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Beliefs and attitudes of university faculty members on climate change in the US.

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Beliefs and attitudes of university faculty members on climate change in the U.S.

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ABSTRACT

This qualitative study explored the beliefs and attitudes of university faculty members towards climate change from Midwestern and Northeastern universities in the U.S. Findings from this study suggest that participants' experiences were mostly associated with extreme weather events, such as heavy rainfall or drought. Diverse opinions were presented on addressing climate change and often participants' expertise guided those opinions. Several suggestions were expressed on climate change accountability, including individuals' responsibility, the importance of active social movements, and the role of corporations, governments, and technology.

KEYWORDS

Academics; phenomenology; climate change; qualitative

Introduction

Climate change has been recognised as the single most important environmental issue that humanity and nature are currently facing [1]. Because of its complexity, addressing climate change requires an interdisciplinary, social-ecological approach [2]. Therefore, several scholars refer to climate change as a wicked problem [3,4]. According to Peters [5, p. 388], wicked problems have the following 10 characteristics:

- (1) 'Wicked problems are difficult to define. There is no definite formulation.
- (2) Wicked problems have no stopping rule.
- (3) Solutions to wicked problems are not true or false, but good or bad.
- (4) There is no immediate or ultimate test for solutions.
- (5) All attempts to solutions have effects that may not be reversible or forgettable.
- (6) These problems have no clear solution, and perhaps not even a set of possible solutions.
- (7) Every wicked problem is essentially unique.
- (8) Every wicked problem may be a symptom of another problem.
- (9) There are multiple explanations for the wicked problem.
- (10) The planner (policymaker) has no right to be wrong'.

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Academia is an ideal setting for transdisciplinary and multidisciplinary research to take place, and several researchers have drawn attention to the importance of transdisciplinary efforts for mitigating wicked problems, such as climate change [6–8].

Much scholarship has been dedicated to the impacts of climate change, but that scholarship has not been adequately divided among disciplines. For example, a recent study looked at grants awarded for climate change research between 1950 and 2020 and revealed that natural and technical sciences (e.g. engineering and technology) received 770% more funding than social sciences and the humanities [9]. Exploring climate change with a diverse academic disciplinary lens allows for a more comprehensive understanding of the problem. The humanities are important for understanding the history and ethics of climate change [10], whereas engineering develops the necessary technology to mitigate climate change effects [11].

The sources that people use to inform themselves about climate change can have an impact on their perceptions of climate change [12]. Scientists are among the most important sources for information about climate change and environmental issues available to the public [13–15]. Recent literature exploring communication and environmental issues suggest that an established trust and credibility between the source of the information and the audience is crucial [15]. Attari, Krantz and Weber [16] found that public perception of climate scientists depends on their carbon footprint; in other words scientists' credibility with an assumed larger carbon footprint was lower than that of those with lower assumed carbon footprint. These studies suggest the importance of academics and their role in informing the public on climate change and environmental issues.

The significance of attitudes has been widely discussed in the context of environmental issues, e.g. by Ziegler [17], Fielding & Hornsey [18], Arbuckle et al. [19] and Corner, Whitmarsh and Xenias [20]. Attitude is deemed to be a critically important construct in understanding individuals' behaviours, as it is directly linked to people's beliefs that inform their actions [21]. People's attitudes and beliefs about climate change depend on their knowledge, experience, and political orientation [22,23]. Lorenzoni and Pidgeon [24] found common attitudes between the US and EU participants towards climate change. For instance, both the US and EU participants believed that, although climate change is perceived as an important social and environmental issue, there are other more vital social and personal issues that need to be addressed before climate change. They also believed that there was a lack of information on the actual causes and sources of climate change [24]. More recent studies suggest that 30% of Americans do not believe that climate change is happening, and 42% do not believe that it is induced by human beings [25].

Whitmarsh [26] employed multiple methods to explore the perception of flood victims in the UK towards climate change and its associated risks; and found that, although people take into consideration the impacts of climate change as an increased personal risk, their attitudes towards climate change are very similar to the non-victims. More recent studies indicate that this relation has changed and that direct experiences of climate change have a direct impact on people's attitudes.

Akerlof [27] looked at four different relevant studies conducted in Michigan, U.S., and concluded that personal experiences of climate change increase risk perception. Similar conclusions have been drawn by Donner & McDaniels, Myers and Spence [28–30].

Climate change experiences are increasingly explored through the lens of the Construal Level Theory and psychological distance looking at individuals' experiences with climate change and their actions and beliefs [31]. Construal Level Theory was developed by Trope and Liberman [32] to explain the relationship between psychological distance and our ability to make decisions for future events and ideas that are physically or mentally distant to us [33]. Psychological distance has been described by Schuldt, Rickard and Yang [31, p. 147] as:

The distance at which objects and events are perceived to occur, a construct that has been conceptualised along four distinct dimensions -namely spatial (physically close vs. far), temporal (e.g. near vs. distant future), social (e.g. involving similar vs. dissimilar others), and uncertainty (e.g. as likely vs. unlikely to occur).

Our perception of psychological distance associated with climate change can influence our actions and perceptions towards climate change [34]. Further, it can impede engaging in pro-climate actions [35,36].

The literature reviewed on human behaviour and pro-environmental actions related to climate change for this study revealed that scholarship mainly focuses on students, tourists, farmers, and the general public as participants, with fewer studies exploring academics' attitudes towards climate change. Studies focusing on academics suggest that the majority of scientists investigating climate change concur that climate change is a result of human actions [1,37], but there is little investigation of the academics' own behaviours and personal activities. Lahsen [38] did an ethnographic study among climate scientists and focused on climate change sceptics and contrarians and their perception of anthropogenic climate change. Because the majority of the public's opinion on climate change is based on what scientists say [13], it is possible that academics supporting the paradigm that climate change is a problem induced by human beings can have a further positive impact on the public's perception towards climate change. Having an in-depth understanding of academics' climate change attitudes and beliefs, particularly those whose teaching or research is linked to climate change, will provide a new perspective on the climate change problem.

Method

This study was part of a larger investigation using a phenomenological, mixed methods approach to explore academics' perceptions and experiences with climate change. The current study focuses solely on the qualitative data. Potential individuals were identified through their responses to the online battery (not described here) and were purposefully selected and invited to partake in follow-up interviews. Once subjects responded positively to participating in the interview process, then a time and date were arranged for the telephone interviews. All participants received an email with the necessary information prior to their participation about the study, including the use of the data for research purposes. This research was approved by Indiana University Bloomington I.R.B., protocol number 1902802280.

Table 1. Descriptive information of the participants.

	Natural Sciences [NS]	Social sciences [SC]	Humanities [H]	Architecture [A]	Engineering [E]
Academic rank					
Professor	28.5%	25%	50%	100%	28.57%
Associate Professor	28.5%	n/a	n/a	n/a	14.29%
Assistant Professor	28.5%	37.5%	50%	n/a	57.14%
Visiting Lecturer	n/a	12.5%	n/a	n/a	n/a
Research Associate	n/a	12.5%	n/a	n/a	n/a
Student	14.5%	n/a	n/a	n/a	n/a
Teacher	n/a	12.5%	n/a	n/a	n/a
Location					
Midwest	71.4%	87.5%	100%	100%	42.85%
Northeast	28.6%	12.5%	n/a	n/a	57.15%
Gender					
Male	28.6%	62.5%	n/a	n/a	100%
Female	71.4%	37.5%	100%	100%	n/a
N	7	8	4	2	7

Interviews

The objective of the phenomenological interviews in this study was to explore academics' perceptions towards climate change and to allow for an in-depth understanding of their experiences with climate change [39]. The phenomenon in this study is participants' experiences with climate change. Through the interviews, the goal was to explore the different modes through which individuals experience climate change and the meaning these experiences have for the participants [39]. The interview script followed the suggestions offered by Giorgi [40, p. 245], stating that 'interview questions are generally broad and open ended so that the subject has sufficient opportunity to express his or her view point extensively'. The interview questions used were structured to allow in-depth exploration of participants' lived experiences, as suggested by Ihde [41]. Throughout the interview process, the researcher posed descriptive questions, followed by structural questions to understand the phenomenon under examination [39].

Sample

The sample population for this study included US-based academics whose teaching or research was directly or indirectly related to climate change and environmental issues. Different fields of study included engineering, social science, architecture, natural science, and the humanities. An attempt was made to have interviewees with participants from the five broad fields of study (See Table 1 for participant descriptors). In total, participants self-described as 10 full professors, 3 associate professors, 11 assistant professors, 1 visiting lecturer, 1 graduate student, 1 research associate, and 1 teacher. The population sampled is anticipated to have some degree of knowledge on the subject, and thus relevant views [42].

Data collection and analysis

A script of 11 open-ended questions was prepared to ask the interviewees for their insight about climate change (see Appendix 1). In total, 29 interviews were conducted, but one was deemed inappropriate, as the participant's field of study did not align with the inclusion criteria. The inclusion criteria for this study required that participants be

Table 2. Interviews' themes and codes*.

Perceptions of Climate change	Psychological distance and climate change	Climate change accountability
Anthropogenic (24)*	No experiences (4)	Individuals (20)
Agriculture (4)	Not sure (5)	Reduction of emissions (8)
Emissions (18)	Yes (23)	Corporations (9)
<ul style="list-style-type: none"> ● Carbon dioxide (1) ● Methane (3) 	<ul style="list-style-type: none"> ● Leisure time (3) ● Weather related (19) 	
Nitrous oxide (6)		
Natural phenomenon (6)		Government/policies (26)
Developed vs developing countries (4)		Technology (14)
Does Climate change pose a problem?		Education (5)
<ul style="list-style-type: none"> ● Yes (28) 		
		Research (15)

*(): Number inside the parenthesis indicates the number of individuals that brought up the specific code.

employed in a US-based academic institution in the Midwest or Northeast and engage in research or teaching in an environmental study field. The remaining 28 interviews were used for the thematic analysis of this study.

Phone interviews were audio recorded and transcribed verbatim, with repetitions and hesitations removed for clarity. Based on Braun and Clarke [43], the following six steps were followed. First one of the researchers, who also conducted the interviews, became familiar with the data through listening to the audio recordings and transcribing the interviews. As a second step, the subsequent transcripts were initially coded using a qualitative analysis software, Dedoose, for emerging codes, followed by an iterative coding protocol through repeated readings and analysis of the transcripts and the development of semantic codes [44]. The third step included the generation of themes by clustering codes together, or by breaking them up where necessary. The fourth step included the review of the potential themes, while re-reading the whole dataset for meaning making. During the fifth step, the final three themes were defined, and excerpts were chosen for representation. The sixth and final step is to produce this manuscript by presenting and explaining the selected themes.

Interview questions were adjusted amongst participants to gain better insight from individuals with more expertise, knowledge, and with unique experiences. Throughout all the interviews, a memo was kept for the initial coding after each interview and to note any researcher's bias that could have resulted while the interviewer was asking questions. Between interviews, cycles of analysis continued until saturation was reached. The iterative process allowed us to revisit and adjust the codes until there was a robust and representative codebook. Saturation was reached when participants' responses did not report any new explanations or variations in the phenomenon explored [45].

The final coding process gave rise to three primary themes: a) perceptions of climate change; b) psychological distance and climate change; and c) climate change accountability. Table 2 details the three themes with their associated codes.

Results

Participants were asked to: 1) share their experiences regarding climate change; 2) discuss what climate change means for them; and 3) talk about the various ways through which

climate change can be addressed. Various codes emerged for each of the three themes (see Table 2). Each theme will be discussed separately below with corresponding codes and a selection of excerpts from the interviews. At the beginning of each excerpt, the anonymous identifier for each participant is included, with two letters indicating the field of study: [SS] is for social sciences, [NS] is for natural sciences, [H] is for humanities, [A] for architecture, and [E] for engineers.

Theme 1: perceptions of climate change

All the participants were asked an open-ended question ‘What is climate change?’, with a follow-up question on whether they believe that climate change is a problem or not. All participants reported climate change as a problem, but the causes of climate change and what climate change is varied amongst interviewees.

Some of the responses to ‘Is climate change a problem?’ include:

[SS1] *“It’s an existential threat for humanity,”*

[NS1] *“Well absolutely. [. . .] I think it’s a problem of the first order and it is something that to different degrees is now beginning whether people acknowledge it or realise or not to influence every aspect of human life”.*

One participant suggested that it is a social justice issue, while another participant discussed the power dynamics between developed and developing countries by stating:

[H1] *“[. . .]it is tied to social justice.”*

[E1] *“[. . .]at least we’re not polluting our environment, and that’s where I would say your developed countries have a wonderful attitude about hiding their problems and that goes along with the environmentalist too”.*

Other participant responses were similar. Some respondents believed climate change to be an anthropogenic problem, related to the emissions released by various industries, including agriculture. Several interviewees mentioned that climate change can be caused by natural processes, including solar variation and natural sources emitting gases. Two of the associated excerpts are:

[E2] *“ . . . now there are natural causes too, you know, the volcano erupts or something like that. There are also releases of methane, also when a tree or something like that degrades, there are certain greenhouse gases emitted,”*

and

[E3] *“ . . . one of them is the output of the sun.”*

Two of the participants talked about the importance of scale when discussing climate change: [E2] ‘

[E2] *“Well, you have to look at what scale you’re talking about from the local standpoint and local environments, humans can make changes. [. . .] And, when we start getting on the global scale, and you say humans are affecting it from the global standpoint, I don’t think there’s any credible, scientific evidence to make that conclusion [. . .] so by standpoint, I have not seen any credible scientific evidence to link humans at a global scale. Humans can affect the local environment, but globally I have not seen that scientific evidence”.*

and

[E3] *“There has been a lot of work and data published in different forms and I know that there are short-term and long-term types of studies and depending on how the question is framed, you can get extremely different results. [. . .] it is possible to selectively choose time frames and portions of data to portray any type of result that you want, okay? [. . .] and so, the end point of that is essentially that if someone consciously selects time frame in a particular way, you can portray a different possible outcome. And at some point, there is a question of whether it is any more science or whether it becomes a form of political propaganda for some other purpose.”*

Carbon dioxide was the predominant emission type mentioned by 11 participants, followed by methane with three participants, and nitrous oxides discussed by one interviewee. Several participants referred to greenhouse gases as a general term without specifying gas types.

Theme 2: psychological distance and climate change?

From the interview analysis, seven codes emerged associated with participants’ experiences with climate change. The four dimensions of psychological distance identified were spatial, temporal, uncertainty, and social. Most of the interviewees reported having experienced climate change in their personal life, and it was mostly associated with weather phenomena, such as heavy rainfalls, droughts, or unusual snow precipitation.

One participant shared her experience in Florida with the following excerpt describing both the social and temporal dimensions:

[SS2] *“Well, I lived in Florida for a handful of years. We had a hurricane every year that I was there, in Tallahassee, which isn’t generally a spot that hurricanes usually come through. People [who] had lived there a long time, were saying that this wasn’t the norm, but it happened for three consecutive years when I was there. So, we talked a lot about if this is due to climate change.”*

Another participant noted that everyone has experienced climate change in some way or other but that not everyone is open about it when describing the temporal dimension:

[H2] *“I think we’ve all experienced climate change, whether we’re willing identify it as so or not [. . .] I know the effect it’s having on my raspberries and other plants, I know*

about invasive species that are coming in that is related to climate change and, and their ability to, to move differently, you know, on, and on and on. I see it every day”.

Few individuals reported their predicament on whether the unusual weather events they experienced were owing to climate change or not. That notion describes the dimension of uncertainty. One of the interviewees discussed the ambiguity amongst scientists about climate change by stating:

[H3] *“You know, that’s hard to answer, right? Because the science is still trying to figure out if they can attribute weather events to climate change, and they’re trying to figure out how to do that. [...] Even if the scientists haven’t proved that it is that, I guess I would say yeah, with respect to some of these extreme weather events, I feel like I’m experiencing it firsthand.”*

Another academic’s statement also depicted the temporal dimension in addition to the uncertainty dimension.

[SS3] *“I would say that the answer is kind of yes and no. Because the reality is that it’s hard to think that we experience climate being a decadal sensation. We experience weather and that weather is related to climate but may or may not be a direct effect of climate change. So, I’d say the answer is yes, but I’m not declaring that that’s what it is. I’m declaring that what I experience as weather.”*

Two participants reported that their experience with climate change is associated with their leisure time and activities, such as gardening and travelling. One participant shared his travelling experience:

[SS3]z *“I mean, we can see it and personally experienced the effects, several years ago when I was in Glacier National Park. They had old photos and you could see the retreat of the glaciers.”*

Another interviewee discussed his gardening experience with his wife:

[NS2] *“Yes, and maybe the most poignant experiences is with my wife and I being both avid gardeners. When you’re able to grow lettuce and sensitive crops like that, two months beyond what would be remotely considered normal in Southern New England that, that should send the signal.”*

Theme 3: climate change accountability

The third and final themes explored academics’ suggestions on addressing climate change. The seven codes that emerged are education, individuals, reduction of emissions, corporations, government/policies, and technology. The proposed suggestions varied amongst academics, but it was a common approach that there cannot be just one solution and instead there must be a combination of solutions. Some individuals held the belief

that changes should come from an individual level, some others suggested that changes should be associated with policies from governments, including the regulation of corporations, and a number of other interviewees expressed their belief that, for changes to be efficient, there should be a combination of individual and governmental changes. The importance of education was mentioned by five of the 28 participants, and it was perceived in two different ways. First, education was seen through educators' perspective. Second, there was a focus on the importance of educating the public. Two participants stated that it is important for them to redefine how they teach:

[H4] *"I need to address how to teach differently because I am a teacher, because I'm not a professor [. . .]As a teacher I think it's important that we learn to teach differently so that we can prepare the next generation for all the things that are going to come."*

The three other participants talked about education and the importance of educating the public in climate change issues in order for them to be able to make informed decisions:

[E4] *"I think it's something that we need to address now [. . .]But they don't see climate change as much as an existential threat unless people are educated. Well when they're [people] educated on the subject, then people will take it more seriously."*

The role of individuals was discussed by most participants. The analysis suggests that, for some academics, the role of individuals is a key element to address climate change, while others believe that individuals themselves cannot make a meaningful difference. The two excerpts below indicate the responses from two academics, with the first holding the belief that individual changes are important and the second suggesting that individuals are not responsible for climate change. According to the first academic:

[SS4] *"I know they're diverse opinions, but most of my work, the research that I do in this area is focused on individual action. And I do think that those are important targets and that there can be specific behaviours that individual can do [. . .], I think there are a handful of big behaviours that people tend to be responsible for and can make a contribution to address the current issues,"*

while the second academic stated:

[SS5] *"I think the first step would be to recognise, there aren't individuals responsible for climate change, no matter how silly that sounds. The mainstream narrative I am supposed to believe, is that climate conscious decisions every day to reduce my, green, my greenhouse gas emissions as well as my family can have an impact. I am not against really on lifestyle, but I think it's an inherently flawed, perspective if it's overemphasised because it draws resources and attention away from adequate solutions."*

Few academics discussed the importance of the individuals in creating a social pressure mechanism in order to have meaningful impacts. This can be seen in the following excerpt:

[H2] *“So my research is in ethics and the structure of a moral obligation. And I think that there are moral obligations to do something about this because I think it’s a problem. I don’t think that the solution is, is at the individual level. I don’t think it’s my moral obligation to, to stop driving to work or to, put solar panels on my house. I think the solution from an ethical perspective has to be conceived of at the level of a group and needs to be structural. And if anything, it needs to be large groups of people banding together to enact structural changes because those can have more of an impact than any individual’s personal lifestyle.”*

Another theme that emerged was the immediate reduction of emissions coming from human activities. Many participants discussed the immediate reduction of emissions:

[NS3] *“Well, I think right now the first thing we need to do is stop all fossil fuel extraction and burning, and I would say do that immediately.”*

Further, one participant discussed the timescale of solutions in regard to the reduction of greenhouse emissions:

[E5] *“It depends on what the timescale is you want your solution for. So, for example, if somebody really believes, let’s say that we have until the year 2030 to drastically change things or the world will come to an end as one kind of extreme, then you would have to do something really drastic, right now that is not a technology solution.”*

The role of corporations was very often interwoven with the role of government and establishing policies that would address climate change. It was often the case that academics that did not see individual changes as a key element, suggested that governmental policies and regulations aimed at reducing emissions from corporations/businesses are critical. The two following excerpts represent the statements of participants who supported the idea that the solution should be a result from pressuring corporations and governments:

[SS6] *“I think more progress will be made in government and private sector to take action, rather than individual households trying to take action. Of course, they’re all interrelated or react to one another, so in some sense, it’s difficult to try and isolate one and say they’re more responsible [. . .], most effective means to do policy is the practices of the private sector.”*

and

[A1] *“I think it is part of the system, but I think really what we have to do, is have the government and the big corporation adopt practices that are sustainable, and you know, that, that we do go towards a Green New Deal and, and we have the ways that we are going to phase out fossil fuels within the very near future. I think it has to be governmental and a corporation response, I don’t think it can be [. . .], I think for too long the corporations have placed it on the individual.”*

The last code that emerged was ‘the role of technology’. As with the above codes, the opinions were divided. Some individuals suggested that technology can provide adequate solutions:

[NS2] *“Absolutely. Yes. Yes, yes. I mean, we can see that already. I mean, a simple example is the use of light bulbs. I mean, now, we can get a lot more light from less energy than we could before and the same with cars. We can see cars becoming way more efficient than they were in the 1970s, so I think technology has a huge part to play, but we cannot depend on technology for everything. I mean, we still have to change ourselves.”*

In contrast, another academic believed that technology is given more credit than it should:

[SS5] *“So the first thing I say is that technological solutions are over emphasised, in mainstream discourse about climate politics [. . .]. Renewable energy, I’m not a crazy person or something, I fully support the development of renewable energy, especially wind and solar, however, when you only stress that we need to develop renewable, you’re making an assumption, that if you develop renewable energy and develop more and more of it, that it’s going to phase off fossil fuel energy. And the problem is [. . .] that that’s not happening. It’s only replacing and replacing at a much smaller extent than you would assume. You assume a one-to-one replacement and that’s not it.”*

Discussion

The purpose of this study was to explore academics’ attitudes towards climate change and relate their experiences to climate change. The findings suggest that, although there are certain aspects about climate change that most academics agree upon, there are diverse beliefs on some other aspects of climate change. The following section discusses the findings of this study organised by the different questions the participants were asked and their responses.

In the question if climate change is a problem, all participants reported that climate change is a problem that needs to be addressed. The implications of climate change were not only linked to environmental degradation, but to social justice aspects as well. Those finding align with the results reported by Stocker [1] and van der Linden et al. [46] The significant contribution of human activities to climate change was agreed by most

participants in this study aligning with past studies conducted on various demographics, e.g. teachers, farmers, and the lay community [47,48].

A follow-up question was about addressing climate change. Addressing climate change was an issue that revealed a variety of strategies and opinions by the participants. Several participants brought forward their own research to support their opinions and ideas, while sometimes critiquing other popular approaches of addressing climate change. There was a certain element of disagreement amongst them, which could be expected as participants often came from different academic disciplines and backgrounds. For instance, some academics suggested that change in individual behaviours is a key element to addressing climate change, while others believed that changes should be systemic and initiated by governments, including the regulation of big corporations through policies; excerpts [SS4] and [SS5]. There were also several individuals whose suggestions included the involvement of both individuals and the necessary commitment from governments.

Participants' beliefs might be biased by their own research and could sometimes dismiss published literature on the topic in favour of theirs. That dissonance could have an impact on climate change and public understanding. In their study, Leiserowitz et al. [13] suggest that members of the public rely on academics to get information about climate change. Merging the findings by Leiserowitz et al. [13] and findings from this study, we can see how conflicting opinions might hinder climate change communication, potentially leading to climate scepticism. It is possible that the public can be confused if they receive different and controversial information from academics on how to address climate change. An experimental study conducted by Aklin and Urpelainen [49] suggested that disagreement amongst scientists on environmental issues decreases public support on environmental-related policies. Academics who adhere to the climate change paradigm of denial or scepticism might also have an impact on the public's beliefs towards climate change. In this study, there were no academics who identified as climate change deniers per se, but the analysis of the interviews suggests two participants adhering to climate sceptic characteristics, as per Lahsen [38]. Both participants are engineers with many years of experience in research and teaching, which aligns with the findings on the distribution of climate change deniers in academia, according to Lahsen [38] and Lahsen [50]. Likewise, Incropera [3] suggested that individuals seeking to dismiss the importance of climate change often use the example of data manipulation to strengthen their argument; a dispute that both participants brought up in this study; as seen in the above excerpts. In his book, Hulme [51] indicates that the reason why people have conflicting opinions about climate change is partially because they could be receiving contradictory messages and information.

The next question was in relation to their personal experiences with climate change. Construal level theory and psychological distance have been used to describe individuals' experiences with climate change in different contexts [31]. In this study's data, psychological distance was noted on spatial, temporal, social, and uncertainty dimensions through participants' experiences. The experiences with climate change that most participants associated with were through some extreme weather event they faced, as well as through leisure related to time. Those perceptions and experiences with climate change, align with findings from Spence [30] and Akerlof et al. [27]

Limitations and future directions

A key limitation to this study is that, although the survey was advertised to a wide range of academics, it is possible that individuals who were more accepting of climate change science and discourse were more likely to participate. In addition, the findings of this study explored the attitudes and beliefs of academics in Midwestern and Northeastern universities, and future studies could also include academics from Southern and Western universities. Although the participants were fairly distributed in terms of their field of study, that was not the case for their faculty ranking. Further studies should have a proportionate representation of faculty ranking. The rankings can be seen in [Table 1](#). Although some of the participants were sceptical on climate change, there were no participants that viewed climate change as not being a problem, and that could skew the findings of this study. Finally, it is important to explore whether academics consider those belief differences amongst them and how they address them regarding non-academics and their students.

Conclusion

This study advances our understanding of academics and their thoughts about climate change. Findings from this paper indicate that academics do not have a unified approach on how to address climate change, but their suggestions often vary according to their individual research and the available evidence they have. In addition to the plurality of ways to address climate change, some participants expressed characteristics associated with that of a climate sceptic ideology.

One question that emerged from this study and requires future attention is the role of climate change beliefs dissidence amongst academics, and the implications that might have on public communication. Most academics have coalesced around the notion that climate change is an anthropogenic problem that needs to be addressed. If that is so, then what is the role of climate change sceptics in their institutions as researchers and teachers? Academia is a hub of knowledge and contestations that allow science and practice to move forward, so could that dissidence be productive for university students? Although disagreement amongst experts can have a negative impact on the public, scholars suggest that environmental disagreement could and should be embraced as a resource [52]. The results here point to some areas of climate change that academics disagree upon and the possible implications for the general public and their actions about climate change. It is crucial to address the disagreement amongst experts and use this narrative for more inclusive efforts in tackling wicked environmental problems like climate change.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

- [1] Stocker, T., (Ed.) 2014, *Climate Change 2013: The Physical Science Basis: Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press).
- [2] Hein, C.J., Ten Hoeve, J.E., Gopalakrishnan, S., Livneh, B., Adams, H.D., Marino, E.K. and Susan Weiler, C., 2018, Overcoming early career barriers to interdisciplinary climate change research. *Wiley Interdisciplinary Reviews: Climate Change* 9(5), e530. doi: [10.1002/wcc.530](https://doi.org/10.1002/wcc.530).
- [3] Incropera, F.P., 2016, *Climate Change: A Wicked Problem: Complexity and Uncertainty at the Intersection of Science, Economics, Politics, and Human Behavior* (New York: Cambridge University Press). doi: [10.1017/CBO9781316266274](https://doi.org/10.1017/CBO9781316266274).
- [4] Levin, K., Cashore, B., Bernstein, S. and Auld, G., 2012, Overcoming the tragedy of super wicked problems: Constraining our future selves to ameliorate global climate change. *Policy sciences* 45(2), 123–152. doi: [10.1007/s11077-012-9151-0](https://doi.org/10.1007/s11077-012-9151-0).
- [5] Peters, B.G., 2017, What is so wicked about wicked problems? A conceptual analysis and a research program. *Policy and Society* 36(3), 385–396. doi: [10.1080/14494035.2017.1361633](https://doi.org/10.1080/14494035.2017.1361633).
- [6] Kate, H., James, J. and Tidmarsh, C., 2019, Using wicked problems to foster interdisciplinary practice among UK trainee teachers. *Journal of Education for Teaching* 45(4), 446–460. doi: [10.1080/02607476.2019.1639263](https://doi.org/10.1080/02607476.2019.1639263).
- [7] Pohl, C., Truffer, B. and Hirsch Hadorn, G., 2017, Addressing wicked problems through transdisciplinary research. In: *The Oxford Handbook of iInterdisciplinarity* (Oxford: Oxford University Press), pp. 319–331. doi: [10.1093/oxfordhb/9780198733522.013.26](https://doi.org/10.1093/oxfordhb/9780198733522.013.26).
- [8] Wohlgezogen, F., McCabe, A., Osegowitsch, T. and Mol, J., 2020, The wicked problem of climate change and interdisciplinary research: Tracking management scholarship's contribution. *Journal of Management & Organization* 26(6), 1048–1072. doi: [10.1017/jmo.2020.14](https://doi.org/10.1017/jmo.2020.14).
- [9] Overland, I. and Sovacool, B.K., 2020, The misallocation of climate research funding. *Energy Research & Social Science* 62, 1–13. doi: [10.1016/j.erss.2019.101349](https://doi.org/10.1016/j.erss.2019.101349).
- [10] Rose, D.B., Van Dooren, T., Chrulew, M., Cooke, S., Kearnes, M. and O'gorman, E., 2012, Thinking through the environment, unsettling the humanities. *Environmental Humanities* 1(1), 1–5. doi: [10.1215/22011919-3609940](https://doi.org/10.1215/22011919-3609940).
- [11] Lefsrud, L.M. and Meyer, R.E., 2012, Science or science fiction? Professionals' discursive construction of climate change. *Organization Studies* 33(11), 1477–1506. doi: [10.1177/0170840612463317](https://doi.org/10.1177/0170840612463317).
- [12] Clayton, S., Devine-Wright, P., Stern, P.C., Whitmarsh, L., Carrico, A., Steg, L., Swim, J. and Bonnes, M., 2015, Psychological research and global climate change. *Nature climate change* 5(7), 640–646. doi: [10.1038/nclimate2622](https://doi.org/10.1038/nclimate2622).
- [13] Leiserowitz, A.A., Maibach, E.W., Roser-Renouf, C., Smith, N. and Dawson, E., 2013, Climategate, public opinion, and the loss of trust. *The American Behavioral Scientist* 57(6), 818–837. doi: [10.1177/0002764212458272](https://doi.org/10.1177/0002764212458272).
- [14] Malka, A., Krosnick, J.A. and Langer, G., 2009, The association of knowledge with concern about global warming: Trusted information sources shape public thinking. *Risk Analysis: An International Journal* 29(5), 633–647. doi: [10.1111/j.1539-6924.2009.01220.x](https://doi.org/10.1111/j.1539-6924.2009.01220.x).
- [15] Brewer, P.R. and Ley, B.L., 2013, Whose science do you believe? Explaining trust in sources of scientific information about the environment. *Science communication* 35(1), 115–137. doi: [10.1177/1075547012441691](https://doi.org/10.1177/1075547012441691).
- [16] Attari, S.Z., Krantz, D.H. and Weber, E.U., 2016, Statements about climate researchers' carbon footprints affect their credibility and the impact of their advice. *Climatic Change* 138(1), 325–338. doi: [10.1007/s10584-016-1713-2](https://doi.org/10.1007/s10584-016-1713-2).
- [17] Ziegler, A., 2017, Political orientation, environmental values, and climate change beliefs and attitudes: An empirical cross-country analysis. *Energy Economics* 63, 144–153. doi: [10.1016/j.eneco.2017.01.022](https://doi.org/10.1016/j.eneco.2017.01.022).

- [18] Fielding, K.S. and Hornsey, M.J., 2016, A social identity analysis of climate change and environmental attitudes and behaviors: Insights and opportunities. *Frontiers in Psychology* 7, 121. doi: [10.3389/fpsyg.2016.00121](https://doi.org/10.3389/fpsyg.2016.00121).
- [19] Arbuckle, J.G., Prokopy, L.S., Haigh, T., Hobbs, J., Knoot, T., Knutson, C., Loy, A., Mase, A. S., McGuire, J., Morton, L.W. and Tyndall, J., 2013, Climate change beliefs, concerns, and attitudes toward adaptation and mitigation among farmers in the Midwestern United States. *Climatic Change* 117(4), 943–950. doi: [10.1007/s10584-013-0707-6](https://doi.org/10.1007/s10584-013-0707-6).
- [20] Corner, A., Whitmarsh, L. and Xenias, D., 2012, Uncertainty, skepticism and attitudes towards climate change: Biased assimilation and attitude polarization. *Climatic Change* 114(3), 463–478. doi: [10.1007/s10584-012-0424-6](https://doi.org/10.1007/s10584-012-0424-6).
- [21] Petty, R.E. and Cacioppo, J.T., 2018, *Attitudes and Persuasion: Classic and Contemporary Approaches* (New York: Routledge). doi: [10.4324/9780429502156](https://doi.org/10.4324/9780429502156).
- [22] Tasquier, G. and Pongiglione, F., 2017, The influence of causal knowledge on the willingness to change attitude towards climate change: Results from an empirical study. *International Journal of Science Education* 39(13), 1846–1868. doi: [10.1080/09500693.2017.1355078](https://doi.org/10.1080/09500693.2017.1355078).
- [23] Palm, R., Lewis, G.B. and Feng, B., 2017, What causes people to change their opinion about climate change?. *Annals of the American Association of Geographers* 107(4), 883–896. doi: [10.1080/24694452.2016.1270193](https://doi.org/10.1080/24694452.2016.1270193).
- [24] Lorenzoni, I. and Pidgeon, N.F., 2006, Public views on climate change: European and USA perspectives. *Climatic Change* 77(1), 73–95. doi: [10.1007/s10584-006-9072-z](https://doi.org/10.1007/s10584-006-9072-z).
- [25] Ballew, M.T., Leiserowitz, A., Roser-Renouf, C., Rosenthal, S.A., Kotcher, J.E., Marlon, J.R., Lyon, E., Goldberg, M.H. and Maibach, E.W., 2019, Climate change in the American mind: Data, tools, and trends. *Environment: Science and Policy for Sustainable Development* 61(3), 4–18. doi: [10.1080/00139157.2019.1589300](https://doi.org/10.1080/00139157.2019.1589300).
- [26] Whitmarsh, L., 2008, Are flood victims more concerned about climate change than other people? The role of direct experience in risk perception and behavioural response. *Journal of Risk Research* 11(3), 351–374. doi: [10.1080/13669870701552235](https://doi.org/10.1080/13669870701552235).
- [27] Akerlof, K., Maibach, E.W., Fitzgerald, D., Cedeno, A.Y. and Neuman, A., 2013, Do people “personally experience” global warming, and if so how, and does it matter? *Global Environmental Change* 23(1), 81–91. doi: [10.1016/j.gloenvcha.2012.07.006](https://doi.org/10.1016/j.gloenvcha.2012.07.006).
- [28] Donner, S.D. and McDaniels, J., 2013, The influence of national temperature fluctuations on opinions about climate change in the US since 1990. *Climatic Change* 118(3), 537–550. doi: [10.1007/s10584-012-0690-3](https://doi.org/10.1007/s10584-012-0690-3).
- [29] Myers, T.A., Maibach, E.W., Roser-Renouf, C., Akerlof, K. and Leiserowitz, A.A., 2013, The relationship between personal experience and belief in the reality of global warming. *Nature climate change* 3(4), 343–347. doi: [10.1038/nclimate1754](https://doi.org/10.1038/nclimate1754).
- [30] Spence, A., Poortinga, W., Butler, C. and Pidgeon, N.F., 2011, Perceptions of climate change and willingness to save energy related to flood experience. *Nature Climate Change* 1(1), 46–49. doi: [10.1038/nclimate1059](https://doi.org/10.1038/nclimate1059).
- [31] Schuldt, J.P., Rickard, L.N. and Yang, Z.J., 2018, Does reduced psychological distance increase climate engagement? On the limits of localizing climate change. *Journal of Environmental Psychology* 55, 147–153. doi: [10.1016/j.jenvp.2018.02.001](https://doi.org/10.1016/j.jenvp.2018.02.001).
- [32] Trope, Y. and Liberman, N., 2003, Temporal construal. *Psychological Review* 110(3), 403. doi: [10.1037/0033-295X.110.3.403](https://doi.org/10.1037/0033-295X.110.3.403).
- [33] Baltatescu, S., 2014, Psychological distance. *Journal of Experimental Social Psychology* 47(3), 610–615. doi: [10.1007/978-94-007-0753-5_2306](https://doi.org/10.1007/978-94-007-0753-5_2306).
- [34] Steentjes, K., Pidgeon, N.F., Poortinga, W., Corner, A.J., Arnold, A., Böhm, G., Mays, C., Poumadère, M., Ruddat, M., Scheer, D. and Sonnberger, M., 2017, *European Perceptions of Climate Change (EPCC): Topline Findings of a Survey Conducted in Four European Countries in 2016* (Cardiff: Cardiff University).
- [35] Milfont, T.L., 2010, Global warming, climate change and human psychology. In: V. Corral-Verdugo, C.H. García-Cadena and M. Frías-Arment (Ed.) *Psychological Approaches to Sustainability: Current Trends in Theory, Research and Practice* (New York: Nova Science), pp. 19–42.

- [36] Markowitz, E.M. and Shariff, A.F., 2012, Climate change and moral judgement. *Nature climate change* 2(4), 243–247. doi: 10.1038/nclimate1378.
- [37] Van Der Velden, H. and Schildmeijer, D., 2015, Public acceptance of natural gas projects: The golden age of gas? Not in My Backyard! International Gas Union World Gas Conference Papers, pp. 1048–1120. Available online at: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84963516495&partnerID=40&md5=40f63ce664c6c47a49ec51250e525ad6> (Accessed 12 January 2023).
- [38] Lahsen, M., 2013, Anatomy of dissent: A cultural analysis of climate skepticism. *The American Behavioral Scientist* 57(6), 732–753. doi: 10.1177/0002764212469799.
- [39] Bevan, M.T., 2014, A method of phenomenological interviewing. *Qualitative Health Research* 24(1), 136–144. doi: 10.1177/1049732313519710.
- [40] Giorgi, A., 1997, The theory, practice, and evaluation of the phenomenological method as a qualitative research procedure. *Journal of Phenomenological Psychology* 28(2), 235–260. doi: 10.1163/156916297X00103.
- [41] Ihde, D., 1971, *Hermeneutic Phenomenology: The Philosopher of Paul Ricoeur* (Evanston: Northwestern University Press).
- [42] Larkin, M. and Thompson, A., 2012, Interpretative phenomenological analysis. In: Thompson, D. Harper (Ed.) *Qualitative Research Methods in Mental Health and Psychotherapy: A Guide for Students and Practitioners* (Oxford: John Wiley & Sons), pp. 99–116. doi: <http://doi.org/10.1002/9781119973249>.
- [43] Clarke, V., Braun, V. and Hayfield, N., 2015, Thematic analysis. *Qualitative psychology: A Practical Guide to Research Methods* 222(2015), 248. doi: 10.1080/17439760.2016.1262613.
- [44] Tracy, S.J., 2019, *Qualitative Research Methods: Collecting Evidence, Crafting Analysis, Communicating Impact* (Chichester: Wiley-Blackwell).
- [45] Bowen, G.A., 2008, Naturalistic inquiry and the saturation concept: A research note. *Qualitative Research* 8(1), 137–152. doi: 10.1177/1468794107085301.
- [46] Van der Linden, S.L., Leiserowitz, A.A., Feinberg, G.D. and Maibach, E.W., 2015, The scientific consensus on climate change as a gateway belief: Experimental evidence. *Plos One* 10(2), e0118489. doi: 10.1371/journal.pone.0118489.
- [47] Higde, E., Oztekin, C. and Sahin, E., 2017, Turkish pre-service science teachers’ awareness, beliefs, values, and behaviours pertinent to climate change. *International Research in Geographical and Environmental Education* 26(3), 253–263. doi: 10.1080/10382046.2017.1330040.
- [48] Ricart, S., Olcina, J. and Rico, A.M., 2018, Evaluating public attitudes and farmers’ beliefs towards climate change adaptation: Awareness, perception, and populism at European level. *Land* 8(1), 4. doi: 10.3390/land8010004.
- [49] Aklın, M. and Urpelainen, J., 2014, Perceptions of scientific dissent undermine public support for environmental policy. *Environmental Science & Policy* 38, 173–177. doi: 10.1016/j.envsci.2013.10.006.
- [50] Lahsen, M., 2008, Experiences of modernity in the greenhouse: A cultural analysis of a physicist “trio” supporting the backlash against global warming. *Global Environmental Change* 18(1), 204–219. doi: 10.1016/j.gloenvcha.2007.10.001.
- [51] Hulme, M., 2009, *Why we Disagree about Climate Change: Understanding Controversy, Inaction and Opportunity* (New York: Cambridge University Press). doi: 10.1017/CBO9780511841200.
- [52] Proctor, J.D., 2020, Introduction: The value of environmental disagreement. *Journal of Environmental Studies and Sciences* 10(2), 156–159. doi: 10.1007/s13412-020-00591-z.

Appendix 1: Interview script

Hallo [participant's name] and thank you for your participation in my study.

Just as a reminder, this interview is a follow-up from the survey you completed about the study 'Environmental behaviour and enactment of Academics towards Climate change. A phenomenological approach to a global problem.'

Before we begin, do you agree to have that interview recorded?

I have started the recording. This interview is on a voluntary basis, and you can stop the process at any time you want. This interview will be anonymous and will be used for the purposes of my dissertation and the publication of peer reviewed articles.

1. What does climate change mean to you?
 - a. *What do you think are the causes of those changes?*
2. Have you personally experienced climate change?
 - a. If yes, can you unpack the experience?
3. Do you think climate change is a problem?
 - a. *Why do you think it is a problem or is not a problem?*
4. Is climate change a problem with a solution? If not, why not? And if yes, where do you think the solution should/could come from?
5. What do you think promotes or limits your ability to perform sustainable behaviours in academic life?
6. What are some actions in your academic life that are sustainable and some that are not?
7. How could you overcome any barriers to environmental sustainability in your academic life?
8. Are you involved with the sustainability in the university?
 - a. If yes, how?
 - b. If not, why not?
9. Do you think that it makes a difference the stage you are in academia with your environmental behaviours in your work life? For example, tenured tracking? Full professor?
 - a. Influence
 - b. Travelling
10. Anything else you would like to add?