic reviews. The search strategy was informed by previous studies that examined eco-anxiety and interventions for the treatment of eco-anxiety (Baudon and Jachens, 2021; Coffey et al., 2021; Boivin et al., 2025) (Supplementary Table S2). The search strategy was tailored for each database to locate original research involving human participants, beginning on the 1st January 2010 and extending until 30th September 2025 (the date the search was

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conducted). The 2010 start date reflects the period in which eco-anxiety began to be conceptualised as a distinct form of climate-related psychological distress, with emerging theoretical frameworks and measurement approaches that enabled later intervention research (Coffey et al., 2021; Boivin et al., 2025). An additional hand search of the reference lists of included studies was undertaken.

Eligibility criteria

Studies were included in this review if they were published in English or Spanish. The eligibility criteria are based on the Population/problem, Interest, Context, Scope and Time (PICoST) approach (Table 1) (Vargas et al., 2026). The review focused on interventions explicitly addressing eco-anxiety or closely related climate-related psychological distress in general or at-risk populations. Studies centred on pre-existing mental health diagnoses or current specialist treatment pathways were excluded to maintain a consistent focus on eco-anxiety-specific or climate-distress-specific intervention responses.

Study selection

The search results were uploaded to Covidence (Veritas Health Innovation, 2022), where duplicates were removed, and all screening was conducted. Two researchers independently screened all article titles, abstracts and full texts. A third researcher resolved all conflicts at both stages (titles and abstracts, and full text).

Data extraction

A data extraction template was developed to extract data from each article. The extracted information included: (1) general information: title, year, lead author and country; (2) characteristics of included studies: aim of study, study design (3) intervention characteristics: intervention description (activities), study duration, target setting, participant details, target exposure, outcomes, tools used to assess outcomes and interest-holder roles; (4) results: main findings, reported strengths and limitations, implications and gaps for future research. Data extraction and quality assessment were conducted by two authors under the supervision of a second author. All the extracted data were exported from Covidence software (Veritas Health Innovation, 2022) to a Microsoft Excel spreadsheet.

Quality assessment

A quality assessment of included studies was conducted using the Quality Assessment Tool for Studies with Diverse Designs (QuADS), a 13-item tool scored 0–3 per item to support appraisal across heterogeneous methodologies (Harrison et al., 2021). QuADS does not specify a cut-off for classifying studies as high or low quality; therefore, studies were not excluded based on QuADS scores. Instead, QuADS ratings were used to characterise the overall strength of the evidence base and to qualify interpretation of findings by identifying features likely to limit interpretability (e.g., single-group pre–post designs, small samples, short exposure windows, limited follow-up and weaker reporting of theoretical underpinning or stakeholder involvement). Given heterogeneity of interventions and outcomes, we did not apply any grading system; instead, we summarised confidence narratively based on consistency of effect direction, design strength, sample size, follow-up and key QuADS reporting domains. QuADS was used to support appraisal across diverse study designs, but it does not replace design-specific risk-of-bias assessment or formal certainty grading, and its findings were interpreted accordingly.

Results

A total of 1,259 articles were considered for title and abstract screening after duplicates were removed. Of these, 140 studies were fully assessed against the eligibility criteria, and 118 were excluded for the reasons described in Supplementary Table S3. Finally, 22 articles were included in our systematic review. A PRISMA flow diagram (Figure 1) illustrates the search results and data collection process.

Table 1. Inclusion and exclusion criteria

	Inclusion	Exclusion
Population	Individuals of any age experiencing, or with potential to experience, eco-anxiety or climate-related psychological distress. Noninstitutionalised/free living populations.	Populations outside the scope of interest (e.g., animals, purely ecological systems). Those with pre-existing mental health diagnosis.
Intervention(s) or exposure(s)	Interventions[^] designed to prevent, manage or reduce, eco-anxiety or climate-related psychological distress (e.g., Nature-based therapy, cognitive-behavioural therapy (CBT), mindfulness, educational programmes, community engagement and policy-driven initiatives).	Interventions or actions focused solely on general anxiety, depression or unrelated mental health conditions without a clear link to environmental concerns. Studies that aim to protect/improve mental health without explicitly considering the impact of climate change on mental health. Interventions that aim to measure triggers of eco-anxiety. Mitigation of climate change effects on mental health (e.g., PTSD).
Context	Any geographical, cultural or institutional setting. This includes clinical, community, educational and policy environments, with no restrictions applied.	Studies where the context is not clearly described. Studies conducted in settings unrelated to mental health, education or community engagement (e.g., industrial, agricultural or purely policy-focused settings without individual-level outcomes). As above exclude individuals in patient mental health services/treatment.
Study design	Protocols and empirical studies evaluating the effectiveness of interventions (e.g., randomised controlled trials (RCTs), quasi-experimental studies, longitudinal studies and pre-post designs) – quantitative and qualitative measures of outcome and process.	Editorials, opinion pieces, studies without outcome evaluation, theses, conference abstracts, poster presentations, reviews (e.g., literature, scoping, systematic or bibliometric).
Time	1st January 2010	Publications prior 2010

[^]Intervention is defined as "any type of local or outside support that aims to protect or promote psychosocial well-being and/or prevent or treat mental disorder" (Cimprich and Ronis 2003).

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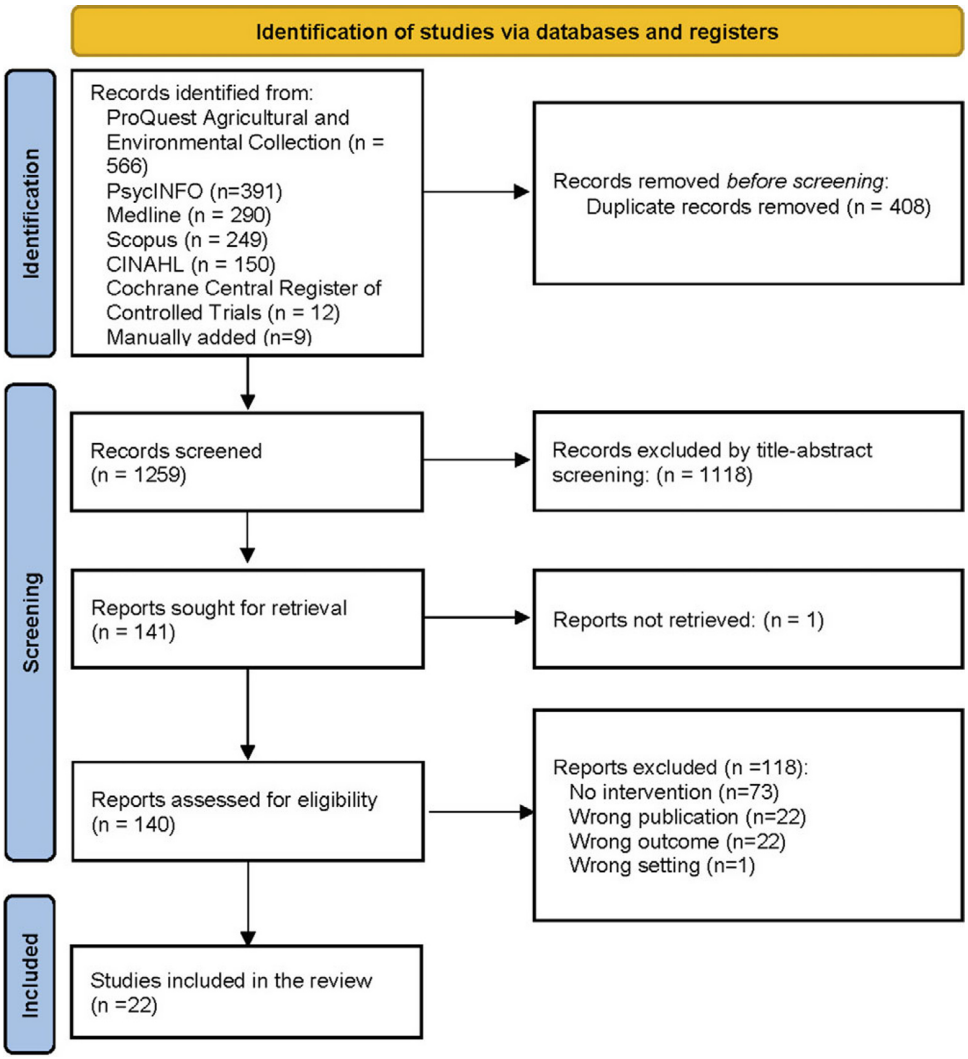


Figure 1. PRISMA diagram of the systematic review process for this review.

Characteristics of included studies

Of the 22 included studies, a subset were protocol or feasibility studies that did not report outcome data. These studies were included to characterise intervention approaches but were not considered when describing effectiveness patterns. Across the 22 included studies, the evidence base is recent and geographically concentrated. Studies were published between 2017 and 2025, with most appearing from 2023 to 2025 (n = 17; 77%) and were conducted predominantly in high-income Western countries. The United States of America (USA) accounted for the largest number of publications (Stevenson et al., 2018; Lawson et al., 2019; Ecker et al., 2020; Trott, 2021; Goldwert et al., 2024; Meixner et al., 2024; Benoit et al., 2025; Bodas et al., 2025; Epel et al., 2025a; Scott et al., 2025) (n = 10; 46%), followed by Australia (Jones et al., 2017; Eichholtzer et al., 2024; Coates et al., 2025; Cosh et al., 2025) (n = 4; 18%), Egypt (Elzohairy et al., 2024; Eweida et al., 2025) (n = 2; 9%), Sweden (Lindhe et al., 2023, 2024) (n = 2; 9%) and other European countries (Howard-Jones et al., 2023; Asbrand et al., 2025; Eklöf and Klöckner, 2025; Glynn et al., 2025) (n = 4; 18%). Table 2 and Supplementary Table S4 summarise the included studies. These patterns indicate that evaluated eco-anxiety interventions are concentrated within a recent and still developing evidence base and are unevenly distributed across global contexts, with limited representation in low- and middle-income countries.

Methodological approaches were heterogeneous (Table 2), but randomised control trials (RCTs) (Jones et al., 2017; Ecker et al., 2020; Lindhe et al., 2023; Eichholtzer et al., 2024; Asbrand et al., 2025; Benoit et al., 2025; Eweida et al., 2025; Glynn et al., 2025; Scott et al., 2025) were the most common design (n = 9; 41%), followed by experimental designs without full randomisation, such as pre-post-test treatment-control designs and quasi-experimental approaches (Stevenson et al., 2018; Lawson et al., 2019; Elzohairy et al., 2024; Bodas et al., 2025; Coates et al., 2025) (n = 5; 23%); mixed-methods designs (Trott, 2021; Howard-Jones et al., 2023; Meixner et al., 2024; Epel et al., 2025a) (n = 4; 18%), combining quantitative pre/post assessments with qualitative reflections or interviews, often across multiple sites or longitudinally and qualitative research (Lindhe et al., 2024; Eklöf and Klöckner, 2025) (n = 2; 9%) exploring participant experiences, while observational designs (Goldwert et al., 2024; Cosh et al., 2025) included cross-sectional studies and exploratory pilot studies with single-group pre/post assessments

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Table 2. Outline of the interventions from the included articles (n = 22)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
Educational interventions							
Stevenson et al. (2018) United States	Experimental pre/post treatment-control design with path analysis to test causal relationships	A four-lesson climate education module focused on: • Weather vs. climate • Climate impacts on wildlife • Wildlife management and climate adaptation • Individual actions for climate mitigation • Lessons were designed to build: • Knowledge (science, causes, impacts) • Concern (via wildlife impacts) • Hope (via action strategies) • Behaviour (individual mitigation actions) (Pre-surveys: December 2014–January 2015; post-surveys: April–June 2015)	**Setting:** Middle schools in North Carolina, USA **Participants:** n = 1,041 students (Grades 6–8, ages 11–14) **Gender:** 51.6% female **Ethnicity:** 62.9% White, 11% Black, 9% Hispanic, others represented **Other:** 64.6% attended Title I (low SES) schools	Participation in the climate education module	**Outcomes:** Climate change knowledge, hope, concern, pro-environmental behaviour **Tools:** Adolescent Climate Change Knowledge Scale, Hope Scale, Concern Scale, Behaviour Scale	• Significant causal link between treatment and increased knowledge • No direct link between treatment and behaviour, hope or concern • Path model supported: • Knowledge • Hope & Concern • Behaviour • Hope was a slightly stronger predictor of behaviour than concern • Title I status is negatively associated with gains in knowledge, concern and behaviour	• Explore worldview, norms and perceived behavioural control Investigate emotional and social factors influencing behaviour • Refine interventions to better foster hope and concern • Extend model testing to adults and diverse populations
Lawson et al. (2019) United States	Quantitative, pre-post, treatment-control experimental design	Curriculum: "Weather, Wildlife, Climate and Change" Components: • Four classroom activities (modelled after Project WILD) • Field-based service-learning project • Student-led parent interview • Reflective blog post Focus: Local species and climate impacts, hands-on learning, parental engagement (Two academic years, 2016–2018)	**Setting:** Coastal counties of North Carolina, USA **Participants:** Teachers: n = 21 (n = 9 treatment, n = 12 control) Students: n = 357 treatment, n = 324 control Treatment and control similar demographics: • **Grades and ages:** Grades 6–8; ages 10–14 • **Gender:** ~52% female • **Other:** Caucasian Parents: n = 199 treatment, n = 93 control) • **Ages:** Grades 6–8; ages 10–14 • **Gender:** 67% female	Climate change education designed to foster child-to-parent transfer of concern through structured activities and communication	**Outcomes:** Change in child climate change concern Change in parent climate change concern (mediated by child concern) Frequency of family climate change discussions **Tools:** Validated Climate Change Concern Scale Single-item measure for family discussion frequency Pre/post surveys for children and parents	• Students in the treatment group showed significantly larger gains in climate change concern compared to the control group (mean increase of +2.05 points on a 16-point scale; p = 0.009). • Parents of children in the treatment group expressed significantly higher climate change concern than parents in the control group (mean increase of +4.29 points; p = 0.006). • The effect was fully mediated by children's increase in concern, confirming the (Intergenerational learning (IGL) pathway.	• Explore mechanisms behind gender differences (why daughters more effective than sons) • Test IGL in contexts with less visible climate impacts (e.g., inland drought areas) • Include additional variables (e.g., hope, trust) and examine long-term behavioural outcomes • Investigate strategies to scale IGL-based

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
			• **Other:** 79% Caucasian • **Political ideology:** 31% conservative, 40% moderate, 27% liberal			• Conservative parents and fathers – groups typically least concerned about climate change – showed the largest gains in concern. • Daughters were more effective than sons in influencing parents' concern. • Increased family discussion about climate change significantly predicted higher parental concern ($p = 0.048$). • Hands-on activities, local context, field-based service-learning and student-led parent interviews were critical components.	interventions nationally
Trott (2021) United States	Mixed-methods, multi-site study using pre/post surveys and post-programme focus groups	Fifteen-week programme titled Science, Camera, Action! based on the "Head, Hands, and Heart" model: • Science: Hands-on climate change education activities • Camera: Photovoice method (children took and discussed photos) • Action: Youth-led family and community climate action projects (Data collection: January–May 2016)	**Setting:** After-school programme across three Boys and Girls Clubs in the USA Mountain West region **Participants:** $n = 55$ children **Age:** 10–12 **Gender:** ~53% girls **Ethnicity:** ~56% White, ~26% Hispanic/Latinx, ~15% multiracial **Other:** ~62% received free/reduced lunch	Climate change education through experiential, reflective and action-oriented learning	**Outcomes:** Environmental responsibility, climate urgency, nature connection **Tools:** Validated attitude scales (pre/post), focus group interviews (post)	• Significant increase in environmental responsibility ($p = 0.001$, $d = 0.47$) • Significant increase in urgency about climate change ($p = 0.011$, $d = 0.36$) • Non-significant increases in connection with nature and ecological worldview • Focus groups revealed deeper respect for nature, mixed emotions and increased motivation to act	• Explore the effects on children with less pro-environmental attitudes • Investigate long-term behavioural impacts • Address barriers to implementing transformative climate change education in formal education
Howard-Jones et al. (2023) UK	Mixed-methods study combining pre- and post-programme survey data with qualitative reflections from teaching staff	A climate education unit including: • Mind mapping Scientific explanations and videos • Carbon footprint calculation Exploration of global/local impacts	**Setting:** A secondary school in South-West UK, involving geography curriculum-based CC education **Participants:** $n = 108$ students (Years 7–9, aged 11–14) **Analysed:** 62 students	Participation in a CC education unit and completion of a brief survey before and after	**Outcomes:** Climate-related belief, self-efficacy, intention to act, action, anxiety **Tools:** Custom-designed survey, Climate Change Worry Scale (adapted for age), items adapted from validated sources	• Significant increase in self-efficacy ($p = 0.003$) No significant change in belief, intention, action or anxiety • Teachers noted that increased action may be due to residual project tasks	• Explore collective efficacy and hope as predictors • Extend behavioural recall window beyond "yesterdays'"

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
		• Evaluation of mitigation strategies • Letter-writing to the headteacher proposing school-level climate actions (Programme delivered, April–May 2022; reflections occurred post-summer break)	(due to absences and data exclusions)			• Anxiety levels slightly decreased, contrary to expectations	• Align survey items across variables Investigate the intention-action gap • Provide resources to support independent teacher data use
Meixner et al. (2024) United States	Mixed-methods study using pre/post assessments and questionnaires across multiple institutions	The Project EDDIE (Environmental Data Driven Inquiry & Exploration) Climate Change module: • Students analysed authentic climate datasets (e.g., Mauna Loa, Vostok ice core) Used Excel for regression, correlation and slope analysis • Engaged with five instructional videos and embedded assessments • Explored mechanisms of climate change and statistical reasoning (Fall 2020 and Spring 2021 semesters)	**Setting:** Six undergraduate courses at five USA institutions delivered asynchronously online due to the COVID-19 pandemic. **Participants:** *n* = 199 students (complete data) Mostly first-year students **Gender:** 69.8% women, 28.6% men, 1.5% non-binary **Ethnicity:** 71.9% White/European American, 17.6% Latinx	Asynchronous engagement with authentic climate data and statistical analysis	**Outcomes:** Climate change understanding, statistical competence, climate anxiety **Tools:** Pre/post module assessments, Anthropogenic Climate Change Dissenter Inventory, Anxiety about Climate Change Survey	• Significant improvement in statistical competence Improved understanding of the correlation between CO_2 and temperature • No significant improvement in understanding causation • Climate anxiety decreased before the module and remained low • Persistent climate change dissenters showed higher-than-average anxiety • Dissenting stance about climate change: 20 of 32 dissenters shifted to scientific consensus by the course end. • All persistent dissenters expressed higher-than-average anxiety about climate change.	• Explore causal reasoning in climate science education Investigate links between anxiety and denial empirically • Develop strategies to support dissenters and reduce anxiety • Refine assessments to better capture conceptual understanding
Bodas et al. (2025) United States	Pre−/post-test experimental design	Children watched one of two 10-min episodes of Nature Cat, distributed by PBS Kids: • Experimental: "Water Woes" (focused on water conservation) • Control: "Enter the Dragonfly" (focused	**Setting:** Conducted online via Zoom, in-person at preschools and a children's museum in the USA **Participants:** *n* = 110 children (57 girls) **Mean age:** ~4.97 years **Race:** 61% White, 13.6% Asian, 1.8% Black, 1.8%	Viewing a nature-themed educational TV episode	**Outcomes:** Conservation knowledge, self-efficacy, environmental worry; **Tools:** Conservation Choice Task, environmental sustainability knowledge: open-ended questions, self-efficacy and worry: five-point visual scale, memory check: eight open-ended	• No significant improvement in conservation knowledge overall • Marginal improvement in near-transfer knowledge (strategies shown in episode) • Significant increase in environmental worry in the experimental group	• Compare anthropomorphic vs. human characters Test repeated exposure effects • Explore active mediation (e.g., adult

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
		on dragonfly life cycle) Followed by assessments of knowledge, self-efficacy and worry.	Native American, 10% multiracial, 10.9% undisclosed		questions, parent environmental knowledge survey (online sample only)	• No significant change in self-efficacy ratings	discussion) Investigate how worry can be channelled into action • Develop age-appropriate conservation strategies
Eweida et al. (2025) Egypt	RCT with repeated measures at baseline, post-intervention and 1-month follow-up	The VBCCP consisted of five video sessions covering: • Introduction to climate change • Health impacts of climate change • Climate literacy and pro-environmental activities Resilience and self-care strategies • Student-led sustainability activities • Interactive discussions followed videos. The control group received climate-related flyers (Recruitment and intervention 2023–2024 academic year)	**Setting:** Faculty of Nursing, Damanhour University, El-Beheira Governorate, Egypt **Participants:** n = 150 students (n = 76 intervention, n = 74 control) **Final analysed sample:** n = 70 per group **Gender:** ~64% female **Age:** 33.6% <20, 34.3% 20–25, 32.1% >25	Participation in VBCCP vs. receiving climate flyers	**Outcomes:** Climate change perception, climate anxiety, environmental self-efficacy **Tools:** Climate Change Perceptions: 14-item scale, Climate Change Anxiety: 13-item scale (Arabic version), environmental Self-Efficacy: 20-item scale	• Significant improvements in climate change perception (large effect sizes: d = 2.174 at T1, d = 2.135 at T2) • Significant reductions in climate anxiety (d = 0.964 at T1, d = 0.937 at T2) • Significant increase in environmental self-efficacy (d = 1.437 at T1, d = 1.596 at T2) • Cognitive impairment due to climate anxiety significantly reduced; functional impairment unchanged	• Extend to other university majors Use mixed-method designs • Explore student satisfaction and long-term behavioural outcomes
Messaging intervention							
Jones et al. (2017) Australia	Randomised controlled experiment with two framing conditions (proximal vs. distal)	Participants were randomly assigned to view one of two 4-min multimedia videos: • Proximal frame: Emphasised recent, local and certain climate impacts in Australia Distal frame: Emphasised distant, future and uncertain climate impacts in other countries	**Setting:** Online survey conducted in Australia **Participants:** n = 333 Australian adults (18+ years). **Gender:** 190 men (just over half). **Age distribution:** 18–24 (4%), 25–34 (14%), 35–44 (22%), 45–54 (21%), 55–64 (21%), 65+ (18%)	Exposure to climate change message framing (proximal vs. distal).	**Outcomes:** Psychological distance, climate concern, mitigation intentions **Tools:** Psychological Distance: 26-item scale covering geographic, temporal, social and uncertainty dimensions, Climate Change Concern: 7-item scale, Mitigation Intentions: 7-item scale	• Proximal framing significantly reduced psychological distance (except temporal, which approached significance) • Reduced psychological distance was associated with increased concern and stronger mitigation intentions • Path analysis showed full mediation by psychological distance	• Explore long-term effects and persistence of framing impacts Investigate affective responses and their interaction with psychological distance • Assess actual behaviour change, not just intentions

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
						dimensions (especially uncertainty and social distance)	• Use orthogonal designs to isolate message components
Asbrand et al. (2025) Germany	Experimental, randomised between-subjects design with three conditions: high agency, low agency and control	Participants watched a climate anxiety-inducing video, followed by a text-based manipulation emphasising either high or low personal agency, or no manipulation (control) (Conducted from September to December 2022)	**Setting:** Online study conducted in Germany	Exposure to climate-related distress and agency framing	**Outcomes:** State anxiety, coping strategies (problem-focused, emotion-focused, meaning-focused), trait mental health (anxiety, depression, general psychopathology), trait climate distress and coping- Intolerance of uncertainty **Tools:** State–Trait Anxiety Inventory Adapted climate-related agency scale, Climate-related coping questionnaire, Mental health: screening focusing on anxiety (depressive symptoms and general psychopathology screening), Intolerance of Uncertainty Scale Climate distress scale	• High agency reduced state anxiety and increased meaning-focused coping • Low agency did not reduce anxiety and decreased problem- and meaning-focused coping Trait climate distress was the strongest predictor of state anxiety • Trait coping predicted respective state coping styles	• Explore broader climate emotions (e.g., guilt, shame, helplessness) • Use specific climate anxiety instruments Study younger children and clinical populations • Investigate emotion-focused coping and its role in mental health • Longitudinal studies and cross-cultural comparisons
Benoit et al. (2025) United States	RCT	Participants watched one of three 110-s videos featuring the same adolescent actor: • Positive: action-oriented climate messaging • Negative: defeatist climate messaging • Control: unrelated book summary Videos were designed in TikTok-style "selfie" format	**Setting:** Online, USA. based sample **Participants:** 932 adolescents (after exclusions) **Age:** Mean ~ 16.9 years **Gender:** ~48% female, 46% male, 6% other **Ethnicity:** 59% White, 19% Black, 23% other – 24% Hispanic/Latino/a/x	Climate change messaging via brief peer-style video	**Outcomes:** Climate change hope, anxiety, behavioural intentions, sense of agency. **Tools:** Climate Change Hope scale (11 items, 3 subscales), Climate Change Anxiety scale (13 items, 2 subscales), Behavioural Intentions custom 8-item, sliders for hopefulness and agency	• Positive video increased climate hope and agency ($p < 0.001$) • No significant change in climate anxiety or behavioural intentions • Hopefulness correlated weakly with behavioural intentions ($r = 0.124$)	• Longitudinal studies to assess sustained impact • Tailored interventions for climate sceptics • Explore effects on behavioural change over time
Coates et al. (2025) Australia	Experimental study using an implicit priming task and a Discrete Choice Experiment (DCE), with pre- and post-priming behavioural measures and post-priming anxiety assessment	Participants were randomly assigned to one of four priming conditions: • Positive imagery • Negative imagery • Neutral imagery • Random mix of all three Each participant viewed 4 blocks of 40 images (16 environmentally focused,	**Setting:** Online study conducted via QuestionPro and JATOS platforms **Participants:** $n = 283$ participants (after exclusions) **Age:** 18–63 years (Mean = 24.85, SD = 7.67) **Gender:** $n = 186$ female, $n = 89$ male, $n = 7$ non-	Exposure to emotionally valenced environmental imagery	**Outcomes:** Climate anxiety, pro-environmental behaviour **Tools:** Discrete Choice Experiment: Simulated transport decisions based on cost, time and eco-friendliness, Climate Change Anxiety Scale: 13-item validated scale measuring cognitive-emotional and functional impairment	• Negative imagery significantly reduced preference for eco-friendly transport choices • No significant differences in climate anxiety across priming conditions Positive correlation between climate anxiety and pro-environment behaviours	• Exploration of the long-term stability of climate anxiety • Use explicit priming or real media content Investigate other domains of behaviour (e.g., financial decisions)

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
		24 neutral), followed by decision-making tasks.	binary, *n* = 1 other/prefer not to say			• No evidence for an inverted-U relationship between climate anxiety and pro-environment behaviours	• Examine affective responses and their role in behaviour change
Ecker et al. (2020) United States	RCT	Participants were exposed to short opinion articles (~225 words) with different framings: Trial-run frame: COVID-19 response as a model for climate action. • Back-seat frame: Climate change should be deprioritised during economic recovery. • Back-seat inoculation/refutation frame (Experiment 2 only): Counterarguments to the back-seat frame. Control group: No article exposure.	**Setting:** Online experiments conducted with adult USA *Experiment 1:* **Participants:** *n* = 560 (*n* = 178 control, *n* = 192 trial-run, *n* = 190 back-seat) **Age:** 18–78 years (Mean = 45.79, *SD* = 15.79) **Gender:** 266 males, 289 females, 5 non-binary/undisclosed *Experiment 2:* **Participants:** *n* = 803 (*n* = 207 control, *n* = 191 trial-run, *n* = 197 back-seat, *n* = 208 back-seat I/R) **Age:** 18–80 years (Mean = 33.03, *SD* = 12.16) **Gender:** *n* = 385 males, *n* = 407 females, *n* = 11 non-binary/undisclosed	Exposure to different framings of climate change in relation to COVID-19	**Outcomes:** Climate change concern, mitigation support **Tools:** Seven-item concern and support scale, pre-treatment covariates: political orientation, climate-change belief, COVID-19 concern	• Trial-run framing: No significant effect on concern or support • Back-seat framing: • Significantly reduced support for climate mitigation in both experiments; mixed effects on concern • Inoculation/refutation: • Offset reduction in concern but not in mitigation support	• Need to explore long-term effects of repeated exposure to back-seat framing • Further investigation into political identity salience and its impact on climate attitudes
Goldwert et al. (2024) United States	Cross-sectional study	Participants watched one of four climate change videos messaging conditions and completed outcome measures	**Setting:** An online survey was conducted among Florida residents **Participants:** *n* = 441 (after exclusions) **Age**: ~47.8 years **Gender:** 61.7% female **Ethnicity:** 80% White, 19.7% Black, Indigenous or Person of Colour **Education:** 23.1% Bachelor's, 13% graduate education **Political ideology:** 34.9% mixed, 20.6% liberal, 23.8% conservative	Exposure to climate change messaging and assessment of individual differences in climate change anxiety and IU.	**Outcomes:** Post-video emotional distress (fear and guilt), support for climate change policies, behavioural engagement in climate initiatives **Tools:** Climate Change Anxiety Questionnaire, Intolerance of Uncertainty Scale Short Form, Modified Differential Affect Scale (for distress), Policy Support Index Behavioural Engagement Index (based on sign-up interest)	• Both climate anxiety and IU predicted greater distress • Only IU predicted greater policy support and behavioural engagement • Climate anxiety did not significantly predict behaviour or policy support when controlling for covariates.	• Need for in-person studies to validate behavioural outcomes • Exploration of mechanisms behind Ui's influence on engagement • Broader geographic and demographic sampling Refinement of messaging interventions

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
Therapeutic interventions							
Lindhe et al. (2023) Sweden	Pilot RCT with two arms: ICBT treatment vs. waitlist control	An-week therapist-supported ICBT Fifteen modules (each participant received 8, including mandatory intro and conclusion) Modules covered topics like nature connectedness, anxiety, stress, self-compassion, emotion regulation and behavioural activation Weekly therapist feedback via secure platform (Recruitment: January 2022; data collected by April 2022)	**Setting:** Online intervention conducted in Sweden using the Iterapi platform **Participants:** *n* = 60 (*n* = 30 treatment, *n* = 30 control) **Mean age:** 40.7 years **Gender:** 76.7% female **Education:** 80% completed university **Climate change experience:** 40% direct, 60% indirect	Psychological support for climate-related distress via tailored CBT modules.	**Outcomes:** Depression, anxiety, stress, climate distress, quality of life **Tools:** Validated scales and two custom instruments	• Significant reductions in: Depression (BDI-II, *d* = 0.87) • Stress (PSS, *d* = 0.76) • Climate distress (CCI-15, *d* = 0.79) • Increased quality of life (BBQ, *d* = 0.79) • No significant changes in anxiety, insomnia, alcohol use or pro-environmental behaviour	• Larger trials to confirm findings Qualitative studies on module effectiveness • Psychometric validation of custom measures • Exploration of mechanisms of change
Lindhe et al. (2024) Sweden	Qualitative research		**Setting:** Online intervention conducted in Sweden using the Iterapi platform **Participants:** *n* = 9 **Age:** 26–56 (mean = 39) **Gender:** *n* = 8 women, *n* = 1 man **Education:** *n* = 8 college/university degrees **Employment:** All employed at baseline; *n* = 3 on leave All showed reduced CCI-15 scores post-treatment	Psychological distress related to climate change (eco-anxiety, solastalgia, etc.)	**Outcomes:** Experiences of emotional, cognitive and behavioural changes, perceived usefulness and challenges of the intervention. **Tools:** Qualitative interviews using a semi-structured guide, Climate Cope Index (CCI-15) for pre—/post-distress levels	• Participants developed new coping strategies and perspectives on climate distress • Treatment was generally helpful but emotionally demanding. • Some increased climate engagement, others reduced it for self-care • Digital format was convenient, but lacked interpersonal connection for some	• Larger, more diverse samples Evaluation of long-term effects and behavioural outcomes • Exploration of meaning-focused coping as a mechanism • Balancing individual well-being with environmental action.
Eklöf and Klöckner (2025) Norway	Qualitative research	A five-session programme called the "Climate Emotion School" designed to: • Develop emotion-focused coping strategies • Teach individual and collective problem-focused coping • Foster social support Balance engagement with self-care • Each session included check-ins, summaries, topic-	**Setting:** Sweden schools and universities **Participants:** *n* = 60 attended at least one workshop 10 participants interviewed (*n* = 8 female, *n* = 2 male; ages 18–29, mean age 22); *n* = 4 practitioners interviewed	Participation in a structured group programme addressing climate-related emotions and engagement	**Outcomes:** Perceived helpfulness of programme elements, emotional coping improvements, motivation and hope related to climate action, challenges in implementation and daily life integration **Tools:** Qualitative interviews, thematic analysis	• Emotion regulation techniques (acceptance, verbalisation) were helpful • Group discussions reduced isolation and validated emotions • Learning about collective action increased hope and motivation • Challenges included transferring insights into daily life and diverse participant needs	• Explore group dynamics and emotional norms • Longitudinal studies on action follow-up • Adaptations for younger age groups • Cultural and contextual variations in eco-anxiety and coping

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
		related activities and check-outs. Topics ranged from emotional regulation to climate engagement. (Programme implementation: August 2022–December 2023; interviews June 2023–February 2024)					
Epel et al. (2025a) United States	Mixed-methods longitudinal intervention study with pre-, post- and 5-month follow-up surveys, plus qualitative interviews	A 10-week in-person course including: • Mindfulness and contemplative practices • Expert video lectures • Group discussions and experiential activities • Nature immersion • Group climate action projects (Implementation: March–June 2024; follow-up, 5 months later)	**Setting:** Eight University of California campuses during Spring 2024 **Participants:** *n* = 190 students **Completed baseline:** *n* = 150 (79%) **Completed the interviews:** *n* = 11 Mean age: 23.2 years (range 17–61) **Gender:** 71% female **Ethnicity:** 39.6% Asian, 22.1% White, 19.5% Hispanic **Education:** 72.3% undergraduates	Participation in the CR course designed to build emotional resilience and climate advocacy skills	**Outcomes:** Climate distress, climate anxiety-related cognitive and functional impairment, mental health (depression, anxiety, stress scale), climate self-efficacy, nature connectedness, climate hope and hopelessness, climate-related loneliness and belonging, altruistic behaviour, climate action engagement **Tools:** Validated scales: Depression Anxiety Stress Scale (DASS), Climate Acceptance and Action Questionnaire (C-AAQ), Climate Change, Anxiety Scale (CCAS), Custom self-efficacy and secondary outcome items	• Significant reductions in climate distress, anxiety and stress • Increased self-efficacy for coping with climate emotions and collective action • Improvements sustained at 5-month follow-up • No significant change in cognitive/functional impairment	• Controlled trials with comparison groups • Adaptations for diverse populations and cultural contexts • Long-term tracking of behavioural outcomes • Evaluation of scalable delivery methods (e.g., remote mindfulness instruction)
Scott et al. (2025) United States	Two-arm stepped-wedge cluster randomised trial: *Ongoing*	COPE is a 3-session group psychoeducational workshop series combining psychoeducation, peer support and community engagement. It includes: • Session 1: Stress recognition and coping • Session 2: Supporting individuals in distress • Session 3: Building community support (Study period: June 2022–June 2025; recruitment: April 2023–Spring 2025;	**Setting:** Community-based organisations affiliated with Together Baton Rouge in Louisiana, USA **Target:** ~300 participants across 15 clusters (Community-Based Organisations) **Mean cluster size:** ~20 participants **Other:** diverse demographics, including Spanish-speaking participants	Exposure to climate-related disasters and chronic stress in underserved communities	**Outcomes:** Psychological distress (stress, anxiety, depression), coping self-efficacy, social support, community resilience. **Tools:** Psychological wellbeing: Depression Anxiety Stress Scale, Perceived Stress Scale Social support: Coping Self-Efficacy Scale, Multidimensional Scale of Perceived Social Support, Community connectedness, Communities Advancing Resilience	• Anticipated improvements in mental health (reduced stress, anxiety, depression) • Increased coping self-efficacy, social support and community resilience • Enhanced implementation feasibility and acceptability	• Long-term impact and sustainability of COPE • Cultural adaptation across diverse settings Implementation science studies on scalability and cost-effectiveness • Comparative studies across different community types

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
		Data analysis: Expected by Spring 2026)					
Nature-based hybrid interventions							
Eichholtzer et al. (2024) Australia	RCT	Participants received wildlife camera traps to monitor small fauna on their land for 8 months. They were trained, contributed data and received monthly updates. The control group was waitlisted and completed surveys only (February–October 2021)	**Setting:** Victoria, Australia; conducted during the COVID-19 pandemic **Participants:** *n* = 70 (30 intervention, 40 control) **Age:** Majority aged 60+ **Gender:** Balanced gender distribution **Education:** Most had a bachelor's degree or higher **Other:** Many had prior environmental volunteering experience	Participation in biodiversity citizen science activities	**Outcomes:** Nature relatedness, self-efficacy to address biodiversity loss, subjective well-being, climate anxiety **Tools:** Nature Relatedness Scale, Personal Wellbeing Index, Short Warwick, Edinburgh Mental Well-Being Scale, Climate Anxiety Scale Custom self-efficacy item	• Significant increase in nature-relatedness and self-efficacy in the intervention group • No significant change in climate anxiety or overall well-being scores • Qualitative data showed perceived mental and physical health benefits, especially for those without prior volunteering experience	• Explore impacts on younger and more diverse populations • Use validated self-efficacy scales • Investigate effects on those with low nature-relatedness or climate anxiety • Longitudinal studies to track co-benefits over time
Elzohairy et al. (2024) Egypt	Quasi-experimental, pre-test/post-test design with two groups (intervention and control)	A 7-session psycho-educational programme, delivered over two weeks (3–4 sessions/week) covering: • Climate change basics and causes • Health risks for older adults Emission-reducing behaviours • Healthy lifestyle practices • Coping strategies (problem-solving, emotion management, cognitive reframing, breathing exercises) (Data collection: March–July 2023)	**Setting:** Three elderly clubs in Damanhour City, El-Behaira Governorate, Egypt **Participants:** *n* = 80 older adults (*n* = 40 intervention, *n* = 40 control) **Age:** 60+ years (mean ~ 72 years) **Gender:** ~55% male **Education:** ~50% illiterate **Chronic illness:** ~75% had conditions like diabetes, hypertension, osteoporosis	Climate change distress and risk perception among older adults	**Outcomes:** Climate change distress, impairment, risk perception **Tools:** Climate Change Distress and Impairment Scale, Risk Perception Scale, Socio-demographic and clinical data questionnaire	• Significant reduction in climate change distress and impairment in the intervention group • Significant increase in risk perception in the intervention group	• Long-term effects of psycho-educational programmes • Broader geographic and randomised sampling • Larger sample sizes • Further exploration of climate change's impact on older adults' mental health
Cosh et al. (2025) Australia	Exploratory pilot study using a pre-post design with a single group.	A 5-module group-based intervention delivered outdoors, focusing on: • Emotional awareness and climate emotions	**Setting:** Rural region of northern New South Wales, Australia, in a community setting. **Target minimum:** 12 children (to allow for attrition)	Children aged 10 ‚Äì14 years with self-reported exposure to at least one natural hazard (e.g., fire, flood, drought).	**Outcomes:** Psychological distress, resilience, climate emotions, intervention acceptability and feasibility, climate emotions (worry and emotional responses to climate change)	• Ongoing	• Need for randomised controlled trials with larger samples Inclusion of longer-term follow-up

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Table 2. (*Continued*)

Author (year) country	Study design	Intervention (study duration)	Setting and participants description	Target exposure	Outcomes measured and ools to measure outcomes	Main results	Future research
		• Nature restoration activities (e.g., building bee hives) • Mindfulness and nature journaling • Resilience and coping skills Group reflection and future planning • Delivered by trained provisional and clinical psychologists. (Recruitment: Late 2024; study duration: 1 year; expected results publication: Late 2025)	**Enrolled as of March 2025**: 28 children **Age:** 10–14 years **Location:** Rural areas (Modified Monash Model 3+) **Exposure:** At least one natural hazard		**Tools:** Psychological distress (DASS-21 Youth), Resilience (Resilience Scale for Children), Subjective Units of Distress (SUDs), custom acceptability questionnaire		• Use of multi-informant assessments (e.g., parent reports, clinical interviews) • Further exploration of sustained intervention effects
Glynn et al. (2025) Ireland	RCT with pre- and post-intervention assessments and qualitative interviews	Weekly GenAI-generated online climate education and motivation messages (4 weeks) Supervised a half-day nature-based field trip, including forest bathing, river restoration and tree planting The control group received the standard curriculum (Enrolment began 6 November 2024; final assessments completed by 16 December 2024)	**Setting:** Ursuline Secondary School, Thurles, Ireland (all-female school) **Participants:** $n = 86$ ($n = 43$ intervention, $n = 43$ control) **Completed follow-up**: 83 (97%) **Gender:** All participants were female, aged 15–16	Nature-based climate education and action intervention	**Outcomes:** Climate capability, eco-anxiety **Tools:** Climate Capability Scale: 24-item validated scale for adolescents, Hogg Eco-Anxiety Scale - HEAS: 13-item scale measuring affective symptoms, rumination, behavioural symptoms and personal impact anxiety	• Significant increase in climate capability score in intervention group (+8.67 points, $p < 0.01$) • Significant increase in eco-anxiety score in intervention group (+5.51 points, $p < 0.01$) • Positive correlation between change in climate capability and eco-anxiety ($r = 0.485$, $p < 0.001$) • Sub scores of eco-anxiety (affective, rumination, personal impact) increased significantly; behavioural sub score did not	• Long-term tracking of climate capability and eco-anxiety • Exploration of structural constraints on youth behaviour • Expansion to diverse populations and settings • Identification of perceived agency and opportunities for youth action

(n = 2; 9%). Studies varied in the outcomes measured and how change was assessed, and the types of inferences that could be made across studies.

Interventions/strategies implemented to address eco-anxiety

Across the 22 included studies, interventions did not cluster into a single modality. Instead, they spanned therapeutic, educational, messaging/communication and nature/community-based approaches, with several interventions combining emotional coping elements with engagement or agency-building components. Educational interventions were most common (n = 7; 32%) (Stevenson et al., 2018; Lawson et al., 2019; Trott, 2021; Howard-Jones et al., 2023; Meixner et al., 2024; Bodas et al., 2025; Eweida et al., 2025), followed by messaging/communication approaches (n = 6; 27%) (Jones et al., 2017; Ecker et al., 2020; Goldwert et al., 2024; Asbrand et al., 2025; Benoit et al., 2025; Coates et al., 2025), therapeutic interventions (n = 5; 23%) (Lindhe et al., 2023, 2024; Eklöf and Klöckner, 2025; Epel et al., 2025a; Scott et al., 2025) and nature based−/hybrid interventions (n = 4; 18%) (Eichholtzer et al., 2024; Elzohairy et al., 2024; Cosh et al., 2025; Glynn et al., 2025).

Across these categories, intervention aims can be summarised into three recurring "action logics":

The first focused on distress reduction and coping support, targeting eco-anxiety symptoms through psychological skills or structured support (Elzohairy et al., 2024; Lindhe et al., 2023, 2024; Eklöf and Klöckner, 2025; Epel et al., 2025b). The second focused on capability and agency building, aiming to strengthen self-efficacy, hope and engagement (Jones et al., 2017; Stevenson et al., 2018; Lawson et al., 2019; Howard-Jones et al., 2023; Meixner et al., 2024; Asbrand et al., 2025; Benoit et al., 2025). The third focused on connection-based resilience, using group, community or nature-based approaches to enhance belonging and social support (Eichholtzer et al., 2024; Cosh et al., 2025; Glynn et al., 2025; Scott et al., 2025). This functional clustering reflects variation in intervention priorities, with some interventions focused primarily on symptom reduction and others targeting engagement, capability or agency.

Measurement tools used to assess intervention outcomes

Outcome measurement was highly heterogeneous across studies and included three broad categories of constructs: (1) distress or impairment-focused measures, including eco-anxiety/climate-distress specific scales and general mental health measures; (2) concern or emotional activation measures and (3) agency-, engagement-, hope- or self-efficacy-related measures. Eco-anxiety and climate distress were assessed using instruments such as the Climate Anxiety Scale and Climate Change Anxiety Scale, alongside more general measures such as the Depression Anxiety Stress Scale (DASS). Social dimensions, such as perceived support or community connectedness, were less commonly measured. Variation in outcome measures and inconsistent use of eco-anxiety-specific instruments limited comparability across studies and informed the decision not to formally group intervention effects (Lindhe et al., 2023; Eichholtzer et al., 2024; Elzohairy et al., 2024; Benoit et al., 2025; Coates et al., 2025; Cosh et al., 2025; Eweida et al., 2025; Epel et al., 2025a; Scott et al., 2025).

Beyond symptom-focused outcomes, studies frequently assessed constructs aligned with four hypothesised mechanisms of change: (1) Hope/agency and emotional constructs (e.g., hope scales, agency ratings, subjective distress) (Stevenson et al., 2018; Trott, 2021; Goldwert et al., 2024; Asbrand et al., 2025; Benoit et al., 2025). (2) Knowledge/cognitive outcomes (climate knowledge/competence, module assessments) (Stevenson et al., 2018; Lawson et al., 2019; Meixner et al., 2024; Bodas et al., 2025). (3) Behavioural/self-efficacy and engagement outcomes (pro-environmental intentions/actions, self-efficacy, policy support/behavioural engagement indices) (Jones et al., 2017; Ecker et al., 2020; Goldwert et al., 2024; Coates et al., 2025; Eweida et al., 2025; Scott et al., 2025). (4) Social dimensions were less commonly measured directly (e.g., perceived social support/community connectedness), despite frequent discussion of peer/group mechanisms (Lindhe et al., 2024; Eklöf and Klöckner, 2025; Scott et al., 2025). Variation in measurement and inconsistent use of eco-anxiety-specific instruments limited cross-study comparability and informed the decision not to formally group intervention effects.

Intervention effectiveness in addressing eco-anxiety and related climate distress outcomes

Of the 22 included studies, some were protocol or feasibility studies that did not report outcome data. These studies were included to describe intervention approaches but were not used to inform effectiveness findings. Across intervention types, approaches targeting coping, emotional regulation and resilience were most consistently associated with improvements in distress-related outcomes compared with interventions focused on knowledge or capability. The included studies differed in intervention type, outcome measures and follow-up periods. For this reason, meta-analysis was not conducted, and effectiveness patterns were summarised descriptively.

Distress reduction interventions were most consistently associated with improvements in distress-related outcomes. Therapeutic approaches, particularly CBT/ACT-informed or mindfulness/acceptance-based programmes, most consistently reported reductions in climate distress and related mental health outcomes (Lindhe et al., 2023; Epel et al., 2025a). For example, tailored internet-delivered CBT reduced depression, stress and climate distress and improved quality of life in a pilot RCT (Lindhe et al., 2023) and a psychosocial climate resilience course reported significant reductions in climate distress/anxiety and stress alongside increased self-efficacy, with improvements maintained at 5-month follow-up (Lindhe et al., 2023; Epel et al., 2025a).

Educational and community approaches were more likely to be associated with favourable wellbeing-related outcomes when they incorporated emotional engagement, agency or peer support. Educational interventions showed mixed effects on eco-anxiety and worry outcomes, but a consistent pattern was that interventions embedding emotional engagement, agency or peer support tended to align with more favourable wellbeing-related outcomes than knowledge-only approaches (Trott, 2021; Howard-Jones et al., 2023; Eweida et al., 2025). Some curricula reported slight decreases or no change in anxiety while increasing self-efficacy (Howard-Jones et al., 2023), whereas other media-based content increased environmental worry (Bodas et al., 2025), indicating information alone may increase concern without providing coping or agency pathways.

Messaging/framing interventions produced mixed and sometimes null effects on eco-anxiety. Messaging studies varied widely (agency framing; imagery valence; issue framing) and yielded inconsistent effects on anxiety outcomes (Ecker et al., 2020; Asbrand et al., 2025; Coates et al., 2025). Agency-promoting framing reduced state anxiety in one experimental study (Asbrand et al., 2025), whereas imagery and framing manipulations did not consistently change climate anxiety in others (Ecker et al., 2020; Coates et al., 2025). Brief messaging appeared more reliable for shifting proximal constructs such as hope/agency

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than for altering distress-related outcomes within short exposure windows (Benoit et al., 2025).

Some interventions increased eco-anxiety alongside increased capability or engagement. A subset of interventions reported increases in eco-anxiety alongside improvements in capability or engagement-related outcomes (Glynn et al., 2025). For instance, a nature-based intervention increased climate capability while also increasing eco-anxiety scores, with change scores correlated (Glynn et al., 2025).

Barriers and facilitators that influence implementation

Implementation reporting was uneven, but cross-cutting constraints were evident. Many interventions were researcher-led and time-bound, with common challenges related to scalability, cultural relevance and sustainability beyond pilot contexts (Eichholtzer et al., 2024; Epel et al., 2025a; Scott et al., 2025). Where facilitators were described, they frequently involved social and participatory features. Group formats and peer support reduced isolation and validated emotions in qualitative accounts (Lindhe et al., 2024; Eklöf and Klöckner, 2025), and structured opportunities for action/agency were emphasised as important for sustaining engagement (Trott, 2021; Asbrand et al., 2025). However, explicit reporting of the roles of educators, clinicians, community leaders and policymakers as co-designers or delivery partners remained limited, consistent with lower QuADS ratings for stakeholder involvement across studies.

Quality assessment

QuADS appraisal indicated moderate overall methodological quality across the included studies, with most scoring relatively well on the appropriateness of methods to address study aims and on the clarity of analysis, but weaker reporting in domains critical for interpretability and transferability. Overall, 18 studies (82%) averaged between 2 and 2.8 (out of 3) across QuADS items, while 4 studies (18%) averaged below 2. Two recurrent limitations were (i) limited reporting of theoretical or conceptual underpinnings and (ii) limited consideration of stakeholder involvement in research design or conduct, with only 11 studies scoring ≥2 for theoretical underpinning and 7 studies scoring ≥2 for stakeholder involvement. These gaps limit the extent to which mechanisms of change, generalisability and implementation readiness can be assessed across the included studies. QuADS findings were considered when interpreting effectiveness patterns, particularly where study design, sample size, reporting or follow-up limited confidence in the findings. Confidence was highest where improvements were observed in studies using stronger study designs (e.g., controlled trials) with clearer reporting, and more cautious where findings were derived from small samples, short-duration interventions or designs with limited follow-up. Consistent with these quality patterns, evidence about longer-term impact, cultural adaptation and co-designed delivery remains comparatively underdeveloped, reinforcing the need for more rigorous, participatory and longer-term evaluations. Individual study quality scores are provided in Supplementary Table S5.

Discussion

This systematic review synthesised how interventions explicitly addressing eco-anxiety are designed, evaluated, implemented and measured across diverse populations and settings. Across 22 included studies, most published between 2023 and 2025 and conducted predominantly in high-income countries, particularly the United States and Australia, we identified a recent but methodologically mixed evidence base spanning therapeutic, educational, messaging and nature- or community-based approaches. Interventions were commonly researcher-led, time-bound and delivered within single settings, with few leveraging broader community partnerships or more embedded system-level approaches. Positive findings within the current evidence base were most consistently reported for interventions targeting coping, emotional regulation and resilience, whereas educational and messaging approaches showed more variable results and, in some cases, were associated with increased emotional engagement or concern (Baudon and Jachens, 2021; Xue et al., 2024). Outcome measurement was highly heterogeneous, and most studies provided limited follow-up, restricting confidence in cross-study comparability and longer-term effects (Kırımer-Aydınlı et al., 2025; Ramsay et al., 2025). Taken together, these findings indicate that the evidence base is promising but still preliminary, and that intervention effects should be interpreted in relation to intervention aims and outcome type rather than assuming symptom reduction as the only relevant endpoint (Pihkala, 2020; Baudon and Jachens, 2021).

A major finding of this review is the geographic concentration of the available evidence in high-income Western settings. Although eco-anxiety is globally relevant, most evaluated interventions were conducted in the United States, Australia or Europe, with very limited representation from low- and middle-income countries or regions experiencing severe climate-related disruption (Coffey et al., 2021; IPCC, 2022). This limits the generalisability of the current evidence base. Eco-anxiety measured in high-income student or general population samples may differ meaningfully from climate-related distress in settings where environmental change is closely linked to drought, displacement, livelihood disruption or constrained access to mental health care (Berry et al., 2018; Coffey et al., 2021; Boluda-Verdú et al., 2022; IPCC, 2022). Cultural variation may also shape how climate-related emotions are expressed, interpreted and supported, with implications for both measurement validity and intervention acceptability (Berry et al., 2018; Coffey et al., 2021; Kırımer-Aydınlı et al., 2025; Ramsay et al., 2025). The current literature therefore provides only partial insight into how eco-anxiety interventions may need to be adapted for highly climate-affected and resource-constrained contexts. In these settings, delivery feasibility is also likely to depend on scalable, low-intensity and contextually grounded approaches, such as group-based, community-led, task-shared or digitally supported formats, alongside equitable research partnerships that prioritise under-represented regions (Inter-Agency Standing Committee, 2007; IPCC, 2022; World Health Organization, 2022).

Our review also reinforces the importance of conceptual clarity in how eco-anxiety is framed. The included interventions reflected both clinical and non-clinical understandings of eco-anxiety, consistent with broader literature distinguishing maladaptive eco-anxiety from more adaptive climate concern (Pihkala, 2020; Coffey et al., 2021). Therapeutic approaches such as CBT-, ACT- and mindfulness-informed programmes were more often associated with improvements in distress-related outcomes, suggesting that some forms of eco-anxiety may benefit from structured psychological support (World Health Organization, 2019; Fordham et al., 2021). At the same time, several interventions were designed not to reduce climate concern itself, but to strengthen knowledge, hope, agency, resilience or engagement (Baudon and Jachens, 2021; Martin et al., 2024). In

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this context, increases in eco-anxiety or climate concern do not necessarily indicate harm. Rather, they may reflect heightened salience, emotional activation or deeper engagement with climate realities, particularly when accompanied by improvements in self-efficacy or capability-related outcomes (Becht et al., 2024; Marinkovic Chavez et al., 2024). This distinction is important because it suggests that intervention effects should be interpreted according to whether the measured outcome reflects impairment, emotional concern or adaptive engagement, and whether the intervention was intended to reduce distress, strengthen coping or foster constructive action (Pihkala, 2020; Baudon and Jachens, 2021). At the same time, the reviewed studies also indicate that eco-anxiety does not arise only at the level of individual cognition or emotion; it is shaped by broader environmental and social conditions. This suggests that individual-level interventions may be beneficial but are unlikely to be sufficient if disconnected from opportunities for collective efficacy, social support or credible pathways for action (Lawson et al., 2019; Glynn et al., 2025).

Another important finding concerns implementation. Across the included studies, interventions were often researcher-led, bounded to specific settings and evaluated over relatively short timeframes. Reporting on feasibility, scalability, cultural adaptation and sustainability was uneven (World Health Organization, 2022; Xue et al., 2024). Where facilitators were described, these commonly included peer support, group-based formats and opportunities for action or agency (Baudon and Jachens, 2021; Patrick et al., 2023). In contrast, there was limited explicit reporting of the roles of educators, clinicians, community leaders or policymakers in intervention co-design or delivery, consistent with weaker reporting on stakeholder involvement in the QuADS appraisal (Harrison et al., 2021). These patterns suggest that, although a range of intervention approaches is emerging, many have not yet been evaluated in forms that are implementation-ready or readily transferable beyond pilot or research contexts (World Health Organization, 2022; Patrick et al., 2023). In conjunction with broader guidance emphasising community assets, workforce capacity and coordination across services, these findings indicate that future intervention research should pay greater attention to how eco-anxiety responses can be delivered feasibly and sustainably beyond small-scale, researcher-led pilots(Black et al., 2024; World Health Organization, 2024; Lee-Johnson et al., 2025).

Our review further highlights that confidence in the evidence base remains constrained by limitations in study design and reporting. Although QuADS was appropriate for appraisal of this heterogeneous literature, the included studies varied substantially in methodological strength, and no formal certainty grading framework was applied (Harrison et al., 2021). Confidence was greater where findings were observed in controlled studies with clearer reporting and some follow-up, and lower where evidence was derived from small samples, single-group designs, short exposure windows or protocol-only studies (Xue et al., 2024; Ramsay et al., 2025). Two recurrent weaknesses across studies were limited reporting of theoretical or conceptual underpinnings and limited stakeholder involvement in design or conduct (Harrison et al., 2021). These features do not diminish the early positive signals emerging in the field; however, they warrant caution in drawing conclusions regarding mechanisms of change, implementation readiness and comparative effectiveness (Baudon and Jachens, 2021; Xue et al., 2024). Overall, the review supports a narrative of emerging promise rather than settled evidence.

Limited follow-up across the included studies also restricts confidence in the durability of intervention effects. This is particularly relevant because eco-anxiety and climate-related distress arise in the context of an ongoing and evolving stressor rather than a discrete event (Berry et al., 2018; World Health Organization, 2022). Short-term reductions in distress may not necessarily translate into sustained adaptation, and some interventions may require repeated support, social reinforcement or institutional embedding to maintain effects over time (Sciberras and Fernando, 2022; World Health Organization, 2022). The short duration of most evaluations therefore limits what can currently be concluded about longer-term effectiveness. Future intervention studies would benefit from longer follow-up periods, repeated outcome assessment and designs capable of examining whether observed changes are maintained, attenuated or shift over time (Williamson et al., 2017; Berry et al., 2018). Read more broadly, these findings also support the value of evaluation designs that can detect delayed, nonlinear or context-dependent effects, particularly where interventions seek not only to reduce distress but also to foster resilience, agency or sustained engagement over time (Meadows, 2008; Berry et al., 2018).

This review has several strengths. It addresses a timely and underdeveloped area of research using a transparent and reproducible systematic review design, guided by PRISMA and supported by an inclusive search strategy developed with a research librarian (Page et al., 2021). The review was also designed to capture heterogeneity in terminology and intervention format, allowing inclusion of a broad range of approaches across therapeutic, educational, community and nature-based domains (Baudon and Jachens, 2021; Coffey et al., 2021). A further contribution is the identification of extensive measurement heterogeneity, including inconsistent use and limited validation of eco-anxiety-specific tools, which complicates cross-study comparison (Kırımer-Aydınlı et al., 2025; Ramsay et al., 2025). The review also highlights implementation-related gaps, particularly the limited use of participatory design, culturally grounded delivery models and longer-term evaluations, which shape what can realistically be sustained beyond research pilots (World Health Organization, 2022; Patrick et al., 2023).

Several limitations should be acknowledged. Although the search strategy used a broad range of climate-related and eco-anxiety terms, studies using less common terminology for climate-related distress or weather-related anxiety may not have been captured (Coffey et al., 2021; Xue et al., 2024). The review was limited to English- and Spanish-language publications, which may have contributed to under-representation of evidence from regions where other languages are more commonly used. The exclusion of studies centred on pre-existing mental health diagnoses or specialist treatment settings also narrows the direct applicability of the findings to clinical populations. In addition, the inclusion of protocol and feasibility studies was useful for characterising the intervention landscape, but these studies did not contribute outcome data in the same way as completed empirical evaluations. Finally, heterogeneity in design, intervention type and outcome measurement precluded meta-analysis and limits the strength of comparative conclusions (Baudon and Jachens, 2021; Harrison et al., 2021; Xue et al., 2024).

The findings nevertheless suggest several implications for practice. Current evidence indicates that interventions addressing eco-anxiety may be most useful when outcomes are aligned with intervention intent – for example, targeting distress reduction where impairment is present, while also recognising that some interventions may appropriately prioritise agency, hope, connection or constructive engagement (Pihkala, 2020; Martin et al., 2024). The review also suggests that interventions delivered in

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group or community contexts, or those that incorporate opportunities for agency and social support, may offer advantages beyond individual-level coping alone, although these pathways remain under-evaluated (Baudon and Jachens, 2021; Patrick et al., 2023). In highly climate-affected or low-resource settings, future programme development will likely need to consider culturally appropriate and scalable delivery formats, alongside partnerships that support local adaptation and implementation feasibility (IPCC, 2022; World Health Organization, 2022).

Future research should prioritise three areas. First, greater consistency in measurement is needed, including clearer distinction between distress or impairment outcomes, emotional concern and agency- or engagement-related outcomes, as well as stronger psychometric validation across settings and populations (Kırımer-Aydınlı et al., 2025; Ramsay et al., 2025). Second, the field would benefit from more rigorous and longer-term evaluations, including controlled studies with repeated follow-up and clearer reporting of theoretical pathways and stakeholder roles (Williamson et al., 2017; Harrison et al., 2021). Third, there is a clear need for participatory and contextually grounded intervention research in low- and middle-income countries, climate-vulnerable regions and communities disproportionately affected by environmental change, including Indigenous-led and community-governed partnerships where appropriate (IPCC, 2022; World Health Organization, 2022; Patrick et al., 2023). Addressing these priorities will be essential for moving from a fragmented early evidence base towards more robust, implementation-ready and globally relevant responses to eco-anxiety.

The review addresses a timely question at what appears to be a critical juncture in the emerging science of addressing the mental health impacts of climate change. A strength of the review is the design, which allowed the inclusion of a wide diversity of studies. This review was constructed to adapt to the expected heterogeneity and variation in terminology through an inclusive suite of search terms and a broad set of databases. Our methods are transparent and reproducible, and we use the PRISMA process (Page et al., 2021). We used a clear set of inclusion and exclusion criteria, and deliberately included protocol, feasibility and completed intervention studies to capture a broader representation of intervention approaches in this emerging field. Protocol and feasibility studies contributed to mapping the intervention landscape, whereas completed studies reporting outcome data informed the effectiveness synthesis. We used established approaches to assess study quality, using the Quality Assessment Tool (QuADS), which was appropriate to multiple study designs included in this review (Harrison et al., 2021). A further unique contribution of this review is clarifying the extent of measurement heterogeneity, including limited consistency and validation of eco-anxiety outcome tools, which constrains cross-study comparability. It also surfaces under-examined implementation constraints and enablers, particularly scalability, cultural relevance and limited stakeholder participation in design and delivery, that shape what can realistically be sustained beyond research pilots.

Although a broad set of climate-related and eco-anxiety search terms was used, studies employing less common terminology for climate-related distress or adverse weather–related anxiety may not have been captured. Rigorous dual screening at title, abstract and full-text stages reduced an initial pool of over 1,600 records to 22 eligible studies, excluding those in which changes in eco-anxiety were reported only as unintended outcomes of interventions targeting other aims. In addition, the exclusion of studies centred on pre-existing mental health diagnoses or specialist treatment contexts narrows the direct applicability of the review to clinical populations and specialist mental health services. The review was further limited to English- and Spanish-language publications, introducing potential language bias and likely under-representation of evidence from regions where research is commonly published in other languages. Substantial heterogeneity in study designs and outcome measures precluded meta-analysis. Finally, limited follow-up across included studies restricts confidence in durability of effects, and the concentration of evidence in high-income Western settings limits generalisability to highly climate-affected and low-resource contexts.

This review highlights several important implications for practice in addressing the mental health impacts of climate change and adverse weather events. Critically, there are emerging directions that indicate it is possible to develop effective, context-sensitive approaches for supporting populations affected by these environmental stressors, particularly when mental health is integrated into climate preparedness and response and delivered through community-based, culturally informed models (World Health Organization, 2022). Strengthening climate-mental health responses will likely require pairing individual coping support with community-delivered and structurally informed strategies, particularly in highly climate-affected regions where feasibility and relevance may differ from high-income university or general population samples.

However, the current evidence base is fragmented, with wide variation in intervention design, delivery, evaluation methods and reporting standards, challenging the identification and scale-up of best practice. National and international bodies, such as the WHO, should provide authoritative guidance, convene collaborative learning platforms and support capacity-building for climate-linked mental health and psychosocial support (Pan American Health Organization, 2023). Finally, while our initial aim was to examine the roles of different actors engaged in mitigating the mental health impacts of climate hazards, the included studies largely positioned participants as passive recipients rather than partners. Future interventions should adopt participatory approaches that empower affected communities and embed their perspectives throughout design, implementation and evaluation, consistent with established guidance on community mobilisation and multi-sector coordination (Inter-Agency Standing Committee, 2007).

Future research should deliberately move towards consistency in outcomes, represented by a core outcome set for climate-related mental health research to harmonise measurement across trials and evaluations (Williamson et al., 2017). To address the current high-income geographic skew, future studies should prioritise participatory, community-led trials and implementation studies in low- and middle-income countries and highly climate-affected regions, where distress may be shaped by displacement, livelihood disruption and limited service access (IPCC, 2022). This work should be conducted with engagement of Indigenous-led and community-governed research partnerships (e.g., co-design, data sovereignty arrangements and shared decision-making), with funding directed to local partners and workforce development to support culturally safe delivery and context-specific models of care. The medium-term goal of this research endeavour would be to collate and align this research programme to best-practice approaches that are transparent and shared across regions represented by significant investment in practice-based evidence through multi-country pragmatic trials and open-access monitoring and evaluation frameworks.

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