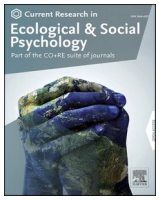
Current Research in Ecological and Social Psychology 9 (2025) 100245

Contents lists available at ScienceDirect

Current Research in Ecological and Social Psychology

journal homepage: www.elsevier.com/locate/cresp



Understanding climate change attitudes in Europe: A systematic review using social ecological framework

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ARTICLE INFO

Keywords:
Climate change attitudes Systems theory
Climate change scepticism Socio-political attitudes

ABSTRACT

Understanding climate change attitudes is key to addressing the most significant challenge of our time. This paper outlines a pre-registered systematic review (https://www.crd.york.ac.uk/PROSPERO/view/445108) which uses Bronfenbrenner's Bioecological Systems Theory to examine the academic literature on person-centred social influences of climate change attitudes in Europe. After screening 4554 articles from four databases, we identified and synthesised data from 93 studies conducted in Europe. Across Europe, there is a high level of concern and belief in climate change. While we found that there are factors at multiple levels which appear to influence attitudes toward climate change, many of the findings are mixed, and the quality of evidence is relatively weak. Most included studies used a cross-sectional survey design. The available evidence suggests that no single factor explains the diversity of views on this critical issue, and instead climate change attitudes result from a dynamic interplay between demographic factors, proximal influences, and broader socio political orientations. If we really want to understand what predicts attitudes toward climate change in Europe, there is a clear need for more rigorous, longitudinal research; such research would deepen our understanding of how climate change attitudes evolve over time and are influenced by changing political, social, and environmental conditions.

Introduction

Climate changes pose serious risks to natural, economic, and social systems (Stern, 2008; Diaz and Moore, 2017; Masson-Delmotte et al., 2019). Climate change impacts are direct through the exacerbation of existing problems such as disease and death from extreme weather events and increased prevalence of noncommunicable disease, as well as indirect through changes in air quality, disruption of food and water systems, and the mental health impacts of individual, community and societal disruption. In the past few years, Europe witnessed the largest wildfires ever recorded, one of the wettest years, severe marine heatwaves, and widespread devastating flooding. 2024 made history as the first year to exceed the 1.5 °C threshold above the pre-industrial average set by the Paris Agreement, and the global sea ice extent reached a new all-time minimum in February 2025 (Copernicus Climate Change Service, 2025).

As humans and human activity are major causes of these changes in climate (Diaz and Moore, 2017), then individual actions - including the internal processes that drive action - are essential parts of the solutions (Leiserowitz, 2005). Although people's attitudes are not always consistent with their behaviours (Ajzen, 1991; Hornsey et al., 2016), if we want to understand behavioural change and action, we must also understand attitudes toward climate change (Albarracín et al., 2014). The European Green Deal aims to make Europe climate neutral by 2050, with an ambitious net greenhouse gas emissions reduction target of at least −55 % by 2030, compared to 1990 levels. Such ambitious policies for mitigating climate change require substantial public support. Thus, it is critical that we start to understand climate change attitudes and the social contexts that influence these attitudes in order to drive individual action and engagement in addressing the problem.

In their seminal work on understanding psychology's contribution to climate change, Swim et al. (2011) argue that we must consider how cognitive, affective, motivational, and interpersonal responses and processes impact on human causes of, consequences of, and responses (adaptation and mitigation) to climate change. Some of these processes include human's attitudes toward the existence, extent, causes, and consequences of climate change. Climate change attitudes incorporate a range of cognitive variables with multiple meanings given the complex

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https://doi.org/10.1016/j.cresp.2025.100245
Received 13 June 2025; Received in revised form 25 August 2025; Accepted 16 September 2025
Available online 16 September 2025

multi-faceted nature of the climate debate. Poortinga et al. (2011) differentiate attitudes according to trend, attribution and impact scepticism - ranging from the belief that climate change exists in the first place, attributions as to the causes of climate change (the anthropogenic component), to scepticism about the harmfulness of the impacts of climate change. In this review, we consider climate change attitudes as belief (encompassing scepticism regarding the existence, cause, and impact of climate change) and climate change concern (evaluations of the seriousness of the issue), in line with Poortinga and colleagues (2019).

There is a significant body of literature on the social factors that impact climate change attitudes, from wider socio-political influences (Crawley et al., 2020), to more proximal influences such as family and friends (Bodor et al., 2020); however, there are limited systematic review of these wide-ranging studies. Previous reviews on climate change attitudes include a meta-analysis of the determinants and outcomes of belief in climate change globally (Hornsey et al., 2016); a review of the impact of attitude interventions in American samples (Rode et al., 2021); and an examination of how an individual conceives themselves in terms of a particular social identity influences their environmental attitude (Fielding and Hornsey, 2016). However, there are no reviews that synthesises the broad range of literature on the different levels of social influences on climate change attitudes in Europe, with its unique social and political contexts and policy responses. Understanding the social factors that underlie climate change attitudes is key to implementation of European mitigation and adaptation efforts.

We used Bioecological Systems Theory (Bronfenbrenner, 2000) as the underpinning model for this review. This framework, originally developed in the context of child development and one of the most influential theories in social sciences, proposes that development is a process of bidirectional and reciprocal relationships between a developing individual and their surrounding environments (Bronfenbrenner, 2000). The model proposes a series of 'layers' of environment, ranging from the immediate surroundings to broad societal structures, each influencing the individual. Given the extensive body of literature on climate change attitudes, our aim was not to review this vast body of literature, but to synthesize research that could be effectively analysed and interpreted through this framework. Attitudes can be viewed as embedded in wider representational and ideological systems attached to social groups and systems (Hogg and Smith, 2007) and contemporary understanding of attitudes suggest that they exist in three fundamental contexts: the person; the social context; and the broader sociohistorical, and cultural context (Albarracin and Shavitt, 2018). The Bioecological Systems theory provides a very well-established framework to apply this contemporary view of attitudes to climate change - a complex societal crisis that requires understanding across a range of social, political and chronosystem. To effect societal change, we must understand both the relation between the human social system and the various ecosystems in which that social system is embedded, as well as the social system itself and how it produces the aggregated outcome of human behaviours (Kashima et al., 2023). This systems theory considers the individual at the centre of the model, and the multilevel systems in which the individual is embedded, which have an interacting influence on the person: microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner, 2000). At the individual level, we are interested in the demographic and personality variables associated with climate change attitudes. For example, gender differences have been found in environmental attitudes more generally (Gifford and Nilsson, 2014; Milfont and Schultz, 2018) which may be attributed to girls and women being socialised to be interdependent and cooperative and to empathise with the needs and welfare of others (Milfont and Schultz, 2018) and men being more likely to accept environmental and technological risks (Finucane et al., 2000). The microsystem includes proximal influences like family, friends, and educational environments (as opposed to educational level) with which individuals have direct and frequent contact. Theories such as Social Comparison Theory (Festinger, 1954) and Social Impact Theory (Latané, 1981) contend that proximal compared to distal influences would be more relevant and consequential to individual attitudes, and this is borne out in research on attitudes generally (Brechwald and Prinstein, 2011) and climate change attitudes more specifically (Stevenson et al., 2019).

The mesosystem examines the relationships between microsystems, such as the peer group and family. The exosystem includes settings or influences that the individual does not directly engage with but that still affect them indirectly. This can include public and governmental policy which plays a significant role in individuals' beliefs and behaviours (Stoutenborough et al., 2014). The macrosystem then includes broader political and cultural beliefs that may affect climate change attitudes. Within this review we examine socio political values, attitudes, and orientations within the macrosystem as, although reflecting individual dispositions, they reflect the individual's orientation to the wider socio-cultural norms of society. A meta-analysis of climate attitudes and behaviours found that individual variables, such as education and gender, were overshadowed in predictive power by values, ideologies, worldviews and political orientation (Hornsey et al., 2016). Finally, the chronosystem considers the temporal, transitional, or historical influences on attitudes. One of the biggest challenges to climate change issues is the substantial temporal gap between attitudes, actions, and consequences. Despite the widespread use of the framework, there are no explicit criteria for inclusion in each system, particularly in the context of adult attitudes. The positions of some social influences within the systems are evident; however, the bidirectional and interactionist nature of the systems means that factors can fit into more than one system. For this review, we conceptualised individual differences related to demographics and personality traits at the level of the individual. However, orientations related to that of the wider socio-political or cultural context, including political orientation, social dominance orientation, and religiosity, were conceptualised at the macro level, given they are influenced by, and themselves influence, the socio-political and cultural systems. Furthermore, a country's GDP was included in the exosystem as this influences government policies and funding allocations - as well as taxation policies - all of which can have an indirect effect on individual attitudes.

Our aim in this paper is to systematically review the current evidence on climate change attitudes in Europe, using this theoretical framework. We specifically focus on attitudes in Europe as a cluster of high-income countries - the majority of whom have signed up to the European Green Deal. The European context is distinct from the North American context, not only in terms of policy and approaches to climate change (e.g., Healey et al., 2019), but also the social and political contexts. For example, Americans tend to be more polarised in their political affiliation (Boxell et al., 2020) and political orientation has more of an impact on climate change attitudes in the US compared with European samples (Ziegler, 2017; Dunlap et al., 2016). Such differences are reflected in the differences found between European and US samples on climate change awareness and risk perception (Lee et al., 2015) and support for policy (Bechtel and Scheve, 2013).

Methods

We pre-registered this rapid review on PROSPERO (BLINDED) and then conducted searches of PsycInfo, Web of Science, SciElo, and Scopus on 14 September 2023. We developed search strings related to (1) attitudes (e.g., attitude* or belief* or opinion* or stance or judgement*), (2) climate change (e.g., "climate change" or "climate crisis", or "climate catastrophe") and (3) terms related to relationships and the social context (e.g., relation*, or "social context*", or "person-cent*" or "social contract"). The full list of the search strings is available in the supplemental material. This search was supplemented by article searches in two leading environmental journals - Global Environmental Change and Journal of Environmental Psychology - and recommended articles over the same time period ($n = 13$). The journals were searched using the

term 'climate change attitudes' and reviewed using the inclusion criteria below.

Eligibility criteria

After the systematic search results were uploaded to Covidence, papers that were not empirical or in English were excluded. Studies published in the previous ten years that had qualitative or quantitative design were included, as long as the studies examined the relationship between the social context (based on Bronfenbrenner's social ecological model) and attitudes or attitude formation to climate change, within a general population (see Table 1 for the inclusion and exclusion criteria). Studies that examined climate change knowledge or literacy, behaviours or behaviour intentions, or emotions related to climate change (e.g., anxiety) were excluded. We excluded studies that explored media discourse as the outcome variable because our focus was on individual attitudes, not broader media representations. Studies that recruited participants from non-general populations such as climate scientists were excluded.

Study screening

All titles and abstracts were independently assessed by two of the authors. We then screened the full texts to see if they met our inclusion and exclusion criteria. More than 40 % of the full-texts were independently reviewed by two authors. For both title/abstract and full text screening, where there was a conflict between reviewers, this was resolved through discussion. At the beginning of data extraction, LW, AB, and SJ extracted data from the same articles and met together to discuss and systematise the extraction process, after which the three independently extracted data for included studies. The original search focused on research conducted worldwide. However, for the purposes of this paper - with a focus on European attitudes - we included only studies conducted using data from European countries, resulting in a total of 80 studies from the systematic search and an additional 13 studies from the hand search - resulting in 93 studies included in the final review (Fig. 1).

Data extraction and synthesis

Data extracted from the included studies were categorized based on how they fit within the Bronfenbrenner's social ecological model, and then narratively synthesized within each level. We assessed the quality of the studies through the Quality Assessment for Diverse Studies (QuADS) tool (Harrison et al., 2021) to determine risk of bias. Following data extraction and quality assessment, the data was exported to an excel spreadsheet found at [https://osf.io/b3a9y/files/osfstorage]

Table 1
Inclusion and exclusion criteria for papers.

Inclusion	Exclusion
All age groups	Unavailable papers
Years spanning 2013–2023	Not published in the English language
Climate change attitudes	Not peer reviewed
Climate change belief	Climate change concern as an emotion rather than an attitude (e.g., distress, anxiety)
Climate change concern as a cognitive measure	Impacts of specific extreme weather events (unless longitudinal and measuring how long the event affects attitudes)
Belief in anthropogenic climate Change	Attitudes towards the environment in general unless it includes climate change
Climate change scepticism	Specific groups that were not generalisable to wider population (e.g. forest workers in Bavaria or tourists in Sicily)
Climate change denial	Studies from outside Europe
Climate change education with climate change attitudes as an outcome	
Includes data from participants in a European country	
Experimental/educational studies with climate change attitudes as outcome variable	

Results

Methodologies used

The final group of included studies were predominantly quantitative, with only two papers using a solely qualitative approach (Filimonov and Carpentier, 2022; Singh et al., 2023), and six using a mixed-methods approach (Ajaps and McLellan, 2015; Happer and Philo, 2016; Hope and Jones, 2014; Kurup et al., 2021; B. León et al., 2021; Żuk and Żuk, 2021). Of the quantitative studies, almost all were cross-sectional survey studies ($n = 76$). Thirteen of these studies were derived from the European Social Survey Round 8. There were also two experimental studies (Harker-Schuch and Bugge-Henriksen, 2013; Sacchi et al., 2016), one prevalence study (Buckley et al., 2017), and six longitudinal studies (Andor et al., 2018; Baiardi and Morana, 2021; Duijndam and van Beukering, 2021; Ojala, 2015; Glogger and Shehata, 2022). Overall, this is quite a limited mixture of methods used, and the over-use of the relatively weak methodology of cross-sectional survey studies is problematic for making strong recommendations based on these results.

Thirty of the studies used large-scale secondary datasets in their research which were often collected at the national level or a similarly large-scale level. Of those included in this review, most of the datasets were not created to address climate change specifically, but instead include some climate change variables which then were secondarily analysed by a separate set of researchers. Of the 30 studies which used secondary data in this review, 16 studies used data from the ESS, of which 14 focused on Wave 8.

Climate change attitudinal measures

There were a wide range of measures used to examine climate change attitudes. Some studies asked one or two questions about outright denial that climate change exists or about levels of climate change denial (e.g. Jylha et al., 2021), others included a measure of Anthropogenic Climate Change (ACC) belief, (e.g., Furnham and Robinson, 2022) and still others examined climate change scepticism (e.g., Stefkovics and Hortay, 2022). Climate change scepticism is multifaceted and typically examined using a 12-item scale containing items corresponding broadly to trend, attribution, and impact scepticism (Poortinga et al., 2011). Other attitudes included climate change concern, such as the perceived seriousness of the problem (e.g., Lo and Chow, 2015) or the urgency individuals feel towards climate change, which was usually assessed by asking participants whether they feel climate change would be a major concern as of this generation or future generations. Less consistently addressed were participants' beliefs in the level of scientific consensus regarding climate change (Bertoldo et al., 2019).

Populations studied

The studies included were mostly focused on adult populations (18 years and over) or in the case of the ESS data, participants aged 15 years and over. Twelve studies focused on second-level students, with the ages in these studies ranging from 12 to 18 years (Andor et al., 2018; Antronico et al., 2023; Grapsas et al., 2023; Kurup et al., 2021; Yli-Panula et al., 2021; Ojala, 2015; Stenseth et al., 2016; Nepras et al., 2023; Harker-Schuch and Bugge-Henriksen, 2013; Harker-Schuch et al., 2021; Skamp et al., 2021). Three studies focused on adolescents (Nepras et al., 2023, 12–13-year-olds; Harker-Schuch et al., 2021, 12–13-year-olds; Kurup et al., 2021, 13–14-year-olds). None of the included studies focused on primary-school-aged children.

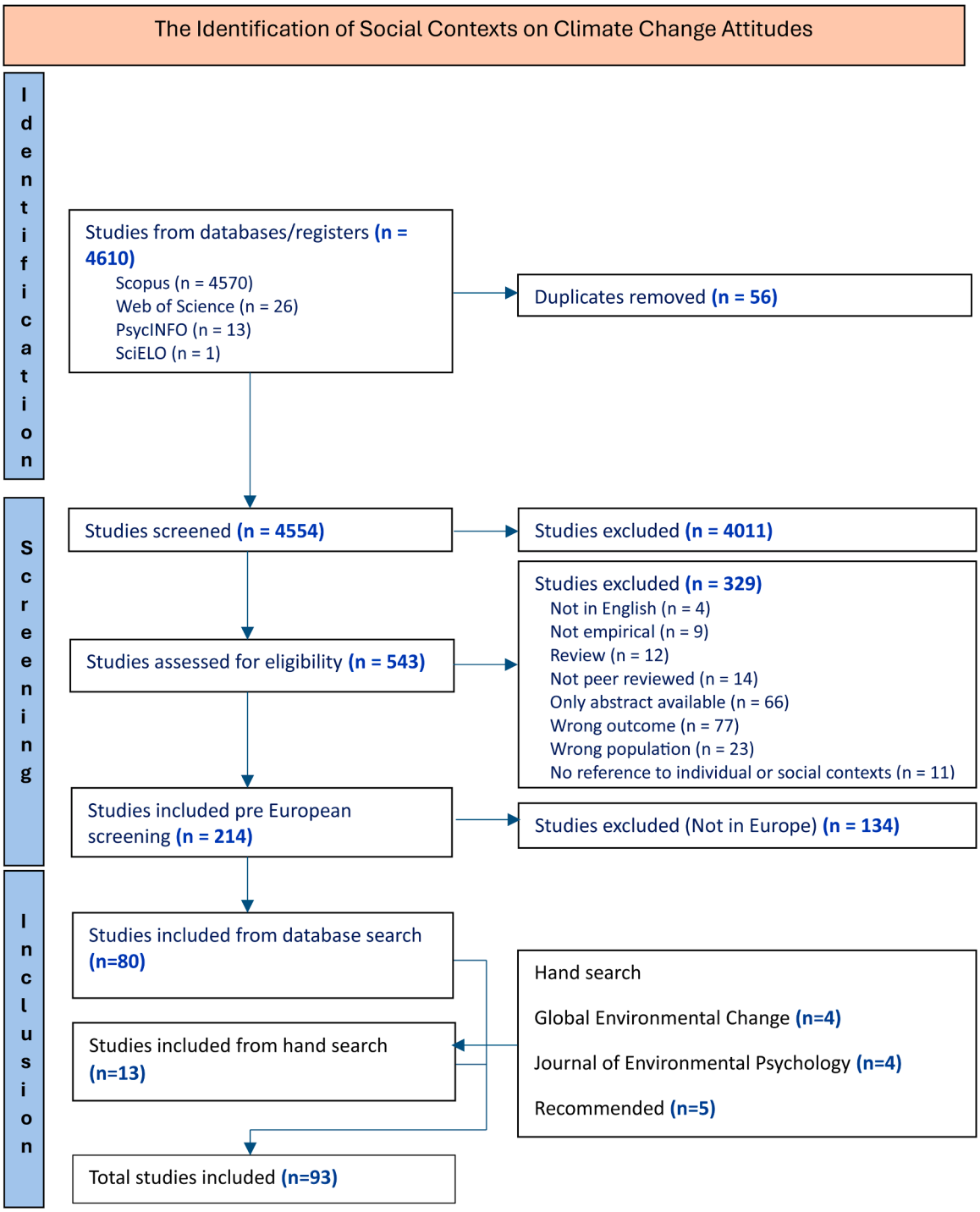

Fig. 1. Prisma Diagram showing identification, screening and inclusion of studies.

Prevalence of climate change attitudes

Overall, there are high levels of belief that climate change is occurring across Europe. Studies using large population samples across European countries estimated belief in climate change is about 98 % (Fairbrother et al., 2019; Fisher et al., 2022). However, there were differences in prevalence rates depending on the attitudinal measures employed, the context of the research, and the samples used in the studies. For example, Poortinga and colleagues (2019), found that trend scepticism ranged from 2.3 % in Iceland to 16.5 % in the Russian Federation, and attribution scepticism from 4.0 % in Spain to 15.4 % in Lithuania. Skamp et al. (2021) found that 77 % of secondary school students across 11 countries believed global warming was occurring, with 74 % concerned about its consequences, while Harker-Schuch and Bugge-Henriksen (2013) reported that 92 % of 16–17-year-olds in Austria and Denmark believed climate change was happening.

Data synthesis using Bronfenbrenner's bioecological systems theory

Below, we will discuss the results of the review within the framework of Bronfenbrenner's bioecological systems model, which emphasises the complex interrelations between an individual and their environment

Table 2
Evidence on climate change attitudes across each system of the Bioecological Systems Theory.

Bioecological Systems Theory		Summary of Findings	Strength of Evidence
Individual	Age	Differential impact of age on CC attitudes	Mixed evidence
	Gender	Being female is associated with more favourable CC views	Strong evidence
	Educational Level	Education levels are either unrelated to CC attitudes or higher educational levels are associated with a stronger belief in anthropogenic CC	Mixed evidence
	Dispositions	Self-transcendent individuals are more concerned about the climate change than those with high levels of self-enhancement	Limited evidence
Microsystem	Family and Friends	Individuals tend to hold similar CC views as their family members, romantic partners, and friends	Moderate evidence
	School	The influence of schools and climate change education on climate change attitudes is relatively unstudied.	Weak Evidence
	Location	Living in a more rural environment was associated with greater climate change scepticism. Living in Northern Europe associated with less climate change worry	Moderate evidence
	Media Use	Only one identified study found that media use was a significant moderator between socio-cultural ideologies and climate change beliefs	Weak evidence
Exosystem	GDP	GDP positively associated with the perceived importance and concern about climate change but no cross-national differences on climate change concern based on economic development factors at a country-level	Mixed evidence
	Perceived effectiveness of governmental policies (e.g., carbon tax, renewable energy)	Perceived effectiveness was associated with increased support for CC mitigation	Moderate evidence
Macrosystem	Political orientation	Left-wing ideology has no effect on CC attitudes but right-wing and centrist ideology does	Strong evidence
	Populism	Populism is an important predictor of a lack of belief in anthropogenic CC or concern about CC	Strong evidence
	Degree of individualism/ collectivism	Individualism is associated with less support for governmental action for CC	Weak evidence
	Social Dominance	Having a social dominance orientation is associated with more CC denial	Strong evidence
	Relationships with other social groups	Intolerance towards Muslims, foreign workers, and LGBTQIA+ people was associated with CC denial	Strong evidence
	Political Trust	Inconclusive findings on the relationship between political trust and CC attitudes	Strong evidence
Chronosystem	CC attitudes are changing over time, but it's not yet clear what the most important predictors of CC attitudes are		Moderate evidence

(Table 2).

The individual

When examining individual level-variables, most studies tended to focus on demographic information such as age, gender, educational level, and individual attitudes - personality or psychological constructs were less frequently examined, and the targeted variables (e.g., self-esteem, extraversion) (e.g., Boncu et al., 2022) were less systematically addressed or conceptualised.

Apart from Johansson et al. (2022), and Gómez-Román et al. (2020), all studies looking at age found that participants' views on climate change tended to be associated with the age of the participants. Using ESS data from 23 European countrues, Kácha et al. (2022) found that older participants were less likely to be 'Concerned' or 'Engaged' about climate change and Poortinga et al. (2019) found that older respondents, across 22 European countries, were more likely to have trend or attribution sceptical views, perceived the impacts of climate change to be less negative, and had lower levels of concern about climate change than younger respondents. Similarly, being older in Germany was associated with less concern for climate change (Andor et al., 2018). However, being younger was not uniformly associated with having less sceptical attitudes towards climate change. For example, older individuals (55+ years old) in the UK tended to be less sceptical about the human impact on climate change than younger participants, which was attributed to either educational differences or lived experiences (Ruiu et al., 2022). Gómez-Román et al. (2020) found no difference between the attitudes of millennials and generation Xers, in a sample from 23 European countries. In the absence of longitudinal data, it is not possible to make any strong conclusions on the impact of age.

The pattern for gender differences was very clear and was mostly consistently replicated. Being female was associated with believing more strongly that climate change is an important concern from samples from across 23 European countries (e.g., Andor et al., 2018 (Germany); Elert and Lundin, 2022 (Sweden); Gómez-Román et al., 2020 (ESS); Mata et al., 2023 (ESS); Poortinga et al., 2019 (ESS)) and that climate change is human-caused (e.g., Kácha et al., 2022 (ESS)). The exception to this pattern was Harker-Schuch and Bugge-Henriksen (2013) study with Austrian 12- and 13-year-olds, which found that while both boys and girls held strong concern for climate change, girls tended to believe less that climate change is anthropogenic.

Findings on educational levels suggest that either education level is unrelated to climate change attitudes or that greater education is associated with stronger belief in anthropogenic climate change. Kiss et al. (2022) found that education level was only partially related to climate

change concerns in Hungary. Similarly, Kácha et al. (2022) did not find clear differences in how educational attainment was associated with climate change attitudes across 23 European countries. By contrast, other studies found that lower educational levels were associated with higher trend and attribution scepticism across a range of countries (e.g., Gómez-Román et al., 2020 (ESS); Poortinga et al., 2019 (ESS); Ruiu et al., 2022 (UK); Weckroth and Ala-Mantila, 2022 (ESS)). Czarnek et al. (2021) found similar effects across 64 countries, but the effects only held when a country's developmental level was low- to mid- on the Human Development Index. Where countries are at high levels of development, educational levels were attenuated by right-wing political ideology. Propper et al. (2022) found similar results using ESS data: higher educational levels predicted greater belief in anthropogenic climate change, but these effects were moderated by political beliefs.

Orientations towards self-transcendence (altruism) vs. self-enhancement (egoism) were predictive of climate attitudes - across the majority of European countries - individuals who prioritise self-enhancement over self-transcendence values were less concerned about climate change and more likely to hold climate sceptical views (Poortinga et al., 2019 (ESS)). This finding was somewhat mirrored in a smaller scale study with Dutch adolescents in which climate change scepticism was positively related to self-enhancement and negatively related to self-transcendence (Grapsas et al., 2023). The high profile of some autistic environmentalists led to the hypothesis about the relationship between autistic traits and climate beliefs. However, UK research indicates there is no relationship between these variables (Taylor et al., 2021). In a study across multiple countries, environmental identity and horizontal collectivism (a tendency to engage in very strong interactions and interdependence with own in-groups) was negatively associated with climate change denial and vertical collectivism (a subordination to in-group authorities) was positively associated with denial in the Estonian sample; but null effects were found in the Turkish, Ukrainian or Polish sample (Nartova-Bochaver, et al., 2022). Individual differences that reflect orientations towards social, cultural, or political systems are dealt with in macrosystem section below.

The microsystem

There were only a small number of studies which examined how an aspect of the microsystem impacted climate change attitudes. The research broadly focused on the impacts of close relationships and educational environments (as opposed to educational level). Studies found that individuals tend to hold similar views on climate change as others within their immediate social circles. For example, a study across 25+ European countries found that couples tended to hold similar views on climate change (Goldberg et al., 2022). Similarly, Grade 10 students in Sweden found that having a parent sceptical of climate change predicted adolescents' own climate change scepticism one year later (Ojala, 2015). Arıkan and Günay (2021) found, using the Pew Research Center Global Attitudes Survey, that participants who viewed climate change as a direct threat to family members and friends had more concern about climate change.

Educational environments such as schools and universities are important elements of the microsystem. However, we only identified one study that examined the influence of climate change education in schools on climate change attitudes, likely because many of these studies examine knowledge rather than attitudes as an outcome. Harker-Schuch and Bugge-Henriksen (2013) found that a 71-slide lecture on climate change did not significantly contribute to any attitudinal changes on climate change among Austrian participants. However, a significant proportion of the sample (92 %) already held favourable opinions on climate change and intervention in the study used a particularly dated didactic approach. A study on scientific literacy in Spain, found that having greater scientific literacy was only associated with a strengthened belief in anthropogenic climate change for left-leaning individuals (Arroyo-Barrigüete et al., 2023). A small-scale study on Spanish undergraduate students (n = 120) examined climate change communication and how the frame used impacted on attitudes (B. León et al., 2021). This study found that - only for those who had low or medium environmental concern - framing climate change through a global lens had a more significant impact on their perception of the seriousness of climate change compared to participants exposed to frames with a local perspective (B. León et al., 2021).

The influence of geographical location was identified by Weckroth and Ala-Mantila (2022), using ESS data, who found that living in a more rural environment was associated with greater climate change scepticism and lower climate change concern compared to living in a larger city, and higher population density is also related to higher levels of scepticism. Found that participants from Southern Europe were more worried about climate change compared to those from Northern Europe (Gómez-Román et al., 2020). There were also cross-country differences in support for climate policies. According to data from the ESS, people in Czechia, Ireland, Hungary, and Portugal were strongly against support for higher fossil fuel taxes whereas people in countries such as Switzerland and Finland were strongly supp ortive (Fairbrother et al., 2019).

The mesosystem

Exploring trust in institutions, Kaltenborn and colleagues (2017) found that among 4077 Norwegian participants, high trust in institutions was associated with a greater likelihood of believing in human-caused climate change.

The exosystem

The exosystem examines how the individuals' indirect environment influences them. Included here were studies that explored a country's economy (GDP), taxation policies or environmental context on attitudes. Two studies, using data from a variety of large population studies from the majority of European countries, found that a country's economic performance or GDP was positively associated with the perceived importance of climate change (Lo and Chow, 2015) and climate change concern (Duijndam and van Beukering, 2021). Mayer and Smith (2017) found that participants across 25 European countries who perceived a global recession to be negatively affecting their household were more concerned with climate change. However, no cross-national differences on climate change concern were observed when taking into account economic development factors at a country-level (Mayer and Smith, 2017). People from countries which had greater per capita carbon emissions also exhibited a stronger relationship between climate change scepticism than people from countries with lower per capita carbon emissions, in a global sample (Hornsey et al., 2018). In Germany and Poland (n = 1969 participants), the perceived effectiveness of carbon tax was a significant predictor of support for climate change mitigation (Bohdanowicz, 2021).

The macrosystem

The macrosystem level focuses on individuals' social, political, cultural, or religious values and their relation to different climate change attitudes. Most of the studies fell into this category and addressed socio political variables. While most studies examined political orientation (e.g., left-right axes, liberal-conservative continuum), there were others which examined degrees of individualism-collectivism (e.g., Chan and Tam, 2023), belief in a just/unjust world (Furnham and Robinson, 2022), identification with humanity (Bertin et al., 2021), and belief in a "model of science" (Bertoldo et al., 2019). While these are values that individual participants hold regardless of their strength and prevalence within a culture, when examined on a wider national level, these value-based constructs can be construed as reflective of society's adoption or rejection of certain norms, thus making it easier to predict whether societal shifts in political or social orientation may have any effect on individuals' attitudes to climate change. A cross-national comparison (n = 5323) of the effects of five different ideologies (conspiratorial ideation, individualism, hierarchy, left–right political

ideology and liberal–conservative political ideology on climate change attitudes showed that the attitudes of people in Europe did not show the same associations as people in the USA (Hornsey et al., 2018). Nonetheless, studies consistently show significant correlations between conservative ideologies and climate change scepticism in Europe - people who place themselves on the right-hand side of the political spectrum are more likely to hold climate sceptical views, perceive fewer negative impacts, and are less likely to be concerned about climate change in all or a great majority of countries (e.g., Aasen and Sælen, 2022 (Norway); Gómez-Román et al., 2020 (ESS); Gregersen et al., 2020 (ESS); McCright et al., 2016 (Eurobarometer survey); Poortinga et al., 2019 (ESS)). However, some of these correlations are modest (Patočková, 2020 (Czechia)) and not found in all countries (Fisher et al., 2022 (ESS)). A large cross-national study found that left-leaning individuals in 13 of the 15 included Western European countries were more likely to attribute climate change to human causes than right-leaning individuals, whereas there was no relationship between level of conservative/liberal ideology and climate change attitudes for people in any of the Central and Eastern European countries (Fisher et al., 2022 (ESS)). This might suggest that there may be other important political indicators than political conservativeness in Europe, such as populism.

Jylhä et al. (2020) looked more specifically at 'far-right' orientations in Sweden and found climate change denial was more common among supporters of the radical right-wing party than among mainstream right-wing supporters. A further study utilising ESS data found that nationalist identity was linked with climate scepticism, the association was not as strong as that with traditional left-right political ideology (Kulin et al., 2021). Political participation has also been found to be negatively associated with climate scepticism in Germany (Engels et al., 2013).

Populism is a set of ideas revolving around anti-elitism and a belief that society is divided, on moral grounds, to two groups: the people and the "elite". In the UK, populism was not correlated with political ideology but did significantly predict climate change scepticism and denial (Huber, 2020). While populism as a whole is related to climate change scepticism and denial, specific subdimensions of populist belief appear to be particularly important. Jylhä and Hellmer (2020) examined the relationship between several subdimensions of populism in relation to climate change denial and found that, among Swedish participants (n = 909), exclusionism/anti-egalitarianism was most predictive of climate change denial. A cross-national comparison from Switzerland, France, Finland, Greece, and Italy of other populist dimensions showed that even when populism was significantly associated with perceptions of climate change responsibility, the relationship was not always similar across contexts, nor was the specific dimension of populism predicting climate change responsibility (Staerklé et al., 2022). For example, in France and Greece, both people's sovereignty (the belief that the in-group, or the "people", should have decision-making power) and anti-elitism (antagonism to the out-group, usually elites who are seen as categorically different than ordinary people, such as scientists) had a significant and negative effect on perceptions of climate change responsibility. By contrast, anti-elitism was the only significant predictor in Switzerland and Finland, with a significant indirect effect on both personal responsibility to mitigate climate change. Finally, the opposite was true in Italy, where people's sovereignty revealed the only significant indirect path. Nowlin (2022) found that participants across Europe who tended to espouse individualist or fatalist lines of thinking were less likely to support government action towards climate change.

One study of 2800 people in Sweden found that media use was a significant moderator between socio-cultural ideologies and climate change beliefs (Glogger and Shehata, 2022). When participants who had more 'traditional' social and economic beliefs and who engaged with right-leaning media, they were more doubtful of the scientific evidence supporting climate change and believed it was less dangerous than those who had more 'traditional' social and economic beliefs but engaged less with right-leaning media. They suggest adopting a sociocultural lens ("Green-Alternative-Liberal" and "Traditional-Authoritarian-Nationalist") provides stronger explanatory power than focusing predominantly on right-wing ideologies.

There were two key studies on political trust and climate change: Fairbrother et al. (2019) (ESS), Otto and Gugushvili (2020) (ESS), and Kaltenborn et al. (2017) (Norway). Fairbrother and colleagues' (2019) found that greater political trust in one's parliament, politicians, and political parties is significantly associated with less belief in anthropogenic climate change. Otto and Gugushvili (2020), using ESS data, derived group memberships according to (1) support for climate change policies and (2) support for public welfare provision. Individuals considered to be "eco-social sceptics", defined as low-income groups which perceive less immediate needs for addressing the challenges of climate change and are distrusting of welfare states, were the largest group and constituted around 28 % of the sample. Perceptions of financial and cultural resources may also impact on these perceptions. Otto and Gugushvili (2020) found that as dissatisfaction with one's financial situation decreased, participants became less sceptical of the need to address climate change and adopted instead more favourable views towards both state welfare and environmental provisions. There was no direct effect of cultural resources on climate change attitudes. However, when participants had lower levels of trust, the effect of cultural resources became significant.

Attitudes and intolerance towards societal groups are also related to climate change attitudes. For example, a small cross-national study across Hong Kong, New Zealand, and Sweden found that social dominance orientation - the tendency to accept and endorse group-based social hierarchies - was a significant predictor of climate change denial, particularly in Sweden (n = 223) (Jylhä et al., 2021). Indeed, in a model containing demographic variables, social dominance orientation, and human-nature and human-animal dominance (the belief that humans should be and are dominant or supreme over nature and animals, respectively), social dominance orientation was one of the strongest predictors, explaining 33 % of the variance in climate change denial in Sweden. Further studies have found associations between climate change disbelief with anti-feminist and anti-immigration attitudes (Jylhä et al., 2020), and climate change scepticism and intolerance towards Muslims, foreign workers, and LGBTQIA+ people (Johansson et al., 2022 (ESS)), is associated with climate change scepticism. Johansson et al., 2022 reported that having 10 % higher levels of racial intolerance reduced the probability that an individual would consider the consequences of climate change to be extremely bad by 21.5 %.

A small qualitative study (n = 18) that examined the impact of religiosity on climate change attitudes among UK Muslims, Christians, and seculars found that most participants (Christian participants, to a lesser degree) accepted the reality of climate change, but differences arose in the degree to which climate change would impact humans as opposed to other living things and its urgency - religious participants believed less in climate change urgency than secular participants. Importantly, however, all groups agreed that regardless of whether climate change is a current or future problem, it did not negate the fact that humans and their use of technology are abusing the environment. A study among a non-representative Hungarian sample in Budapest (n = 545; Jankó et al., 2018) illustrated similar perspectives on how most participants do believe that climate change is caused by humans' abuse of the environment and attributed responsibility to both consumerist society and fossil-fuel energy resources. Respondents who had lower salaries or were office or trade workers blamed individuals whereas those with a tertiary-level education or were white-collar executives blamed the failure of environmental policy as the reason for the state of climate change today (Jankó et al., 2018), again highlighting the interactions between the different systems of influence.

The chronosystem

The chronosystem examines the influence of time on climate change attitudes. A longitudinal study across 27 countries in Europe showed

that the proportion of participants who agreed that climate change is a "serious problem" steadily increased over time across several survey periods (Baiardi and Morana, 2021). In a large longitudinal study from the Eurobarometer series exploring climate concern from 2008 to 2017, Duijndam and van Beukering (2021) found only a weak longitudinal relationship between climate concern and the popularity of right-wing populist parties. Deviations in unemployment within a country were the most important variable in explaining longitudinal deviations in climate concern.

A study exploring the psychological underpinnings of the relationship between political ideology and climate skepticism in the Netherlands found that two temporal variables, consideration for future consequences and temporal distance to climate change consequences, partially explained the higher levels of climate change scepticism among conservatives (Većkalov et al., 2021).

Finally, experiences of extreme weather events across time also predicts climate change attitudes. Taylor and colleagues (2014) found, in a UK sample (n = 1848 participants), that perceived changes in hot-weather and wet-weather related events were significant predictors belief in anthropogenic climate change and concern - and wet-weather related events were the strongest predictor. Previous personal experience with heat-wave discomfort and flooding were also associated with greater belief in anthropogenic climate change and concern about this change. Experience of flooding in Germany was found to have a significant positive effect on the beliefs in the existence of climate change for those respondents living close to the flooded area but only for those who already believed in climate change - their belief confirmed by their experience of the flood (Osberghaus and Fugger, 2022).

Discussion

We find in this review that there is a considerable body of research on climate change attitudes. However, the available evidence relies very heavily on cross-sectional survey design, with considerable variation in the operationalisation and measurement of climate change attitudes, which limits the conclusions that can be drawn from the data. Broadly, the review indicated very high levels of climate change belief across Europe - ranging from 96 % (Bodor et al., 2020) to 98 % (Fisher et al., 2022) - however, prevalence of climate change belief was also dependent on the sample under investigation and the attitudinal measure employed. The existing research is predominantly conducted on adults - there is some research on adolescents' attitudes, and child samples are significantly absent; this is problematic for understanding climate change attitudes from a children's rights perspective.

The review did not synthesise all the literature on climate change attitudes; instead, by utilising the bioecological model we were able to categorise the diverse predictors of climate attitudes in a coherent manner to reflect the social systems that interact to influence climate change attitudes. These findings reflect the contemporary understanding of attitudes across the individual, social, and cultural and sociohistorical contexts (Albarracin and Shavitt, 2018) and aids the understanding of climate change attitudes from the individual level to wider sociocultural and political levels - the systems that must be considered in the implementing climate policy and addressing climate change dilemmas (Capstick et al., 2015). The review highlighted the various social contextual influences on climate change attitudes from immediate proximal influences to broader political ideologies and interactions between the various social systems. The majority of the evidence suggests that younger people, women, and more educated people are more likely to have higher concern about climate change and stronger beliefs in the human causes of climate change, although the findings are mixed for age and education. The influence of the microsystem on climate change attitudes was unsurprising, such that individuals hold similar views on climate change as their partners (Goldberg et al., 2022) and adolescents have similar levels of climate scepticism as their parents (Ojala, 2015). The limited research on these more proximal influences on attitudes was surprising given the persuasive influence of proximal referents to attitudes, compared with more distal referents (Latané, 1981). The limited findings point to a close network of influence that could be targeted in climate change messaging to counter climate change scepticism.

The most compelling evidence that emerged from this review was the role of socio-political orientations and climate change attitudes. There is a very significant body of literature supporting the finding that left-wing ideologies were associated with belief in anthropogenic climate change and right-wing ideologies are associated with climate change scepticism (Aasen and Sælen, 2022; Hornsey et al., 2018; McCright et al., 2016; Poortinga et al., 2019). This finding mirrors the findings on US samples (Hornsey et al., 2018), however these findings were less strong and suggest less polarisation as that which is found in US samples (e.g., Patočková, 2020) and not consistent across all European countries (Fisher et al., 2022). Some research suggests that the socio-cultural dimension of ideology is a better predictor than a left–right continuum in predicting beliefs about climate change (Glogger and Shehata, 2022). Populism, particularly egalitarianism, anti–elitism and people's sovereignty, are notable predictors of climate change attitudes in European samples (Huber et al., 2022; Jylhä and Hellmer, 2020; Staerklé et al., 2022). The findings were generally more mixed on the association between climate attitudes and political trust (Fairbrother et al., 2019; Kaltenborn et al., 2017).

A further socio-political finding that emerged from the review - which mirrors the findings elsewhere on environmental attitudes more generally - is the association between social dominance orientation and climate change denial, accounting for one third of the variance in climate change denial in one study (Jylha et al., 2021). This finding along with political ideology findings, and the finding on the relationship between scepticism and intolerance towards social groups (Muslims, foreign workers, and LGBTQIA+ people) (Johansson et al., 2022) suggest a clustering together of far-right attitudes. Although the current levels of climate change denial are relatively low in Europe, there is a significant risk of this increasing when these findings are interpreted in the context of increased 'far right' influence in Europe following the Covid-19 pandemic (Wondreys and Mudde, 2022) and the spreading of disinformation about migrants and minority groups in Europe (Szakacs and Bognar, E. (2021).

Taken together the review findings provide evidence for tailoring climate change communication according to groups at different ends of the anthropogenic climate change belief-denial scepticism continuum and to individuals' political beliefs. For example, using scientific evidence and improving scientific literacy may only be effective for left-leaning people (Arroyo-Barrigüete et al., 2023), and the anti-elitism findings (Staerklé et al., 2022) may lend support for the use of non-experts in climate change communications to the small minority of the population that are climate sceptics.

There was a very limited amount of longitudinal research identified in the review. One longitudinal study in Europe indicated an increase in the views on the seriousness of climate change science 2009 (Baiardi and Morana, 2021). Studies were also identified that suggest that experiences of extreme weather events were associated with increased concern and reduced scepticism (Osberghaus and Fugger, 2022; Taylor et al., 2014) which can be interpreted in light of the increased extreme weather events Europe has witnessed over the past couple of years (Copernicus Climate Change Service, 2024, 2025).

Overall, the review highlighted some limitations in the current research landscape on climate change beliefs. While a wide body of research was identified. In the main, the findings were cross-sectional in nature and relied almost exclusively on participant self-report. Studies tended to focus on the existence of attitudes; there was a significant absence of research on attitude formation, changes in attitudes, or providing nuance in terms of climate change attitudes. For the most part, the samples used in the research were from predominantly adult populations and predominantly focused on distal socio-political variables.

Given the vast body of literature on climate change attitudes, we specifically focused our search on person-centred relational systems, guided by the Bioecological Systems Theory. While this approach did not capture every possible study, it allowed us to effectively analyse and frame the relevant literature within this social-ecological framework. The findings of this review are limited by the inclusion and exclusion criteria in the study. The review was focused on climate change attitudes as an outcome variable in studies within the European context. Determining what is an attitude from the varied variables used in this research context was challenging, requiring a subjective interpretation of study variables. For example, we included concern/worry about climate change in instances where we viewed its operationalisation as cognitive in nature. However, some researchers view this as an affective dimension. Given the focus on attitudes as outcome variables in experimental studies, we did not include research that examined representation and communication of climate change attitudes in the media. There is a significant body of research media's representation of climate change and future research may look to review this literature.

Based on the findings of this review, we recommend that to examine attitudes more comprehensively, future research focuses on how climate change attributes are formed from childhood, through adolescence, to adulthood with an in depth focus on immediate proximal influences, as well as the role of out-group intolerance on attitudes. Future research may also examine the routes to attitudinal change using models of persuasion and on public support for climate change policies, including the specifics of the policies that support intrinsic and extrinsic motivating factors to climate action.

Preregistration

PROSPERO registration: CRD42023445108

OSF page with supplementary information: https://osf.io/b3a9y/files/osfstorage.

Funding statement

The research was funded by the Environmental Protection Agency in Ireland

Ethics approval statement

This is a review paper and therefore does not have any human/animal participants

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Ashling Bourke reports financial support was provided by Environmental Protection Agency Ireland. Ashling Bourke reports a relationship with Environmental Protection Agency Ireland that includes: funding grants. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.cresp.2025.100245.

Data availability

No data was used for the research described in the article.

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